

FOREMAN'S TRAINING  
COURSE





# FOREMAN'S TRAINING COURSE

1923

PUBLISHED BY  
HARRISBURG SHOP FOREMAN'S CLUB  
HARRISBURG, PA.



# CONTENTS

	PAGE
1. January 10, 1923. Industrial Relations—Some Fundamentals ..... HENRY C. METCALF, PH. D.	7
2. January 16, 1923. How the Business of the Rail- road Is Handled ..... R. C. MORSE.	29
3. January 23, 1923. Railroad Operation in Poland C. S. GASKILL.	54
4. January 30, 1923. Industry in Relation to the Supervisor ..... JAMES B. HORN.	86
5. February 5, 1923. Foreman and Labor Turnover G. M. BASFORD.	112
6. February 13, 1923. Wage Systems ..... KEPPELE HALL.	135
7. February 20, 1923. Job Analysis From a Time Study Basis ..... R. C. DAVIS.	166
8. February 26, 1923. Shop Schedules and Shop Delays ..... ELIOT SUMNER.	192
9. March 6, 1923. The Foreman's Job ..... CHARLES WOODWARD.	232
10. March 13, 1923. The Foreman and His Relation to Operation ..... C. S. KRICK.	252

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## INDUSTRIAL RELATIONS—SOME FUNDAMENTALS

HENRY CLAYTON METCALF, Ph. D.

January 10, 1923

Director Bureau of Personnel Administration  
New York City

More and more we are realizing that production must be organized and administered with a view to life's fundamental needs—physical welfare, an opportunity for intellectual growth and development, a chance to associate with our fellow workers, to appreciate an aesthetic environment, to enjoy a fair share of material wealth and to apply and develop our spiritual powers. We are feeling more strongly that the permanent satisfactions of life, not money profit, must direct our thoughts and shape our conduct. Production must more generally serve *individual* needs and not general wealth if we would bring our individual worth and release individual talents, tastes, interests, capacities and enthusiasm.

With the development of the social sciences a more humane interpretation of industry has come about. The new humanistic movement points out the value of human personality, emphasizing the organic unity of the human being and the corporate life. What is best for the individual is seen to be best for the business: what is best for industry is best for society. A human interpretation of industry is rapidly socializing business.

*Biology*, particularly *Eugenics*, is concentrating attention upon the *quality* of the people. Heredity gives continuity to social life on the physical side. Pollution at the source of life means that the biologically unfit become parents. The heredity material with which a human being starts life is largely determining. It becomes socially important therefore to conserve good hereditary elements which shall form the basis of the next generation. Heredity transmits both good and bad traits, representing physical, mental and moral properties of bygone generations. Hu-

man nature is the most constant factor with which we have to deal. Health, physical and spiritual energy, industrial efficiency are qualities transmissible by descent. They are our natural endowment, our measure of a full life.

*Psychology*, especially vocational psychology, stresses the significance of the human factor in work, pointing out possibilities of discovering and conserving human interests and talents in the work relations. Psychology teaches us to think in terms of instincts, feelings, habits, tastes; of gains and losses in production and consumption; emphasizing the human cost in work and the human gain in satisfaction or utility from work.

Several leading psycholoists are now closely affiliated with industry and have developed various types of tests which are coming into wider use. The technique and scientific application of such tests make the valuation of the human factor for the first time ACCURATE and SPECIFIC. Selective tests now make it possible to demonstrate statistically that certain groups of personal qualities really count in the industrial world, where formerly any evaluation of these qualities rested upon faith, intuition and snap judgment.

*Economics* explains how the quality of life is affected for good or ill by the conditions of the modern work forces. Hence in the structural changes taking place in modern industry, and in the social changes following therefrom, all thoughtful observers attach increasing importance to the scientific discovery, selection, training and efficient application not of physical power alone, but of the finer sorts of physical energy which constitute the chief instruments in successful business progress. "It is in the handling of the stuff and substance of the real world that the finer intellectual and spiritual faculties are quickened into life. Thus the community of interest created by the processes of industry and commerce is, in spite of monstrous abuses, more nearly a holy communion than is any other."\*

\*Ferguson, C., *THE GREAT NEWS* (1915) p. 38.

*Sociology*, again, analyzing the topsy-turvyness of the

present world values, is interpreting the social problem as that of doing justice in human relations. The protective attitude of the social idealist in his efforts to diminish inhumanity has helped us to appreciate the WORTH OF HUMAN PERSONALITY. The waste of the human element in industry, which is thrown back on society, is such a pressing burden as to convince society that many conditions are not always right in the world of work, and to provoke inquiry into the causes. The social idealist points to the effect of environment and asks of industry: what have you to offer the workers that is wholesome, adequate and satisfying?

Sociology is becoming more and more psychological in its interpretation: It sees clearly that the social problem, so well put by Ellwood is the problem of HUMAN LIVING TOGETHER, and that the great humanitarian movement, emphasizing the TRUE WORTH OF HUMAN PERSONALITY, is the most precious contribution bequeathed by the nineteenth to the twentieth century.\*

\*Cf. Ellwood, C. A., THE SOCIAL PROBLEM.

*Influence of Environment.*—Yet though the influence of science is far-reaching in its effect upon the human element, the influence of environment is more immediate and persuasive. “Environments as well as people have children,” the social economist teaches. The influence of the work environment operate unceasingly for good or evil. Conditions that force a man to work below minimum standards with reference to hours, wages, safety, sanitation, instruction, rest, may destroy the value of all the good possibilities he inherited. Conditions that give a man freedom in thought, speech, and occupational choice uphold standards of physical welfare, provide opportunities for education and training, satisfy instincts of pride, joy and ambition in workmanship, gratify desires for ownership, recreation and association, and recognize the right to exercise joint control, will improve human capacity and habits and draw out *quality* in human labor. In the balanced normal life these traits are most harmoniously blended. Personality grows out of

their wise use and control. Quality is the basis of efficient personality; freedom is its expression.

*Organic Unity of Individual.*—This growing interest in the human element, which is promoted by the influence of science and men's reactions to work environment, shows the need of a human interpretation of industry. Business recognizes that man is much more than an economic unit. His deeper interests represent his physical, intellectual and moral personality. Individual organic unity is born of scientific, artistic and moral values.

Every normal human being has a clearly defined number of life needs, which may easily be translated into life values. Bodily welfare is fundamental and the true basis of economic efficiency. Intellectual, economic and recreative values are likewise essential to fit a man for real work. Aesthetic values and the social values of cooperation and friendship touch every part of a man's life; while the character value is his sense of rightness. These basic life interests of bodily integrity, the creative spirit, the association and recreation values, the moral sense, constitute the organic unity of the individual.

*Bodily Integrity.*—"The basis of all national progress, whether industrial or social, is the health and physical efficiency of the people."\* The body is the organ and symbol of the spiritual life. Health is a matter of endowment and of maintenance. One of life's most fascinating problems is, what can I do with myself, with my body. Self-preservation is a command of nature. The soundest type of human nature will tell in the making of the future. It is essential therefore to enforce a general, broadly constructive "Health First" program, insuring improvement of working conditions and spread of personal and industrial hygiene.

\*Garton Foundation, MEMORANDUM ON THE INDUSTRIAL SITUATION AFTER THE WAR, p. 35.

Progressive employers are awakening to the economic value of the physical integrity and moral virility of their work force. They begin to realize the importance of careful physical selection and assignment of employees, and ear-

nestly strive to keep them physically fit through protective and recreational measures. In learning to think more prudently in terms of human worth, employers find themselves obliged to think on the other side; what kind of a place have we to offer? Are we doing all we can to protect adequate life standards in the work relations? Social labor legislation, of course, plays its part in supporting minimum standards of health and safety for the protection of the worker in the same or in differing lines of occupations. Yet human welfare is perhaps most fully within the employer's keeping, for he can successfully mobilize the forces making for its increase.

*Desire to Create.*—The second organic need is the desire to express one's self, the longing to release creative energy. This universal creative desire is the bedrock fact in industry, for all that bears upon the training and instruction of workers. Nothing is more encouraging than to observe the movements in this country and abroad for training workers in connection with their daily tasks.

Knowledge is an instrumental and intrinsic organic value. Intelligence is the principle of the discovery of all values which find their highest expression in truth. Truth comes from observation, experimentation, verification. Science, the handmaid of truth, has conquered the two spiritual foes, superstition and ignorance, which have blocked economic and social progress in many directions.

"Our education consists in learning intelligent choice." Instruction should develop in the individual qualities of imagination, judgment, courage, industry, devotion to higher ideals, sympathy and magnanimity. Progress is in proportion to the growth of these intellectual and spiritual values. There is no other place outside of college life where such fine opportunities exist for the education and training of a person as in the right kind of daily work environment, which is increasingly becoming a genuine school of life. Through intelligent industrial training men gain a broader vision of work opportunity, a better understanding of work hygiene, a deeper appreciation of work duty, an actual reali-

zation of their own creative power. "Work Integrates Life."

The education of adults, especially in this country where we have a vast amount of adult foreign labor, is one of the greatest unsolved problems and a noble challenge to industrial and educational leadership. Facilities for adult education, both of a general and technical character, should therefore be regarded as permanently essential to industry. Especially important, because of their strategic position, is the widespread interest in the training of foremen and minor executives. *What we want in industry is the voluntary consent of all the workers in putting forth their best so as to increase production and elevate the standard of life of all the people.*

*Desire to Possess.*—Another normal human need is the desire to a fair share in the rewards of industry. The desire to possess is as old as history. Our reasonable equality in politics, the compulsory equality up to a certain age in education, freedom in religious beliefs are combined with such general inequality in worldly possessions that there is felt a serious contradiction in the lives of the vast majority of people. If the work environment exercises such far-reaching influence in the lives of workers, as has just been pointed out, if a normal human desire is that for possession, something must be done to harmonize the work relations with the other relations of life if we are to enjoy continued peace and progressive efficiency. *It is impossible under the modern large-scale corporate form of industrial management to have the mass of the people justly satisfied as a result of mere property ownership.*

Yet we must bear in mind that the satisfying of this desire does not mean material goods or money increase alone. People do not care for material or capital goods except as they give opportunity through which to express personal power. Wealth or income is simply a means to this larger end. Poverty breaks wholesome work habits, corrodes character and supports the survival of the unfit. All men should have enough material goods and opportunities for growth to enable them to realize the fullest life. Per-

sonality cannot be made apparent without an adequate income or a reasonable amount of wealth as the source of income. Income, therefore, should bear a definite relation to the cost of living.

An adequate standard of living and the quality of labor which it implies will be the standard by which society will ultimately judge its educational leaders and industrial statesmen. The vital question no longer is: What does the worker make? What is the product? It is rather: what does the worker do? What is the process? How does his bodily integrity react toward it? How much of his quality and interest is embodied in the utilities he produces? How much opportunity has he for the expenditure of creative energy? The opportunities for exercising one's powers, for advancing, for expressing one's self in association with one's fellows, and other non-financial incentives and rewards must be worked out in the future in industry so as to satisfy reasonably the human desire to possess if we are to have increased efficiency and harmony in production.

*Desire to Associate.*—The structure and development of human life is essentially social. Even morality is a social virtue, though its centre is the individual. Man is a socialized individual. His mind cannot be separated from the past and present. His thought, ideas and feelings are through and through social. In all his higher pursuits there is something that he cannot monopolize. He would not if he could, for these higher interests of life are for the purpose of sharing. His strength will be multiplied by an increasingly intimate and extended cooperation with his fellowmen. "Growth in the capacity for and practice in the habit of cooperation is the surest test of an advancing civilization."

Sociability is one of the recreative values involving both the body and the mind. Well directed enthusiasm produces constructive energy. A wisely chosen hobby becomes a source of strength. Uncontrolled and unorganized leisure however threatens efficiency. The satisfaction of social en-

joyment provides channels for the finest expression in sympathy, affection and cooperation.

Man has always sought companions. Employers, workers, teachers—all groups of society join for the purpose of helping one another. This desire is fundamental in the whole trade-union movement, the shop-committee movement, the employers' union, the employees' associations, and all sorts of collective arrangements. It is not only foolish but futile as well to oppose this desire of working people to associate in order to realize a normal life. Whether we like it or not, more and more, according to Mr. Sidney Webb, *"the compulsory freedom of the collective bargain must become a substitute for the illusory liberty of the individual bargain."* In the bargaining relations the individual can no longer be regarded as a commodity, and it is vain to talk about equality of bargaining power between a single individual and our modern large-scale corporations. Ideals of industrial management are needed which look in the direction of giving every individual equal opportunity for achieving his socialized self in cooperation with others.

*Love of the Beautiful.*—Another normal human need is the opportunity to enjoy the aesthetic side of life. This human instinct is the basis for developing not only a beautiful physical, intellectual work environment, but beautiful, physical, intellectual and moral work relations. *The good life is the beautiful life. The bad life is the ugly life.* The so-called "welfare movement" of the past made the grave mistake of stressing the mechanical physical conditions without first being sure that the inner or work relations between those at the top representing the management and those of the rank and file were sound, that is, harmonious and satisfying. Beauty gives spontaneity, harmony, symmetry, proportion, all necessary for the best development of personality. This aesthetic sense seeks to render attractive all objects of human production and finds in industry a vast field for its expression.

*Sense of Justice.*—*Finally,* We may have physical welfare conditions on a high plane; we may have equal opportuni-

ties for the release of the creative desire in the individual: we may have the sense of ownership justly satisfied; we may have the desire to associate reasonably recognized; the aesthetic sense may be duly appreciated and cared for; *yet if the innate sense of justice in the individual life is not adequately met we may be sure that discontent and friction in the industrial relations will continue.* As never before the working people are universally determined to have a square deal in the industrial relations. The working people are conscious of their power. They are resolved not to go backward. Laborers desire a share in shaping industrial plans and policies and determining the work conditions that affect their own lives.

One of the chief causes of dissension between employers and employees in the past has been due to the fact that the worker has been regarded not as an organic man, but as a part of the machinery. He has become mechanized, dehumanized and often lost in the long-range management of large-scale industry. The modern movement along the lines of creating within industry departments of labor administration are doing much to rediscover the individual and adequately protect his physical, intellectual and spiritual powers—in a word, *to give him a square deal.*

Two dominating threads of thought run through the humanistic sciences, the determination to discover, train, apply and protect *human worth*; and the crying need of efficient, *cooperative action.*

Now the best diagnosticians and the best personnel administrators in the world cannot progress very far in the solution of the difficult, delicate and complicated problems of the human relations in industry unless those who *administer* business, the higher executives, have the right ideals of the business organization, are properly instructed and trained in the newer methods, and are *sympathetic* with the newer point of view.

The fact is modern business needs a scientific, humane, dynamic creed. The old autocratic creed of vested rights

must be superseded by a democratic creed of ordered liberty and reciprocal solidarity.

Any satisfactory business creed must be both appealing and practical. It must have a fundamental grasp of this conception of the organic human being. It is the conception of the organic development of the individual within the work environment which employer, employee and society are striving to realize. *We are all endeavoring to work out a scale of life values that shall indicate the aim of the employer, employees and society in the work relations. What are these aims?*

*What the Employee Should Strive For in His Work's Relations.*—The employee ought to strive for a fair, adequate knowledge of his prospective employer; an assurance that he will be intelligently selected for his job physically, intellectually and morally. The employee wants regular employment; protection in work; a satisfactory working environment in which to exercise his powers; he wants equal opportunity to learn the entire business and be justly remunerated. *The worker asks for security of life and for assurance that merit will win;* for a definite share in all activities that will awaken, develop and train his personal powers.

*What the Employer Wants.*—The employer wants this organic development of the individual, as outlined above, made a constant business asset. As stated before, the most valuable asset any business can have is the genuine interest of all its employees in the problem of the improvement of their own labor. *The employer demands the ideal of a healthy, competent, loyal body of workers.* The best way for him to make this ideal practical is to attract the best workers; employ the best methods of selecting, placing and protecting these workers; and the best methods of instructing, training, and retaining them. The leaders in industrial statesmanship are those employers who take *time* to think these problems through, who become genuine students of these industrial human relations problems.

*What Society Should Expect.*—Society demands what en-

lightened employee and employer want—the greatest conservation of natural and human resources; high efficiency in production; reasonable remuneration for capital; a constant increase in the standard of living for all workers. The industrial opportunity which offers every individual his greatest chance for personal development is the best form of industry. It will result in the highest group efficiency.

*Purpose of Industry.*—The true purpose of industry, then, means that we must develop within the work environment worth while people. We must give personality chances to express itself. What is the principle of personality? It is affirmative and authoritative. It is a positive, self-moulding growth, but not in isolated exclusion of others. The principle of personality is prior to and defines purpose. It makes industry what it always should have been—a vast capacity-catching and capacity-developing mechanism. Further, it holds out one of the greatest possibilities of compelling industry and education to become one. *The true purpose of industry is the realization of complete and durable satisfactions in scientific discovery, artistic creation and moral values.* It means opportunity for self-analysis, self-direction, self-control, and self-realization. It is the key to freedom, value and reality, a self-complete human personality. The practical realization of this ideal in business is essential if employers and employees are to work together in mutual confidence and increasing efficiency.

Now in his efforts to realize the normal life needs, as briefly outlined above, that is, give expression to the principle of personality, what the laborer is instinctively striving for, blind and groping though it may at times seem,—is a larger share in the direction and control of those phases of industrial management which directly concern his personal welfare.

Laborers know that they are competent to take part in the shaping of political policies. They believe that they are in a false position because they have so little to say in the shaping of industrial policies. This contradictory position of the workers is sure to be increasingly felt with the growth

of political power, the diffusion of knowledge, and the dynamic influence of work technique which forces practice in cooperation. The conviction on the part of the laborers that they are in a false position is at the very foundation of our present industrial chaos.

This problem of the economic *status* of the workers presents enormous difficulties. It goes to the very foundation of modern democratic society. If it is to be successfully solved, it will have to be approached analytically and worked out experimentally, as the engineer attacks his problem. One of the crying needs of business is more industrial statesmen who are willing to *experiment* in the human aspects of industry.

The way to rid our business system of its discord is to recognize and reasonably satisfy the basic life needs through a scientifically organized and humanly administered work environment. This is the price we must pay for devotion to production, increasing interest in the job and fidelity to the company. To bring about this industrial transformation, is a definite challenge and the greatest opportunity confronting business administrators. To prepare the way for such a transformation is the opportunity of personnel workers. *Personnel administration is the scientific direction and co-ordination of the human relations in industry, with a view to increasing efficiency in production with a minimum of effort, sacrifice and friction, and the fullest development of the individual quality of all the workers.*

There are two groups of scientists whose training and vocational positions especially qualify them to guide and direct aright the solution of the human relations problem in industry as I have tried to outline it. First, the technically trained engineer whose work brings him to the very heart of the material problems of production and who is more nearly neutral in the economic clashings than any other single professional worker who functions on the inside of industry. Secondly, the scientifically trained personnel director whose position should be that of a major officer in industry, counseling and cooperating at every stage of the

work with the heads of the financial department, the production department and the sales department.

These two groups of engineers—one the technical, the other the human, social engineer—if qualified for their tasks by native tastes, talents and enthusiasm, and if properly trained, will bring together in one organic whole the two groups of science around which industry is built. The first group—physics, mathematics, chemistry—deals with the laws of nature and with material equipment. The second group—biology, physiology, economics, statistics, political and social science and sociology—deals with the laws of the individual and society.

Business needs a new type of scientist, the engineer who more *sensitively* evaluates the human phases of industry; and the personnel administrator who with equal penetration realizes how absolutely essential it is that his personnel philosophy, principles and technique, must *practically* tie in with production. The two are absolutely inseparable halves of the problem of production. Given a sincere attitude, sober constructive imagination, sound judgment, true courage, steady *cumulative* energy, thorough scientific training for their jobs on the part of our technical engineers and personnel directors, and the right attitude of mind on the part of those at the top; and the foundations will have been built upon which must be erected a sound and satisfying industrial structure.

### *Discussion*

Following the lecture by Dr. Metcalf, the various conference groups were organized as follows:

#### GROUP ASSIGNMENT—LOCOMOTIVE GROUPS

##### *Group No. 1*

I. Williams, Asst. Master Mechanic, Chairman.  
C. Shaffner, Foreman, E. H. No. 1, Vice Chairman.  
C. J. Zimmerman, Shop Clerk, Secretary.  
W. E. Mullen, Foreman, Eng. House No. 2.  
J. H. Albright, Gang Foreman, Enola E. H.  
G. H. Beck, Foreman, Enola Eng. House.  
C. E. Weisgarver, Foreman, Misc. Shop.

R. S. Weaver, Foreman, Cabinet Shop.  
 J. J. Campbell, Gang Foreman, Eng. House No. 1.  
 J. H. Hook, Jr., Gang Foreman, Machine Shop.  
 A. W. Packer, Gang Foreman, Machine Shop.  
 F. J. Goodyear, Asst. Store Keeper, Hbg.  
 F. H. Shay, Gang Foreman, Boiler Shop.  
 W. W. Ellis, Jr., Gang Foreman, Blacksmith Shop.  
 R. B. Lindsay, Gang Foreman, Misl. Shop.  
 J. G. Shank, Asst. Foreman, Enola E. H.  
 W. I. Pearson, Gang Foreman, Eng. House No. 1.  
 H. C. Hamilton, Gang Foreman, Eng. House No. 2.  
 S. R. Hall, Gang Foreman, Erecting Shop.  
 O. A. Fisher, Gang Foreman, Enola E. H.  
 E. L. Caum, Foreman, Lancaster E. H.  
 M. E. Lehmer, Foreman, Thorndale Coal Wharf.  
 G. W. Mumma, Clerk, Hbg. Frt. Station.  
 Wayne Hoyer, Act. Gang Foreman, Enola E. H.  
 P. R. Smith, Stockman, Hbg. Store House.  
 A. R. Wissler, Gang Foreman, Eng. House No. 2.  
 W. F. Shade, Gang Foreman, Misl. Shop.  
 H. G. Powell, Act. Gang Foreman, Eng. House No. 2.  
 J. C. Dorwart, Asst. Foreman, Misl. Shop.

*Group No. 2*

P. R. Bingman, General Foreman, Chairman.  
 H. G. Knier, Gang Foreman, Enola E. H., Vice Chairman.  
 P. N. Rapp, Clerk, Secretary.  
 W. H. Bickley, Foreman, Eng. House No. 2.  
 I. Reese, Foreman, Engine House No. 1.  
 P. W. Howe, Foreman, Enola Eng. House.  
 C. G. Foster, Foreman, M. M. Office.  
 W. C. Winter, Asst. Foreman, Eng. House No. 2.  
 C. Mellinger, Asst. Foreman, Enola E. H.  
 N. G. Manahan, Foreman, Paint Shop.  
 J. W. Baker, Asst. Foreman, Machine Shop.  
 C. J. Bittner, Asst. Foreman, Eng. House No. 1.  
 C. A. Tomlinson, Gang Foreman, Eng. House No. 2.  
 G. K. Keet, Asst. Shop Clerk.  
 H. A. Rice, Gang Foreman, Eng. House No. 1.  
 E. G. Ellenberger, Store Keeper, Harrisburg.  
 D. Clark, Foreman, Lancaster Eng. House.  
 F. B. Spotten, Foreman, Thorndale Coal Wharf.  
 F. J. Winand, Act. Gang Foreman, Enola E. H.  
 J. Flickinger, Stockman, Hbg. Store House.  
 R. Z. Fasick, Stockman, Enola E. H.  
 I. J. Deen, Gang Foreman, Paint Shop.  
 W. M. Faust, Act. Gang Foreman, Machine Shop.  
 W. H. Gamber, Jr., Gang Foreman, Eng. House No. 1.  
 M. A. Morrett, Act. Gang Foreman, Enola E. H.

*Group No. 4*

J. J. Keller, Foreman, Machine Shop, Chairman.  
 H. W. Geisking, Asst. Foreman, Machine Shop, Vice Chairman.  
 L. F. Mayer, Clerk, Secretary.  
 H. K. Beane, Gang Foreman, Enola E. H.

A. F. Stahler, Gang Foreman, Erecting Shop.  
 H. C. Eberle, Gang Foreman, Enola Eng. House.  
 Paul Givler, Gang Foreman, Eng. House No. 1.  
 S. A. Bitner, Gang Foreman, Enola E. H.  
 F. C. Womer, Gang Foreman, Erecting Shop.  
 E. D. Fries, Gang Foreman, Enola E. H.  
 C. F. Bowman, Gang Foreman, Enola E. H.  
 C. T. Jones, Gang Foreman, Eng. House No. 1.  
 G. G. Handshuh, Gang Foreman, Engine House No. 1.  
 A. L. Maugans, Stockman, Hbg. Store House.  
 J. C. Buck, Jr., Gang Foreman, Enola E. H.  
 C. L. Heffner, Gang Foreman, Electrical Dept.  
 F. D. Reisch, Act. Gang Foreman, Machine Shop.  
 E. A. Lotz, Gang Foreman, Machine Shop.  
 J. R. Metz, Stockman, Hbg. Store House.

*Group No. 5*

R. I. Zwiebel, Foreman, Erecting Shop, Chairman.  
 J. H. Buffington, Asst. Foreman, Erecting Shop, Vice Chairman.  
 E. K. Smith, Gang Foreman, Machine Shop, Secretary.  
 W. R. Green, Gang Foreman, Enola E. H.  
 Samuel Oberholtzer, Gang Foreman, Enola E. H.  
 J. W. Mumma, Gang Foreman, Engine House No. 1.  
 J. E. Murray, Gang Foreman, Machine Shop.  
 E. F. Hall, Gang Foreman, Engine House No. 2.  
 C. C. Baer, Gang Foreman, Machine Shop.  
 Wm. Smith, Jr., Gang Foreman, Machine Shop.  
 R. C. Yost, Gang Foreman, Machine Shop.  
 N. S. Devenney, Gang Foreman, Erecting Shop.  
 G. W. Batten, Gang Foreman, Machine Shop.  
 W. H. Windsor, Gang Foreman, Engine House No. 2.  
 J. W. Keller, Gang Foreman, Enola E. H.  
 W. H. Kreider, Gang Foreman, Enola E. H.  
 D. E. Frank, Storekeeper, Enola.  
 G. T. Burtnett, Clerk, S. C. Office.  
 C. A. Rittler, Gang Foreman, Machine Shop.  
 H. A. Reigle, Act. Gang Foreman, Machine Shop.  
 R. M. Smith, Act. Gang Foreman, Enola E. H.  
 B. E. Weaver, Gang Foreman, Enola E. H.  
 J. N. Harclerod, Act. Gang Foreman, Machine Shop.  
 B. A. Jones, Stockman, Hbg. Store House.  
 G. H. Smiley, Act. Gang Foreman, Erecting Shop.  
 J. W. Watson, Federal Inspector, Erecting Shop.

*Group No. 6*

J. D. Harnish, Foreman, Electricians, Chairman.  
 C. E. Schlayer, Gang Foreman, Machine Shop, Vice Chairman.  
 L. B. Notestine, Chief Clerk, Secretary.  
 E. J. Fosnot, Gang Foreman, Eng. House No. 2.  
 D. R. Sassaman, Gang Foreman, Erecting Shop.  
 W. T. Smiley, Gang Foreman, Enola E. H.  
 J. R. Johnson, Gang Foreman, Enola E. H.  
 G. W. Kissinger, Gang Foreman, Enola E. H.  
 O. A. Meadath, Gang Foreman, Eng. House No. 1.  
 A. E. Workman, Gang Foreman, Eng. House No. 2.

W. H. McDevitt, Gang Foreman, Eng. House No. 1.  
 F. R. Shott, Gang Foreman, Eng. House No. 1.  
 C. E. Meckley, Gang Foreman, Enola E. H.  
 H. E. Mountz, Inspector, M. M. Office.  
 J. R. Bowers, Act. Gang Foreman, Elect. Dept.  
 H. C. Boyer, Stockman, Hbg. Store House.  
 W. H. Runk, Pipe Fitter, Erect. Shop.  
 G. C. Berkheimer, Clerk, Hbg. Store House.

#### CAR DEPARTMENT GROUPS

##### *Group No. 3*

C. Geisking, General Foreman, Chairman.  
 S. M. Mitchell, Asst. Foreman, Lucknow, Vice Chairman.  
 P. E. Zarger, Gang Foreman, Enola C. S., Secretary.  
 W. I. Koons, Foreman, Macley St. Shop.  
 G. W. Eichholtz, Foreman, Division Car Inspectors.  
 H. F. Hartzell, Gang Foreman, Maclay Street.  
 W. D. Mumma, Gang Foreman, Lucknow.  
 R. M. Adams, Gang Foreman, Enola C. S.  
 G. R. Patterson, Gang Foreman, Enola C. S.  
 E. E. Allen, Gang Foreman, Enola C. S.  
 C. F. Kitzmiller, Gang Foreman, Enola C. S.  
 J. M. Derick, Gang Foreman, Enola C. S.  
 E. S. Hassler, Gang Foreman, Enola C. S.  
 J. E. Hassler, Gang Foreman, Enola C. S.  
 J. H. Kinter, Foreman Car Inspectors, Enola.  
 H. S. Zeigler, Gang Foreman, Maclay Street.  
 W. S. Rice, Foreman, Pass. Car Inspectors.  
 H. C. Bobb, Gang Foreman, Lucknow.  
 S. W. Custer, Gang Foreman, Enola C. S.  
 O. S. Stonesifer, Stockman, Hbg. Yard.  
 C. C. Black, Act. Gang Foreman, Enola Yard.  
 J. L. Kreiger, Act. Gang Foreman, Enola C. S.  
 C. E. Sadler, Act. Gang Foreman, Enola C. S.  
 J. W. Shook, Gang Foreman, Maclay St.  
 C. S. Gerheart, Gang Foreman, Lucknow.  
 R. E. Derrick, Gang Foreman, Enola C. S.  
 E. Hoffsmith, Gang Foreman, Enola C. S.

##### *Group No. 7*

D. F. Manahan, Foreman Car Inspectors, Chairman.  
 J. F. Rathvon, Asst. Foreman, Maclay St., Vice Chairman.  
 G. P. Wells, Foreman, Scrap Dock, Lucknow, Secretary.  
 J. G. Smiley, Foreman, Pass. Car Inspectors.  
 W. E. Skeen, Foreman, Bolt Shop, Lucknow.  
 H. E. Stoner, Foreman, Planing Mill, Lucknow.  
 C. F. Hench, Asst. Store Keeper, Lucknow.  
 R. B. White, Foreman, Laborers, Lucknow.  
 J. O. Patterson, Gang Foreman, Lucknow.  
 G. B. Rudy, Gang Foreman, Lucknow.  
 E. W. Clay, Gang Foreman, Enola Yard.  
 G. W. Woodward, Gang Foreman, Enola C. S.  
 R. F. Sebourn, Gang Foreman, Enola C. S.  
 J. W. Monath, Gang Foreman, Enola C. S.  
 J. H. Putt, Gang Foreman, Enola C. S.

G. G. Kinter, Gang Foreman, Enola C. S.  
 E. R. Payne, Gang Foreman, Pass. Car Inspectors.  
 Walter Stetler, Gang Foreman, Enola C. S.  
 J. M. Fleming, Gang Foreman, Enola C. S.  
 S. H. Sipe, Gang Foreman, Enola C. S.  
 S. A. Wilson, Gang Foreman, Pass. Car Inspectors.  
 C. H. Steigerwalt, Act. Gang Foreman, Enola C. S.  
 J. J. Gribble, Act. Gang Foreman, Enola C. S.  
 A. J. McKissick, Acting Gang Foreman, Enola C. S.  
 G. R. Gill, Act. Gang Foreman, Enola C. S.  
 G. W. Lentz, Act. Gang Foreman, Enola C. S.  
 J. M. Straw, Gang Foreman, Lucknow.  
 R. Kunkel, Gang Foreman, Enola C. S.  
 C. N. Liddick, Gang Foreman, Enola Yard.

*Group No. 8*

H. G. Hassler, Foreman, Enola C. S., Chairman.  
 D. W. Shuey, Asst. Foreman, Enola C. S., Vice Chairman.  
 D. W. Shettel, Gang Foreman, Enola, Secretary.  
 T. J. Zimmerman, Gang Foreman, Division Car Inspectors.  
 John Norton, Foreman, Blacksmith Shop, Lucknow.  
 S. W. Rich, Foreman, Wheel Shop, Lucknow.  
 Chas. Bitting, Gang Foreman, Hbg. Yard.  
 J. L. Schlosser, Gang Foreman, Lucknow.  
 J. A. Miller, Gang Foreman, Lucknow.  
 J. V. Douglass, Gang Foreman, Lucknow.  
 C. C. Bowman, Gang Foreman, Maclay St.  
 E. F. Demmy, Gang Foreman, Lucknow.  
 C. E. Ferry, Gang Foreman, Lucknow.  
 W. C. Norton, Gang Foreman, Lucknow.  
 E. S. Bitner, Gang Foreman, Lucknow.  
 S. R. Karper, Stockman, Enola C. S.  
 A. J. Gerfin, Gang Foreman, Division Car Inspectors.  
 F. W. Paull, Gang Foreman, Maclay St.  
 W. K. McDonnell, Gang Foreman, Maclay St.  
 J. C. Snyder, Gang Foreman, Lucknow.  
 G. C. Adams, Gang Foreman, Lucknow.  
 J. F. Shirk, Gang Foreman, Lucknow.  
 J. S. Blacker, Gang Foreman, Enola C. S.  
 L. S. Blosser, Act. Gang Foreman, Enola C. S.  
 M. E. Brymesser, Act. Gang Foreman, Enola C. S.  
 H. M. King, Act. Gang Foreman, Enola C. S.

*Group No. 9*

E. N. Miller, Asst. Foreman, Enola C. S., Chairman  
 R. B. Wheeler, Gang Foreman, Enola C. S., Vice Chairman.  
 C. P. Daley, Gang Foreman, Division Car Inspectors, Secretary.  
 L. B. Hoover, Gang Foreman, Enola C. S.  
 G. Q. McClarin, Asst. Foreman, Hbg. Yard.  
 C. E. Whitman, Gang Foreman, Maclay St.  
 G. W. Fisher, Jr., Gang Foreman, Pass. Car Inspectors.  
 B. E. Rice, Gang Foreman, Pass. Car Inspectors.  
 J. C. Roberts, Gang Foreman, Hbg. Yard.  
 C. M. Geist, Gang Foreman, Hbg. Yard.  
 C. S. Parker, Gang Foreman, Lucknow.

W. S. Turns, Gang Foreman, Lucknow.  
 G. B. Bender, Gang Foreman, Lucknow.  
 C. R. Rudy, Gang Foreman, Lucknow.  
 J. D. Bordlemay, Gang Foreman, Enola Yard.  
 O. F. Sourbeer, Gang Foreman, Lucknow.  
 G. H. Eckert, Gang Foreman, Lucknow.  
 John Quaid, Gang Foreman, Lucknow.  
 W. B. Wise, Gang Foreman, Pass. Car Inspectors.  
 G. H. Wise, Act. Gang Foreman, Enola C. S.  
 W. J. Dolbin, Gang Foreman, Maclay St.  
 I. G. Myers, Gang Foreman, Maclay St.  
 M. R. Walters, Act. Gang Foreman, Enola C. S.  
 G. E. Moser, Gang Foreman, Lucknow.  
 H. L. Boyer, Gang Foreman, Lucknow.  
 Samuel Bankes, Gang Foreman, Hbg. Yard.  
 G. A. Keener, Gang Foreman, Lucknow.  
 E. C. Rosenberry, Gang Foreman, Enola Yard.  
 R. E. Dell, Act. Gang Foreman, Enola C. S.  
 N. C. Heckert, Act. Gang Foreman, Lucknow.

*Group No. 10*

G. W. Cromleigh, Foreman, Lucknow, Chairman.  
 C. C. Albright, Gang Foreman, Hbg. Yard, Vice Chairman.  
 J. A. Alexander, Gang Foreman, Pass. Car Insp., Secretary.  
 M. C. Fisher, Gang Foreman, Maclay St.  
 H. M. Derrick, Gang Foreman, Hbg. Yard.  
 A. W. Harro, Gang Foreman, Hbg. Yard.  
 W. S. Sheaffer, Gang Foreman, Lucknow.  
 L. M. Bell, Gang Foreman, Lucknow.  
 E. C. Myers, Gang Foreman, Enola C. S.  
 G. R. Mager, Gang Foreman, Enola C. S.  
 C. S. Wert, Gang Foreman, Enola C. S.  
 D. E. Wenrick, Wreck Foreman, Enola.  
 M. J. Stum, Gang Foreman, Enola Yard  
 J. C. Westfall, Gang Foreman, Enola C. S.  
 G. A. Nicholas, Act. Gang Foreman, Enola C. S.  
 J. S. Rea, Act. Gang Foreman, Enola C. S.  
 G. T. Albright, Act. Gang Foreman, Enola C. S.  
 R. M. Fasick, Act. Gang Foreman, Enola C. S.  
 C. C. Westfall, Acting Gang Foreman, Enola C. S.  
 M. R. Dawson, Acting Gang Foreman, Enola C. S.  
 B. F. Reed, Gang Foreman, Lucknow.  
 T. F. Shoop, Gang Foreman, Lucknow.  
 E. E. Rhoads, Gang Foreman, Maclay St.  
 G. H. Rea, Act. Gang Foreman, Enola C. S.  
 B. P. Mowery, Act. Gang Foreman, Enola C. S.

The conference groups then proceeded to the rooms assigned to them and discussed the following question:

“A certain Gang Foreman had a Gang which was noted for always being on the job and always holding up its part of the shop production. The Gang Foreman was promoted, and after the new Gang Foreman took hold it was found

that delays and interruptions occurred and when the question was raised with the Gang Foreman he always stated that he was too busy and did not get a chance to look after it. Every time a failure occurred this Gang Foreman had this same excuse, but it was noted that when the Foreman called his attention to the failure it was not repeated. What was wrong?"

*Group No. 1:* The question was discussed by Messrs. Weaver, Ellis, Hall, Mumma, Hamilton and Shaffner, they arriving at the conclusion that the second Gang Foreman was just learning the job and had not sufficiently studied the various jobs, but was depending on his superior for the direction of the work.

*Group No. 2:* Messrs. Baker and Ellenberger stated that the second Gang Foreman did not properly plan his work or had not properly educated himself for the position.

Messrs. Rice and Reese felt that he lacked experience and the co-operation of his men and stated that he should first learn his men and earn their co-operation, after which he should not have to answer that he was too busy, when asked why he had not accomplished certain work.

Mr. Knier stated that the man should be trained and educated to the work before he is promoted to Gang Foreman and should be taught how to plan his work so that there will be no delays caused by his failure to do the proper work first.

*Group No. 3:* Messrs. Patterson, Bobb, Black and Rice were of the opinion that lack of interest on the part of the Gang Foreman was the cause of his failure to meet the standard set by the first man.

Messrs. Mumma, Zarger, Allen and Stonesifer agreed that the first Gang Foreman had established a system and had educated himself to his work, while the man who succeeded him had not come to the place where he knew just what system would do, therefore he lacked education.

*Group No 4:* Mr. Lotz stated that possibly the new Gang Foreman had not secured the confidence of the men because of an improper attitude toward them, while Mr. Beane felt

that the new Gang Foreman lacked confidence in himself or was possibly a little timid.

Messrs. Geisking and Fries stated that probably some domestic trouble might be preying on the mind of the man which would prevent his giving the job the consideration necessary and felt that it was the duty of the Shop Foreman to ascertain if such was the case and endeavor to overcome it. On the other hand if this was not the case he felt that the trouble was with the man himself in that he lacked interest and put too much dependence in his Foreman, to plan the work.

*Group No. 5:* Mr. J. E. Murray was of the opinion that the second man felt the job was easy and took the same without any preparation and failed to bring the element of human relationship into the matter.

Mr. Frank stated that to his mind the first Gang Foreman was ambitious and analyzed his job more thoroughly in order to succeed and obtain advancement, while Mr. Yost felt that the second Gang Foreman did not have any system and only performed what he thought was his duty, but if he was to succeed he should not be afraid to do more than was expected of him.

*Group No. 6:* The question was discussed by Messrs. Schlayer, Johnson, Workman, Bowers and Mountz, who concluded that the first Gang Foreman was efficient, having the qualities of leadership necessary to competent supervisors, was a student of human nature and was obviously a good mechanic and had no trouble in winning the co-operation of his gang; while the second man was wanting in the qualifications possessed by the Gang Foreman who had been promoted. It is apparent that he was lacking in application, as it is reasonably certain that had he studied his job and the men under his direction, assuming that he was selected for the position of Gang Foreman on the strength of his mechanical ability, he would have succeeded. Instead of doing this he was a leaner, depending upon his Foreman to carry him along and for this reason lost the respect of his men, who then failed in their production.

*Group No. 7:* Mr. Rudy stated that the second Gang Foreman did not have the education and experience or failed to make use of it.

Mr. Rathvon felt that he lacked knowledge of how to plan and had not analyzed his job, depending on his superiors to pull him through.

Mr. Stoner was of the opinion that if he had been educated along the particular line of work he was following, he did not make proper application of it.

*Group No. 8:* Mr. Bowman stated that the first Gang Foreman had qualified himself by having an intimate knowledge of A. R. A. rules, loading rules, piece work prices, etc., on account of which he was able to do more individual work and have more time to supervise his men. The second Gang Foreman, to his mind, was lacking in some or all of these respects and naturally did not make the same progress as the first Gang Foreman.

Messrs. Bitner and Zimmerman were of the opinion that the first man had obtained the co-operation of the men while the second Gang Foreman had not, either on account of the fact that he was a driver instead of a leader or had not properly educated himself along the line of his job.

*Group No. 9:* Mr. J. C. Roberts felt that if the second Gang Foreman was given a gang which had already been trained the fault was with the man as he evidently did not have the confidence and respect of the men in the gang and had not properly educated himself to overcome this. Mr. C. S. Parker felt that the first duty of the new Gang Foreman was to study the men in his gang and endeavor to obtain their confidence and respect and then lead the men instead of driving them.

Mr. G. H. Wise felt that the trouble was due to the man's lack of education and not that he was not interested in his work but that he was gradually learning, from the fact that the same failures were not repeated.

This question was also discussed by Messrs. Wheeler, Eckert and Dolbin who presented the same conclusions as Mr. Wise.

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*Group No. 10:* Messrs. Mager and Reed stated that the first Gang Foreman had educated himself along with the education of his men as to how important it was for them to know their jobs and be able to plan and keep ahead of their work.

Messrs. Albright and Westfall presented the conclusion that the man was not able to plan his work as the first Gang Foreman had done and was counting on the Foreman pulling him through.

*Conclusion:* The first Gang Foreman had educated himself along the lines of his job. The second Gang Foreman was depending on his Foreman to educate him and was not making a study of his job and training himself to keep ahead of it.

## HOW THE BUSINESS OF THE RAILROAD IS HANDLED

MR. R. C. MORSE

January 16, 1923

Supt. Freight Transportation, Eastern Region

In brief the business of the railroad is transportation of people, animals, materials, liquids, and even gas. Our commodity, therefore, is service. If analyzed carefully, the business of the railroad is handled the same as any well-conducted manufacturing plant in Harrisburg.

The manufacturing company borrows capital to build a plant, bought materials with which to manufacture, hired men to do the work, salesmen to sell it, accounting officers to render bills and make collections, lawyers to pass upon their contracts and agreements, and the price set upon their articles of manufacture must equal the cost of materials and labor, taxes, and the expenses of sale, with a balance sufficient to pay the interest on the capital which has been invested in the plant.

In the same manner the railroad borrows capital to build its lines, stations, bridges, locomotives, cars, and purchase fuel, etc. It employs 230,000 men, but instead of their being grouped under one roof, they are spread out along 12,000 miles of line in thirteen states, in large towns and farming communities, in the mountains and on the plains. The price of transportation must equal the cost to produce it, plus enough to pay taxes and the interest at a moderate rate on the capital invested.

If the business of this railroad was small enough, the President could act as president and general manager, issue instructions for operation, solicit the business from his neighbors, and pass upon all matters relating to each phase of its operation, but we are considering how the business of the largest transportation company of the World is conducted and a business amounting in gross receipts in one

year to over six hundred million dollars, representing 15% of the passenger service of the country, and 12% of the freight service, the functions of the President must naturally be divided and the following picture of the organization will give the best idea of how the business of the railroad is handled.

SLIDE (0)—shows map of the System.

SLIDE (1)—shows entire organization.

It will be noted that the President is the chief executive officer and that he has a staff consisting of eight principal officers.

Secretary.

Vice-Pres. in Charge of Real Estate, Purchases and Insurance.

Vice-President and General Counsel.

Vice-President in Charge of Accounting.

Vice-President in Charge of Finance.

Vice-President in Charge of Corporate Work.

Vice-President in Charge of Traffic.

Vice-President in Charge of Operation.

(A) The Secretary has charge of the general records and papers of the Company.

(B) The Vice-President in Charge of Real Estate, Purchases and Insurance,—as the name implies, has charge of all these functions. There are large Real Estate transactions and agreements continually changing by reason of change in lines, buildings, and other improvements.

General Supervisor of Stores. This Department has under it the general storekeepers and division storekeepers. This Department has charge of the store after the purchases have been made by the Purchasing Agent. They keep a record of each item of material and issue it on orders. There is a large Insurance Department which manages a fund by which the railroad does nearly all of its insurance work at a lower cost than would be possible through outside companies. The Purchasing Department buys all the supplies and fuel, spending over one hundred million dollars annually.

(C) Vice-President and General Counsel,—has charge of all matters pertaining to law—review and approval of con-

tracts, and agreements with various companies, states and municipalities.

(D) Vice-President in Charge of Accounting—Under his direction the Comptroller, general accountants, Auditor of Revenue, Auditor of Through Freight Traffic, Auditor of Through Passenger Traffic, Auditors of Local Freight Traffic and Auditors of Local Passenger Traffic, report. In this office literally hundreds of thousands of bills are rendered and figures tabulated with which to show the results. In this Department, also, bills are rendered for the portion of revenue due the Company for that part of the movement of each car that comes on our line or goes off of it.

(E) Vice-President in Charge of Finance.—This is what might be termed the banking vice-president. He holds the moneys and spends them after bills are approved under the direction of the Comptroller. He is in charge of the cashiers, registrars of bonds, and general paymasters.

(F) Vice-President in Charge of Corporate Work.—This railroad consists of several hundred small companies, the Charters and agreements of which is a most complicated and delicate work as it involves not only matters of law, but also matters of finance.

(G) Vice-President in Charge of Traffic.—This is the sales part of our railroad. To this Vice-President reports the Traffic Manager, the Freight Traffic Manager, General Coal Freight Agent, Freight Agents, Solicitors, Passenger Traffic Manager and Solicitors, Manager of Through Freight Traffic, Agent of Mail Service, Express Traffic Agent, etc. To this Department the advertising of the service and the sale of it is delegated. It also handles the rate and publishes the tariffs and divisions of revenue between ourselves and other companies involved in a through movement. An entire evening could be well spent in consideration of the work of this department, which so vitally affects our revenues, but in brief, it decides upon the rate, secures the approval of the Commission, and publishes it in tariff form, and furnishes the information to the Comptroller who audits the accounts and makes arrangements for collections

of the money from the thousands of agents and the several hundred connecting lines. A revision of tariffs cost approximately \$1,000,000.

SLIDE (2) Vice-President in Charge of Operation is the officer who might really be called the manager of the plant. This Vice-President has a staff consisting principally of the Vice-President in Charge of Personnel, in which Department matters of employment and working conditions are handled, and to whom report the Superintendent of Relief, and the Superintendent of the Pension Department. There is also the Chief Engineer with his assistants, the Chief of Motive power in charge of the construction and maintenance of all equipment, and the Chief of Transportation who has charge of all matters pertaining to conducting transportation.

These officers, of course, are experts on matters in their particular line and handle, under the direction of the Vice-President in Charge of Operation, all policies concerning the operation for the System.

The System is divided into four regions, each one of which is in charge of a Vice-President who reports directly to the Vice-President in Charge of Operation. These four regions are, to a large extent, independent of each other. The Regional Vice-President has a small staff to whom report the General Manager and the Traffic Manager. The General Manager has a staff somewhat comparable to that of the Vice-President in Charge of Operation.

Each region is divided into a number of grand divisions, each of which is headed by a General Superintendent and his staff. Under the General Superintendents are the Superintendents of Divisions, each of whom is head of a single division, and I am sure that all the higher officers will pardon me for saying that when we reach the Superintendent's Division we are getting down to the men on the front line. My reason for saying this is, that this whole plan of operation and management on the Pennsylvania Railroad System is based upon the Superintendent's division as the unit. All the larger units of the System, as well as the higher officers and executive positions exist generally for the pur-

pose of co-ordinating the work of the divisions. The division is a complete unit. It is in general, self-sustaining, having all the functions of transportation, represented within its organization. It is the basis for train operation, as all train movements are arranged on the theory that each division has entirely within its limits all the facilities required to form a complete and satisfactory service.

How the railroad business is handled on one division will typify how it is handled on all divisions. It is only a matter of added distance and multiplication of divisions to picture the handling of the business of the railroad as a whole.

The business may be generally divided into two parts—passenger and freight.

The passenger business includes the transportation of coach passengers, passengers that travel by day in pullman chair cars, or parlor cars, and passengers that travel in pullman sleepers at night. It includes the transportation of baggage, mail and express, the provision for dining cars, and feature cars, such as club cars, cars with observation ends, cars containing state-rooms and drawing rooms. This is arranged according to the class of people that will use the train and the schedule upon which the train is operated. Aside from the care and general construction for strength and comfort, the equipment must be cleaned, disinfected, iced, watered, and the batteries for lighting charged and kept in repair. There is a complication in all of this work due to the fact that the equipment must leave by a certain time and run on a certain schedule. It is quite evident, therefore, that in order to produce good service, and sell it with satisfaction to our patrons there must be no failure to have the cars properly cleaned, heated, placed in the station on time, and well-lighted, or we may lose a customer.

In order to show how the organization functions with respect to the manufacture of passenger transportation, we will follow a passenger who desires to go from Harrisburg to Philadelphia. First a time-table is consulted, prepared by the trainmaster and printed by the traffic department. These time-tables are furnished free. The railroad police

keep orderly and make safe the approach to the station, waiting room and platform, under the direction of Captain of Police. The station appearance is maintained by the Division Engineer. A ticket is purchased from the agent, it may be a straight ticket, a return ticket, a ten-day, a ten-trip, a fifty trip, or mileage, but each form of ticket is numbered and accounted for. There is, furnished to this passenger a heated waiting-room, where seats are provided, toilets, rest-rooms, and in the larger stations, the services of a physician in cases of emergency. There is also the baggage-room where 150 pounds of baggage will be checked, and for a small sum an excess amount. This baggage after being checked must be moved to the train, loaded, and transported to destination. There are news-stands, parcel-rooms, drug-counters, and in the larger stations, stores located in convenient locations, taxi stations, ushers and station-masters, to direct and guide the passenger to the proper train. All these functions of actually getting the passenger to the train are under the direction of the Supervising Agent and Trainmaster, and may be perfect, but are of little account if the trains are not operated on time. The train has been prepared under the direction of the Master Mechanic, and operated under the direction of the Yardmaster to the station. It must first of all be on time, clean, properly lighted and its running gear in good condition. The engine must be in condition to haul the train without road interference to destination on time. The manning of the locomotive is under the direction of the trainmaster. Its dispatching is under the direction of the Train-dispatcher who provides for its movement in advance. The track over which it runs is maintained by the track-foreman under direction of Supervisors and division engineer. The signals that direct the movement are maintained by the signal maintainers under the direction of the Supervisor of Signals, and thus this passenger for three cents a mile buys our transportation which every one helps to manufacture.

It is obvious that every employee is assisting in the manufacture of Pennsylvania Railroad transportation and must

function 100% if our product is to be superior to that of any other railroad. It is interesting to note that furnishing a passenger with first class transportation depends upon every branch of the service. The failure of anyone will cause the production of poor transportation. If the engine is not in proper shape, if the track is not in condition for high speed, if the signals do not operate properly, if the schedule is not arranged for in advance, and the train and station employees are not courteous and intelligent, we are furnishing poor transportation and that is not the Pennsylvania standard.

Freight Transportation is in many respects quite similar to that of Passenger Transportation. It is similar in that it requires time-tables, police protection, tickets, stations, restaurants in the form of stock-yards, renders baggage service in the form of merchandise, requires proper equipment in good order, the operation of scheduled trains on time, yards for classification, both for receipt and delivery, and power and crews at the proper time and place to operate the trains. The manufacture of freight transportation requires courteous and prompt attention by the station employees that receive freight through the stations under the direction of the Supervising Agent. It requires prompt and intelligent handling by train and engine crew where freight is handled in bulk or carload lots from industrial or mine sidings, from stock-pens, and agricultural sidings. The different kinds of freight transportation might best be illustrated by the different classes of freight equipment, as for instance,

BOX CARS are used for movement of many classes of commodities, such as need protection from the weather, among which are merchandise, explosives, bulk grain, and fine sand, they must be particularly tight to prevent leakage. These cars must fully protect from the weather a commodity such as tin-plate that rusts, by a drop of water. In the west, box cars carry coal for protection from the weather and for the purpose of returning the car to the grain fields loaded. Some Box cars are equipped with stoves for the

movement of potatoes from Maine and a few with hoppers for handling bulk freight.

**HOPPER CARS**—used for the transportation of coal, coke, ore, crushed stone, and in some cases, sand.

**GONDOLA CARS**—used for the movement of structural steel, iron products and rough freight.

**STOCK CARS**—used for the movement of horses and cattle, and rough freight.

**REFRIGERATOR CARS**—used for the movement of refrigeration products such as dressed beef. It is interesting to know that the refrigerator car has made possible the movement of highly perishable food, such as strawberries, from as far south as Florida to New York, during the winter months. This type of car is used in the cold climates to prevent the lading from freezing and in warm climates to keep them from spoiling from the heat. This business on the Pennsylvania Railroad amounts to from 200,000 to 225,000 cars per year.

**TANK CAR**—usually owned by private corporations and used for the movement of oils.

**SLIDE (3) A, B, C, D, E.—ESPECIALLY CONSTRUCTED CARS** for the movement of extra size loads. When it is desired to move a car over the road which has unusual dimensions, special authority must be secured in order that it may be safely routed over a part of the railroad where the clearances are sufficient, and great care must be exercised not only by the train crew and engine crew having a train that contains such a car, but also by the train dispatcher to know that the train is running on the proper track.

In the handling of the freight business it is necessary at terminals where freight is handled in bulk or large quantities, to provide special facilities, a few of which are—

**SLIDE (4)**—Ore unloaders at Cleveland, where sixteen tons of ore are lifted from the hold of a ship in one movement, and 10,000 tons of ore from especially designed vessels are removed in 3½ hours.

**SLIDE (5)**—Coal dumpers at Tidewater where freight is

dumped from the cars into boat by lifting the car and lading.

SLIDE (6)—The Grain Elevator where grain is stored, mixed, cleaned, graded, dried, and loaded to ships. The most modern grain unloader is located at Baltimore where a car of grain can be unloaded every ten minutes.

SLIDE (7)—The floating of car and lading across the Chesapeake Bay from Cape Charles to Norfolk, a distance of 36 miles.

SLIDE (8)—The steam lighter in New York Harbor that transfers freight from the car to the ship's side.

This and many more contrivances for the handling of freight are installed in order to reduce the cost and expedite the movement and thus make our product (transportation) the best on the market.

It is not generally known that many of our freight trains are operated on a schedule. Trains containing stock must operate on a schedule so that the stock will be taken from the cars and rested each 36 hours when trains are late and when this time is exceeded the railroad company is subject to a fine. Trains containing dressed meat are required to operate very closely on a schedule in order that they may arrive at destination for distribution to the markets and thus avoid the necessity of keeping large quantities in store at the distributing plants which depend upon the regular receipts of the meat trains. The trains containing perishable goods must operate on a schedule for they are timed from the originating point as far south as Florida and as far west as the Pacific Coast to arrive at a certain hour on a particular day in order that the contents may be displayed and sold at auction. It frequently happens that when trains containing perishable goods are late and miss the market requiring them to be held over until the following day for the market, that the market price drops a day later and the difference in price is frequently paid by the railroad. The operation of these trains is a subject that might well take up the entire discussion for an evening.

Another interesting phase of the transportation business

is the supply of equipment. Refrigerators at this time of the year are required in the south. As Spring approaches, the crop becomes ready for shipment farther north. This crop movement is at the rate of about 7 miles per day so that strawberries now ripening at a certain point in Florida, ten days later will be shipped from a point 70 miles further north, etc. This requires the movement of refrigerators empty to shipping points and as Fall approaches the heavy movements of the empty refrigerators will be made to the north to bring the fruits south. A somewhat similar movement of cars must be made to meet the movement of grain from the lakes, of ore arriving at the seaboard and of coal from the mines during the winter.

One of the most important things in connection with the handling of our business is the maintenance of a record of the movement of the cars on our line. When a Pennsylvania car is on a foreign railroad we receive a dollar a day during the entire time it is off our line. The same is true when a foreign car is on our line, we pay the foreign railroad a dollar per day which is called per diem. It will be readily seen that when there are more foreign cars on our line than there are our cars, on foreign lines, we are paying car rentals in the form of per diem which, of course, is something to be avoided if possible. Cars are generally moved under Car Service Rules which prescribe for the movement of a foreign car in the direction of home. The handling of foreign cars, therefore, on our line according to Car Service Rules is one of the most important and constant questions before the minds of the operating people. The movement of empty cars is in many cases as important as the movement of loaded cars in order that they may reach the stations where shipments are made.

There are many phases in the manufacture of transportation such as the regulation of the movement of empty cars, car records, demurrage and per diem, storage, the handling of freight at stations, billing, classification, intransit arrangements, and freight handling devices, the discussion of which would lead to a better understanding as to How The Business Of The Railroad Is Handled.

## *Discussion*

### LOCOMOTIVE DEPARTMENT

#### QUESTION No. 1

"Owing to a shortage of Philadelphia Division road power at Enola the Train Dispatcher checked up and found an available engine at Harrisburg, which was not immediately needed. He arranged for its transfer to Enola, but on reaching Enola it was delivered to the inspection pit, inspected, cleaned and coaled and was not offered to the yard until it had been at the Engine House for 30 minutes. No important work was necessary after arrival at Enola. The result was that the engine left Enola with train seven hours after it was made available at Harrisburg. What was wrong?"

*Group No. 1:* Messrs. Shank, Weaver, Mullen and Fisher stated that the Train Dispatcher should have notified the engine house people at Enola that the locomotive was on the way over, available for service, and switchmen at that point should have been instructed accordingly.

Messrs. Wisler, Mumma and Beck were of the opinion that the locomotive should not have been inspected at Enola but sent on to the yard and delivered to the proper point by the man in charge of the engine arriving at Enola.

*Group 2:* Mr. Bitner stated that if the engine was ordered to Enola available the Train Runner should have seen to it that the locomotive was given prompt movement and the hostler in charge should have determined whether the engine needed coal or not and if not he should have notified the switchman to cut the engine down the storage track available for service.

Mr. Baker stated that if the Train Runner had notified the engine houses that the engine had left Harrisburg available for service the engine house people in turn should have

offered the engine for a board, and if the train runner had given the locomotive prompt movement no detention should have occurred.

Mr. Foster was of the opinion that the locomotive should not have been run over the inspection pit at Enola but the hostler should have ascertained if the locomotive needed coal, taken coal, if necessary, and then placed the locomotive on the storage track for a train.

Mr. Reese stated that after the engine house people were notified that the engine was leaving Harrisburg, the engine house people should have kept in touch with the movement of the locomotive and in case they found it was not being given a prompt movement the train runner should have been notified, with the information that the engine was offered for a train. They should then arrange not to have the engine run over the inspection pit but direct to the storage yard.

*Group No. 4:* Mr. S. A. Bitner felt that the engine house people at Enola should have been advised that the engine was being sent to Enola available and that the train runner had ordered the engine to Enola to take a train.

Mr. Handschuh stated that the train dispatcher should have notified Enola of the movement so that they would know that the train was in Enola Yard awaiting the engine, also that the engine house people at Harrisburg should have notified Enola when the engine left Harrisburg, feeling that both were at fault for lack of co-operation.

*Group No. 5:* J. W. Mumma stated that the movement was improperly handled as the engine should not have had the fire cleaned or inspected at Enola but should have gone direct to the storage yard.

E. F. Hall considered it proper to inspect the engine at Enola before placing it in service, as many things might happen to it in moving from Harrisburg to Enola, but felt that the train dispatcher should have notified all parties concerned that this movement was being made and when it would arrive at Enola in order to prevent any unnecessary delay at that point.

J. W. Keller stated that engine sent from Harrisburg to Enola, as available, should not be inspected unless the hostler delivering the engine reports defects, but that engines are frequently dispatched to Enola available and the engine house and inspection pit not notified that it is available for service, with the result that the engine gets on the pit, is inspected and sometimes blocked in which causes several hours delay before it is shifted out and sent to the storage yard. He recommended that the engine dispatcher at Harrisburg notify the engine dispatcher at Enola when available engines are sent to that point.

*Group No. 6:* Mr. Schlayer stated that some one had slipped up in failing to notify Enola about this move. Engine should have been run around the inspection pit and sent to the storage yard and offered to the yard immediately upon arrival from Harrisburg. Messrs. Meadath and Workman concurred in this thought.

Mr. Johnson stated that hostlers delivering engines to Enola frequently report work on arrival at that point and for that reason the engines are passed over the inspection pit, inspected and necessary repairs made before the engine is offered to the yard. He further stated that occasionally engines are blocked out of the house which further delays the movement.

*Conclusion:* The Engine House Foreman at Enola should have been notified by the Train Dispatcher that the engine was being dispatched from Harrisburg available and whether a prompt movement through the yard could be expected. The Engine House Foreman should then offer the engine to the yard and arrange with the switchman at the engine house switches for prompt delivery of the engine to the engine house territory. On arrival at Enola it should be ascertained that the fire is in proper shape and sufficient coal on the tender after which the engine should be delivered to the crew. If handled properly the engine should leave Enola with train three hours after leaving the storage track at Harrisburg.

## QUESTION No. 2

"Engine No. 5547, class K4s, failed for steam causing detention to passenger trains on December 12th, 17th, 23rd, 27th and January 5th. On January 5th it was ordered held out of service by the Superintendent Motive Power for thorough examination. On the trips when no failure occurred the engineman in seven cases reported "Engine does not steam freely." In the other cases no report was made of steam trouble. What was wrong? What is the proper action to take after receiving the message from the Superintendent Motive Power?

*Group No. 1:* Mr. Pearson advanced the opinion that the damper may have become loose, or in other cases the diaphragm may have become loose and raised or lowered, but this trouble after being remedied may not have been the cause of the trouble and only a thorough inspection of locomotive would develop the real cause of the steam failure.

Messrs. Fisher and Beck felt that the engineman was not co-operating properly with the engine house people.

Mr. Wissler stated that the front end should be opened, smoke bell, diaphragm, exhaust nozzle, flues, superheater joints, steam pipes and anything connected with the steaming qualities should be inspected under pressure.

*Group No. 2:* Mr. Howe was of the opinion that when the Engine House Foreman noticed that this locomotive had failed in steam more than once, a thorough examination should have been made in order to find the cause and not let the locomotive remain in service and fail continually.

Mr. Reese stated that there were cases where engines failed in steam often and all parts which would affect the steaming qualities were examined and they would still receive reports that the engine would not steam freely.

Mr. Clark stated that in many cases a locomotive got a bad name for not steaming and if the trouble was found and adjusted further reports were received of the same locomotive not steaming, which made it appear that enginemen still reported the engine as not steaming on account of its bad name.

Mr. Knier brought out the point that it would be a good thing to have some one in authority ride the locomotive that has been giving trouble and has apparently been given proper attention at the engine house, in order to see whether the crew is doing their part, how the locomotive performs on the road, and endeavor to find the trouble if the locomotive again fails in steam.

*Group No. 4:* This question was discussed from all angles by the members present and it was felt that many defects could exist that would cause a failure, such as exhaust nozzle out of plumb and not of proper size, front end arrangement defective, superheater damper not working properly, dirty flues. It was brought out that a workman may leave a tool or some other obstruction in the exhaust nozzle that retard the draft. It was felt that after an extensive examination had been made of the engine and no defects found that would cause a steam failure, a competent inspector should ride on the engine on the next trip to observe draft conditions and note if the Fireman was properly handling the engine.

*Group No. 5:* Mr. Mumma stated that the engine should have been held out of service on the first failure and a thorough examination made, and the cause corrected.

Mr. Keller was of the opinion that the engine should have been held out of service and the front end and flues examined, superheater units tested and delivery pipe examined.

Messrs. Hall and Watson discussed this question, bringing out thoughts similar to those expressed by Mr. Keller.

*Group No. 6:* Mr. Shott stated that oft times engines are reported failing in steam before they get out of engine house territory or yards, the engineman alleging that engine will not steam, having been prompted by some other engineman to report engine as a bad steamer. As a matter of fact much of the steam trouble is due to poor firemen and such cases should be classed as man failures and not engine failures. In fact engines have been examined and found in first class condition, that had been reported failing in steam and had warned the enginehouse foreman to be on the

lookout for further reports of engine failing in steam, which would be properly chargeable to poor fireman or prejudiced engineer. He further stated that in the examination of engines for steam failures all front end appurtenances should be carefully examined, examine flues and arches; briefly, make a thorough examination of all draft appliances, not forgetting the exhaust nozzle. If these items are found in good condition the machinery should be examined, valves, piston packing, etc. This thorough examination should have been given the second time the engine was reported failing in steam.

Mr. Runk stated that he felt the continued failure of the engine was due to the enginehouse management not following up the work clearly as it is reasonably certain had the engine been thoroughly inspected and tested out according to instructions, defects would have been discovered and necessary repairs made, putting engine in good condition. He further stated that steam failures are frequently due to delivery pipes being in bad condition, being separated or containing holes.

Messrs. Workman, Bowers, McDevitt and Sassaman also discussed this question and brought out thoughts along the same lines as Mr. Shott.

*Conclusion:* The defect existing in this locomotive is evidently a chronic condition not revealed by running inspection and has been overlooked by the engine house people. When the engine is held off the exhaust nozzle should be checked to see that it is of the proper size, projections in proper condition and in correct alignment with the stack and necessary repairs noted. The exhaust nozzle should then be blocked with a clamp and water pressure applied through a peep hole plug to cylinders, exhaust column, steam pipes, superheater, dry pipe and stand pipe, with the throttle blocked shut. An inspection should be made inside the boiler while pressure is applied to see that all joints are tight in the main steam pipe. The front end fittings should be checked with the standard prints and superheater damper checked for proper opening. The superheater damper

cylinder should be tested to see that it operates properly at 50 pounds pressure as required by the "L" instructions. The front end should be inspected for air leaks. The flues should be inspected to see that all are clean. The ashpan should be inspected to see that the admission of air is not restricted. The internal delivery pipe should be inspected to see that it is free, properly connected and water delivered at the proper point as shown on the blueprint. If no defects are found after the above processes have been thoroughly applied, the engine should be fired up and taken out on a track where it can be worked, having an observer stand on top of the boiler to ascertain if the exhaust fills the stack. If it does not some obstruction probably exists in the exhaust passage in the cylinders or in the exhaust base. If nothing is found by this test, as a last resort, a competent observer should ride the locomotive on its first trip to observe the manner in which it burns the fire.

#### QUESTION No. 3

"Engine 4765 was turned off the boiler wash track with a new right back main rod brass. This brass ran hot enroute and it was necessary to stop and fill the grease cups at Middletown and Columbia. At "SF" the brass was hot again. At this point the engineman slacked the main rod key slightly and refilled the grease cup. The pin ran cool for the balance of the trip. What was wrong?"

*Group No. 1:* Mr. Whisler stated that in his opinion the brass was not fit to the pin, and Mr. Hall stated that the brass could not have been fit according to the "L" Instructions.

*Group No. 4:* Messrs. Womer and Reish were of the opinion that the brass had been keyed too tight.

Mr. Handschuh felt that if the key was not driven in too tight, it was evident that the brass had not been bored properly. He also suggested that some foreign matter may have lodged in the oil ways and the brass did not get proper lubrication.

*Group No. 6:* Mr. Workman was of the opinion that the brass was not properly bored.

Mr. Johnson stated that the brass must warm up before lubrication will begin to act, requiring considerable heat to melt the hard grease and when this is not followed up intelligently by the road engineman the pin sometimes heats up too much and causes a failure. He further stated that it is possible for the engineman to drive the key too tightly after receiving the engine from the engine house.

Mr. Schlager was of the opinion that this trouble was due to improper workmanship. He insisted it is the duty of the mechanic to fit brass to pin in accordance with outstanding instructions, further that it is the duty of the Gang Foreman to see that work is properly done before the engine is pronounced fit for service.

*Conclusion:* The brass was evidently keyed too tight on the pin but a brass which is properly closed and bored cannot pinch the pin. The brass may have been bored too small or may have been bored out of square, or one or both of the liners may have been missing when it was bored. If bored too small or if the liners were missing the trouble should have been detected when the brass was tested on the pin in a clamp. If bored out of square the machinist who assembled the brass should have detected it when he keyed the brass.

## CAR DEPARTMENT

### QUESTION No. 1

“For the first ten months of the year 1922 the Pennsylvania Railroad System had a per diem bill of over seven million dollars covering foreign cars on Pennsylvania rails. What can the Car Department Gang Foreman do to reduce this bill?”

*Group No. 3:* This question was discussed by Messrs. Derick, Gerheart, Mitchell and Eichholtz who brought out the thought that by having foreign cars set ahead of pool cars on shop tracks and repair them as soon as possible would greatly reduce the per diem on foreign cars.

*Group No. 7:* Mr. Skeen mentioned the thought that if

cars are unloaded and repaired in shops care should be taken to see that they are shifted out promptly.

Mr. Stoner stated that all employes should faithfully observe the rule not to load foreign cars with Company material to points on our own lines.

Mr. Kinter felt that more care should be exercised by inspectors at interchange points and also yard inspectors to make sure that they cannot repair cars in the yard before sending them to the shop.

Messrs. Lentz, Fleming and Woodward also discussed the question bringing out thoughts similar to those above.

*Group No. 8:* Messrs. Bowman and Bitner stated that foreign cars should be moved to the shop, repairs made and released to the C. T. yard as soon as possible. But they both believed that all Gang Foremen were giving preference to repairs to foreign cars.

Mr. Schlosser stated that every Gang Foreman should do his part as promptly as possible in getting foreign cars repaired and released from the shop, but if the Gang Foreman completes his part promptly, it is then up to the C. T. people to give the car prompt movement.

Mr. Shuey stated that if everybody is on the job and knows his duties there will be no unnecessary per diem, there may be cars offered at junction points that we are not always positive we can get off our line without making repairs. Mr. Shuey cited a case of a refrigerator car with warning cards shopped for end sill and brake rigging, car was to be delivered to the P. & R. He arranged with the P. & R. Inspector to receive this car with defect card attached for one end sill. Mr. Shuey meant to bring out that the P. & R. Inspector was protecting his own road by not accepting cars without defect card. Mr. Shuey also stated that all Gang Foremen should be familiar with the car service rules in order to make only the repairs necessary.

*Group No. 9:* Mr. Roberts stated that the duty of a Gang Foreman in the Transportation yard is to keep as many cars as possible on the move and shop them only when there

is no other course to take. Don't be too quick to place them in the hospital.

Mr. Myers brought out the thought that the first step when foreign cars are placed in shop should be to get them repaired promptly. Sometimes better to go to the hospital a day earlier. Possibly in certain cases if cars got in shop 30 or 40 miles sooner on the road much additional damage and unnecessary expense would be avoided, likewise further delay.

Mr. Bender stated that when a car isn't fit to run it isn't safe and such cars should not be kept out of shop, but when a car does come in shop it should be found if standard parts are needed that are not kept on hand and avoid any delay in ordering.

Mr. Daley felt that the shopping of foreign cars should be reduced to a minimum, co-operating with transportation and warehouse forces to use cars to the end that cars with defective body and truck bolsters that are not safe to carry load but safe to travel empty, and similar defects, may be forwarded to home shop as much as possible in place of company shop; co-operate for prompt movement of shop cars to shop, at outlying points; advise Train Dispatcher when good order foreign cars are mixed in storage; act promptly on cars and loads held for exceeding clearance dimensions; when couplers, including attachments, and any foreign metal parts are lost in district direction of inspector shopping the car, eight load same in car or mark on M. P. 197-A where same is located, in order that arrangements can be made to have it shipped special to shop.

*Group No. 10:* Mr. Albright stated that it was important that every Gang Foreman make a thorough study of car service rules and the different car orders that are issued from time to time and to note that agent at Receiving yard places the right cards in regards to routing foreign cars. He also referred to loaded foreign cars in company yards shopped for repairs, or transfer, that they should be looked after promptly and not permitted to be blocked in yards.

This question was also discussed by Messrs. Rhoads,

Dawson and Fisher who corroborated the thoughts expressed by Mr. Albright.

*Conclusion:* Each Gang Foreman should familiarize himself with Car Service Rules and with the various car orders in effect from time to time. Cars shopped for repairs or transfer of lading should be handled promptly. Foreign cars received with Company material should be released promptly. Under no circumstances should a foreign car be loaded out with Company supplies. Bad order cars held for material due to owners defects which require material from the owner must have material ordered promptly so that car can be released from per diem.

## QUESTION No. 2

"A rush shipment of automobiles consigned to the New York Automobile Show was shopped on account of draw bar being pulled out and it was decided to transfer the lading. Another car was placed on the adjoining track. It was then found that the transfer would have to be made through the end doors and the cars were shifted to the same track. It was then found that the cars had a blind end and it was necessary to take one car to the engine house and turn it on the table. While this was being done tricks were changed and the oncoming Gang Foreman found a message in the office stating that the car must not be delayed. He then went out to this car and found that a coupler could be applied to take the car to destination which was done in approximately two hours. The total delay to car on account of shopping was 17 hours. What was wrong?"

*Group No. 3:* Messrs. Koons, E. S. Hassler and J. E. Hassler discussed this question and felt that the Gang Foreman who first ordered the car shopped should have looked into the advisability of applying a new coupler before shopping the car, but that after the car was shopped the man who arranged for the transfer of lading should have made sure that the cars were placed properly for the transfer.

*Group No. 7:* Messrs. Kunkle and Fleming stated that the

man who decided to transfer the load was primarily in error, but that it was a poor or indifferent shifting crew who placed a car as stated.

Messrs. Straw and Kitner felt that the first Gang Foreman was at fault for not looking the job over thoroughly before deciding to transfer the load, as it was better many times to use wrong material and give a defect card to cover, than to transfer.

Mr. Kinter further stated that his experience teaches him not to transfer a car unless absolutely necessary on account of expense of transfer and possible loss and damage, especially on perishable freight, and the Gang Foreman who has this in mind will be able to scheme out some way to get the car through, and if necessary request to have car hauled on rear.

*Group No. 8:* Mr. Zimmerman stated that if the second Gang Foreman applied a coupler the first Gang Foreman should have been able to do the same, unless the second Gang Foreman might have been a silent Storekeeper and had this coupler under cover somewhere.

Mr. Norton raised a question as to whether the first man knew it was a preference car, stating that the first Gang Foreman probably thought it better to hold car for permanent repairs and when the second Gang Foreman learned it was a rush shipment he made temporary repairs and left car go forward.

Mr. Schlosser gave an illustration of a case where a coupler had pulled out of a foreign car in a yard, there was no Blacksmith on duty at the shop and no couplers on hand with yoke riveted on, car was loaded with heavy machinery and the Gang Foreman did not have enough men to transfer same. He ascertained where coupler had pulled out, took a couple of men and went and got the coupler and draft rigging to shop, made proper repairs and released car to service with very little delay.

*Group No. 9:* Mr. Geist was of the opinion that the trouble was with the first Gang Foreman, possibly not that he did not know his business. On his first look he decided to un-

load, but had he taken time to look over the job more thoroughly he might have decided to make repairs.

Mr. Eckert stated that it looked to him as though there was a difference of opinion on safety. The one took a chance and the other didn't. The car may have been used up pretty badly, and sometimes such jobs fail soon after leaving the shop. The first Gang Foreman may have been sincere in playing his part of the job, but it was alright with the second Gang Foreman if the car continued through, but if the car got back in the shop with a further delay he would be open to criticism.

The question was also discussed by Messrs. Parker, Hoover, Roberts and Wise who felt that there was a succession of "fall downs" brought about by lack of co-operation.

*Group No. 10:* This question was discussed by Messrs. Fisher, Mager, Wenrich and Westfall who felt that the Gang Foreman should first use good judgment as to whether the car should be transferred or whether temporary repairs can be made to allow the car to go to destination, which would have developed if a thorough examination had been made of the car.

*Conclusion:* The first decision was evidently improper and the subsequent planning shows entire lack of generalship. If the decision to transfer the lading was proper a survey should have been made to determine whether it should be transferred through the side doors or through end doors and the relative location of end doors noted so that one set up would be sufficient.

### QUESTION No. 3

"I. C. box car 88762 loaded with tin plate, Vandergrift to New Haven was set off at Denholm and Newport on the Middle Division and at Maclay Street, Columbia and Pomeroy on the Philadelphia Division on account of right No. 1 box hot and burned out. The inspector at Pomeroy found lading in car shifted to right side and made adjustment. From Pomeroy box ran cool to destination. What was

wrong and what should have been done to prevent this condition?"

*Group No. 3:* Mr. Koons felt that the bearing was not properly seated while Mr. Eichholtz felt that probably the journal was defective and the defect had not been detected.

Mr. Rice stated that there may have been a broken spring on the car which would throw the load on box No. 1 and cause it to get hot, or it may have been that a piece of sponging became wedged between the journal and the box and not discovered until at Pomeroy and the responding at Pomeroy stopped the journal from heating.

The question was also discussed by Messrs. Hassler and Zarger, who stated that if the journal was taken when it first started to heat and treated it at once the journal would run cool, but if it was left go too long it was hard to stop.

*Group No. 7:* Mr. Rudy felt that the Inspector at Pomeroy was well posted to make a thorough examination of car on account of running hot so often.

Mr. Stetler stated that very often continued trouble with the same journal running hot was caused by the rusted condition of journal before application, which shows the importance of properly protecting journals when exposed to the weather. Mr. White felt that part of the trouble lay at the point of shipment due to the load evidently not being properly stowed and braced when loaded.

*Group No. 8:* Mr. Zimmerman expressed the thought that the man who gave the car attention at Pomeroy must have found car hanging to one side or he would not have broken the seals on the car and that if lading had been properly stowed it would not have shifted.

Mr. Norton did not think the first inspector fell down on the job but that it might have been two or three bearings to wear the journal smooth and when the last bearing was applied journal was smooth, allowing journal to run cool to destination.

Mr. Schlosser stated that if the men at Denholm or Mac-lay Street found car sagging to one side he believed they

would have broken the seals and examined lading, but that this condition may not have existed until car arrived at Pomeroy.

*Group No. 9:* Mr. Daley was of the opinion that Rule 265 of the loading rules was not properly observed at loading point or met with severe rough handling enroute. The rules provide amply for securing piles against side or end shifting. Tin plate is heavy and such commodity is usually loaded to axle capacity. Inasmuch as there was no repetition of the trouble after the lading was adjusted at Pomeroy it is quite evident that excess weight at "B" end caused box R-1 to run hot.

Messrs. Rice, Bankes and Wise raised a question as to why R-2 box was not affected if unequal distribution was the cause of No. 1 box heating. The fact that one particular box was giving all the trouble made it likely that a wrong condition was present in the journal, brass or sponging. The fact that the journal gave no further trouble after car was at Pomeroy and lading had been adjusted may be circumstantial.

*Conclusion:* The repeated hot boxes were evidently due to shifted lading. The performance of this car illustrates the bad effect of habit in making repairs without ascertaining the cause and taking steps to prevent a repetition. It remained for the inspector at Pomeroy to notice that the car was leaning to the right and riding hard on the side bearings on that side. Had the inspector at any of the other points observed this condition and investigated by opening the car all the subsequent hot boxes would have been avoided.

## RAILROAD OPERATION IN POLAND

C. S. GASKILL  
Philadelphia, Pa.

January 23, 1923

The self determination of small nations' policy, advocated by the Allies, created a situation in Europe difficult for an American to understand. As an aid to your understanding, suppose that the war had resulted in a defeat for us and that representatives of Germany, Austria, and Turkey had advocated this same principle. Many groups from foreign countries have emigrated to the United States and settled in certain regions creating a strong sphere of influence there. Suppose that Minnesota was given to the Swedes, the Dakotas to the Norwegians, Milwaukee region to the Germans, Massachusetts to the Portuguese, and Connecticut to the French Canadians. You can easily imagine the jealousy and bickering that would exist between these sections and the parent country. Not content with the difficult situation thus created it was further complicated by allowing certain districts to vote at a future time to decide which country they wished to be with. These plebecite regions usually rich in natural resources caused immense difficulties in getting the new countries of Europe down to a working basis.

Roumania was given Bessarabia from Russia and Transylvania from Austro-Hungary. Czecho Slovakia was formed from parts of Germany and Austria. Esthonia, Latvia, and Lithuania were taken from Russia leaving her only the Baltic port of Petrograd. Poland was formed from parts of Russia, Austria, and Germany.

One of the first steps of all these countries was to seize the railroad facilities within their boundaries. As all the rolling stock had been the property of Austria and Germany it was open game for these new countries and they grabbed all of it that crossed their frontiers. It was even so bad that loaded cars could not be sent from one country to an-

other. German cars seized in Poland would bear Polish markings but if it went over into Czecho Slovakia they would paint out the Polish marks and substitute theirs.

This condition arose largely out of our failure to ratify the League of Nations. Under that League the Chairman of the Reparations Commission was to have been an American but on account of our reluctance to join, nothing was done for a long time until a Jap was finally appointed.

The unsettled condition in Europe after the Armistice caused a famine condition so that Mr. Hoover was obliged to begin feeding the children in these countries. Transportation being so disorganized he formed Technical Advisors Missions to several of the countries, I being asked to go to Poland. General Atterbury extended my Army furlough and I started on a mission that was to carry me beyond my wildest dreams.

We found the situation in Poland most difficult due to the confusion of languages and a certain amount of jealousy between the Russian, Austrian, and German sections. The Polish language had been officially dead for many years, it being a finable offense to use Polish words, so that there were no words for the modern technical ideas. General Atterbury sent us copies of all the P. R. R. forms, these were translated and altered to suit conditions and eventually substituted for the three different ones formerly in use.

The track in former German and Austrian Poland was of the 4'-8½" gauge but in Russian Poland it was of 5' gauge. However after Germany had conquered this section and occupied Warsaw, thousands of prisoners of war were set to work moving the one rail to make the track of standard gauge. Almost all the track now in Poland was so changed. This of course, rendered the broad gauge rolling stock imperative so that Poland had a claim on Germany for additional rolling stock in reparation.

It is the Continental custom to figure so many engines and cars are necessary for each kilometer of track without much thought of the density of traffic. The Polish engineers would talk of the situation in other countries and try

to delude themselves that with no traffic beyond troop trains, lumber and coal they had nothing else to move, but wanted equipment equal in amount to heavy traffic countries.

The Reparations Board finally worked this out on a basis fairly satisfactory to all. During the rows over the Upper Silesian Plebiscite this Board ordered Germany to turn over three hundred and fifty engines to Poland, but, as the feeling was so bitter, it wasn't being done so I was sent over to Germany to get the engines. It wasn't very difficult as Americans were on a special footing in Central Europe at that time. We examined and tested the engines, finally riding them over the border and delivering them to Polish engineers.

If our legislators in Washington had understood the feeling of hope and trust for American aid that existed, I am sure that they would have joined the League of Nations.

Out of the grand scramble for rolling stock Poland emerged with 3600 engines, of which 42% were out of order, and 15,000 kilometers of track. Seven armies had gone across the country leaving everything in a most dilapidated condition. There were no spare parts for repairs, metals, belting, drawings, etc. The machine tools left behind were only the ones fit for scrap and of a most antique pattern.

One of the first things we did was to try to get some parts. The Polish money would not be looked at by the Germans so that we finally secured the materials needed by exchanging geese, eggs, and potatoes for them, thus returning to the original manner of bartering. Explosives for the coal mines were obtained in like manner.

The Polish railways as finally organized consisted of seven grand divisions called "Directions." Each Direction had a main shop and numerous small shops in connection with the engine houses or "running sheds." The shops are invariably of the "cross type" with a transfer table down the centre. I did not see a single longitudinal shop with cranes such as ours. Few of these shops had facilities for making boiler repairs as it had been their practice to con-

concentrate such work at one or two highly specialized shops. As these shops remained in Germany it was difficult to get the work done as the Germans would not aid us. It resulted in much hand work, beautifully done but at much expense of time. A fire box job usually took about six months. We tried to get them to use patches but they had an old Russian law that compelled such repairs to be made at each six year interval as would make it necessary for the work to be done over in the next period.

The engines were in the shops a very long time but they were thoroughly repaired when they did come out and spent mighty little time in the engine houses being tinkered with.

The engines in that part of the world are much lighter than ours having as a maximum weight of 18 tons to the axle. They use all white metal bearings and no solid bushings. The frames are plates with a narrow fire box going down between them so that the first shop operation is to jack up the boiler. They cannot understand our use of steel fire boxes, all of theirs are copper though I could learn of no real reason why they stick to them except that the metal is easier worked.

Even with a shortage of motive power, we could not get the Poles interested in the pooling system, the "American System" it is called. All the engines are assigned with three men in operation. The fireman is hired as such and is not promoted, the assistant engineer must have served four years in the shop and is eventually promoted to engineer. This makes a flexible system as the men either work in the shop during dull periods on the road or move up in busy times.

My most interesting experience was in the ill fated expedition to Kieff. The Russian Poles wished to extend their boundaries to include all the former Kingdom of Poland, the German Poles were against it as they knew that with their German Army experience they would have to bear the brunt of the fighting. Marshal Pilsudski insisted on the move so that Kieff was finally taken. I followed along after with another of our men who was looking for food stuffs

for Poland while I was to find rolling stock to move it. The advance of Poland seemed to consolidate Russia so that they moved down on us in a mass. Kieff was cut off and we spent a hectic six days fighting our way out. We were all in uniform thinking that the U. S. on our collars would be of help if we were captured. After we were through the Soviet lines and joined the main Polish Army, we found them all in complete American uniforms with our buttons and big U. S. on canteens and equipment. This stuff had been purchased from our stocks in France and they did not have time to alter the markings.

When we saw them we realized that our U. S. would not have been of much use to us.

The Polish battle line was much extended and as they did not have proper methods of communication they were forced to retire until the Soviet Army was only fifteen kilometers from Warsaw. Here the Poles made a determined stand and the Soviet Army was driven back. Unfortunately this was during the harvest season so that all the crops were destroyed resulting in Poland's having to buy all her bread grains in foreign countries during the next year, having an influence on her money from which she has never recovered.

The first winter there was very little fuel to be obtained as the coal fields were in Upper Silesia and that was still German. The dwelling houses, apartments, hotels, and theatres were without heat so that living in that climate was rather uncomfortable. The Baldwin Locomotive Representative secured an army tent which he erected in his room, placed an electric stove and light in it and was very comfortable. It was an amusing sight to open the door of this large room and see the tent set up in the middle of the floor.

The fuel situation was much improved the next year due to the purchase in the U. S. of 4600 coal cars of 30 tons capacity, these being part of the army stocks built for use in France. They also bought 150 consolidation engines from Baldwin's.

All this equipment was erected at Danzig and rendered valuable service. These cars were equipped with air brakes

and as they do not have air brakes on freight equipment in that part of the world, it was necessary to write the necessary instructions for operation. I did this in English but to get it translated into Polish required the formation of many words not in the language. However, it was finally done with the help of many professors from the University.

One of the first of the plebecites to be voted was in the Teschen region. This gave almost all the coal lands to Czecho Slovakia but left the city of Teschen to Poland, the boundary being a small river through the outskirts of the town. The water works are in Czecho Slovakia while the reservoir is in Poland. When either side gets contrary they shut down their part of it. Also, when anyone goes shopping, they must have passports with visas and submit to customs inspection in and out.

The result of this plebecite also transformed the boundaries of three countries so that transportation yards, formerly for car interchange and customs inspection, were now miles away with no yard facilities at the new borders. This made endless confusion and bad feeling.

Our mission was in Poland two years during which time we gave them enough advice to last them a long time, most of which they didn't like as it was too different from what they were used to doing.

In the summer of 1921, I came back to the U. S. expecting to go back to the P. R. R. again, but about this time the starvation in Russia became acute and I was asked to go there on account of the knowledge I possessed of railroading in that part of the world. General Atterbury extended my furlough once more and I left for Russia early in October. During the next two months I covered Russia from one end to the other, first in the capacity of Traffic Manager and after the first rush was over as Supervisor of the State of Saratov, a district located along the Volga and Western Asia, just above the Caspian Sea.

All persons entering Soviet Russia were obliged to do so through Riga, Latvia. Here the Soviets had a body of their secret police and your dossier was looked over to see if they

had anything on you that made you objectionable. Members of the American Relief Administration (universally known as the A. R. A.) were given special treatment under an agreement with the Soviet Government by which they agreed to transport relief workers, supplies, etc., free, furnish warehouses and guards, telephone and telegraph and in return we would furnish food stuffs and supervise its distribution but would not become involved in religious, commercial, or political matters.

The trip from Riga to Moscow wasn't so bad for the old timers but for the men from home it was a hard trip and showed them what was to come. The journey is about 800 miles taking from three days to a week. The traveller carries his own bedding, food, boiled water, and stove, usually a gasoline "Primus." In his compartment, shared with two or more others, he does the best he can.

The influence of this journey has a marked effect; some grin and stand it, others turn around in Moscow and take the next train back.

The newspaper men have had much to say about Russia and most of it is true, but it all depends upon what the investigator is looking for, those looking for horror and misery, find it; however, most of the men stay only long enough to tell the difference between the Ukraine and a Ukelele and the ones remaining the shortest length of time write the worst stories.

Before I talk of the railroads, I would like to give you an idea of what life is like under Communism. The Russian Government is usually spoken of here as the Bolshevik Government but this word only means the majority government, the word coming from the word "bolshvi" meaning big or large. The minority party is the "menshevic;" the former believes in the State's owning all property, the second does not believe in complete nationalization. The real name is the Russian Socialist Federative Soviet Republics, usually known as the R. S. F. S. R. or the Soviet Government.

It is hard to make an American really understand a situation where there are no stores, no money, and nothing to

buy. Everything had been nationalized from land and houses to personal articles of luxury. Everything belonged to the State and in exchange for your work they furnished you the necessities of life. The principle announced by the Soviet Government was as follows: "From each one according to his ability, to each one according to his needs."

They had 37 different categories of workers when this principle was first established. Now they have 17. Your position in Communistic life depended on your status in this category; also, the quarters you got depended on your position. It was quite possible to work up in this category by diligent service. The houses and rooms in the various former hotels were assigned a good bit in accordance with the billeting system we used ourselves in the army. When you moved from one place to another all you had to do was to show your authority for moving to the Commissar in charge of quarters. He gave you a list of rooms. You went around, looked them over and decided which one you preferred to live in. He gave you an order on the Commissar in charge of the Soviet warehouse and you drew your furniture, stove if they had any, dishes, pots, pans, and other equipment for keeping house. You then procured an order on the Commissar in charge of provisions and drew your rations which consisted mostly of smoked herring and black bread. You were then ready to set up house keeping. The announced policy of the Soviet was that two rooms was enough for a family of five people, and in these two rooms everyone was compelled to do everything connected with the business of life. Fuel being very scarce, it was necessary to get as much heat as possible out of one stove, and in case they had no stove they built a brick oven in the middle of the floor, got all the stove pipe they could find and, in case they could not secure sufficient of this they tore off the drain pipes from the outside of the building and ran this around the room and then stuck the pipe out the window. This resulted in badly smoking the outside of the buildings. They had no fuel to keep fires in the central heating plant; in fact, the service plant was out of service, the pipes frozen

and bursted and the equipment practically ruined. In these rooms the people slept, ate, and everything else they did, and there they lived. Some of these buildings had formerly been large apartments and it was necessary to go through the rooms of several other families every time you went to your own, but they made the best of it.

The former poorer classes were very bitter against the former rich owners of these buildings and they were given very miserable quarters indeed, were often packed in some outhouse, or in the servants' quarters and often in the cellar. Under the system of communism you work for the government and the government furnishes you with everything it was necessary for you to have to support life in your state. The street cars were free, railroads, and even the theatres were free. Everything was being run for the people, and you got your ration of theatre tickets just the same as you got food and clothing. You could not buy anything, there was nothing to buy. The stores had been closed and the windows boarded up and everything worth while had been taken by the Government. If you can imagine Philadelphia with every store closed, the windows boarded shut or broken and filled with dirt and dust, you can see the condition of Moscow as I saw it in October, 1922. There was nothing you could get from any other source than from the Government storehouses or from the proper Commissar. The same thing was true with the other necessities of life. A doctor was assigned to each district, in case of sickness he attended you free, gave an order to the Soviet Pharmacy for the medicines, which they gave you if they had any, which was seldom. All dentists were mobilized in the Soviet dental parlors, you got an order from the proper Commissar, went to the dentist and had the work done, only if you wanted a gold filling you had to furnish your own gold. The same with the shoe repair shop and tailors.

The Soviets have passed many laws regulating conditions among the peasants but they remain much as they have been for generations. Ninety per cent of them are illiterate and are of a degree of stupidity hard for us to realize. We see

the immigrants coming into this country and think them cattle but each one of them is a hundredth man who has enterprise, you should see the ninety-nine remaining! They were kept in slavery and darkness for so many years that they are above the cattle only inasmuch as they can rear themselves up on their hind legs and have articulate speech. While going in an automobile along a country road one day, we met such a man. He probably had never seen a motor car before; he kept walking towards us until we had to stop the car. He did not understand enough to get out of the way and it was only when he touched the hot radiator that he jumped. They have eyes, of course, and their eyes see things, but convey no meaning to the alleged brain.

In the rural districts there is no communication with the outside world. The railways are few and touch only the large centers. Travel is by water, horse or camel. They have, in these country towns, no telephones, lights, newspapers, or any of the things we think necessary for a civilized age.

The village life and customs are those of the old tribal ways that they brought with them from the plains of Tartary. The peasants group themselves in towns of from two to six thousand working the fields held in common. Some of them live on the land itself; they own their own cabin and yard in the village but the farm lands are held by the inhabitants jointly. Once a year the town officers are elected and the land apportioned among the families, each of which gets enough to raise 18 poods (a pood equals 36 pounds) of grain for each eater. Any surplus is sold comparatively for manufactured articles and other necessities that the village cannot produce itself. This plan is especially true in the Volga region where the land was very rich, producing big crops so that there was much activity in the cooperative societies.

At the start of the revolution the peasants were instructed to kill the large land owners, to get and hold the lands for themselves. This they did but were much astonished at the result. They always had the idea that all the troubles of

Russia were due to the large land owners who, living in Paris or London, took everything and gave nothing. The figures for 26 States show that this seizure of lands has increased the individual holdings by only .6 of an acre. They are beginning to see that their troubles were caused not by the big estates but by their own inability to produce. In good years they produced enormous crops but it did not take much drought to wither the roots. The ground was only scratched, the seed sowed broadcast by hand so that the roots had no depth. It did not take a great lack of rain together with a heat generated by a sun shining twenty hours a day to make famine conditions.

They see now that it is up to them to work a little harder and use different methods to produce a certain crop. To this end the Soviet Government has begun agricultural stations to show the peasants how to till the soil properly.

The entire Communistic idea is now admitted by Lenine himself as being a failure. It comes down to the age old fact that most men will not work if they don't have to do so.

The cities and manufacturing districts were supposed to furnish the peasant the articles they needed, such as tools, clothing, etc. The Government was run by the workers and peasant Soviets so that the workers themselves reduced the hours of work from twelve to ten to eight and six, and increased the holidays so that in spite of the taking over of the American Harvester Works and immense spinning mills, they were not able to furnish the peasants the manufactured goods they must have. The peasants then began to produce less so that the cities began to feel the pinch of hunger and cold.

In the seizure of all property, of course, many of the rich people had been able to retain possession of considerable potential wealth. This they would carry to the country to exchange for food even though it was against the law with a very severe penalty.

All the peasants had bales of worthless paper rubles issued by the various leaders and revolutionary parties so that they refused to take any more of it. I have seen log

cabins, with thatched roof, filled with talking machines, furs, paintings, big chairs, diamonds, etc., that the owners have taken in exchange.

In spite of all laws passed to aid the peasants no real aid was given so that the amount of grain that was grown was so small in 1921 that the cities were starving and the army was sent out to requisition the stocks held by the peasants. This, together with a naturally bad year, resulted in the famine in the Volga region causing relief to be furnished from America.

In this country we do not know what a famine is. We do not know what masses of people actually dying from lack of food really means. We cannot picture such a thing. It isn't just not having meat once a day or week, they had nothing. In the north they ate ground oak bark but in the south where there were no trees, the people had ground up thistles and bones mixed with clay or ground horse hoofs boiled up to make the mixture stick together.

Last July, the American Relief Administration was feeding ten million people a day. Three million children were getting a cooked meal and seven million adults were receiving a pound of corn each day. We had in Russia not over two hundred Americans, but had 80,000 Russians working with us furnished by the Soviet Government.

It had been our intention to bring in the vast amount of supplies through the Baltic ports but in January, 1922, began the worst freeze up that the sea had had in 35 years. It was so serious that our plans had to be altered and the ships diverted from the Baltic to the Black Sea.

I went down to Novorssisk where we had our wharves and a fine big elevator. Admiral Bristol put a destroyer at our command for a trip to the Crimea where we opened up the port of Feodosia. During the time from August, 1921, to August, 1922, we took into Russia 800,000 tons of foodstuffs, clothing and hospital supplies.

The handling of this enormous amount of material was a difficult job on the part of the broken down railroads of Russia. The fuel situation was most serious. The oil fields

of Baku were practically abandoned and the wells were not being used so that they had no oil fuel. The miners in the Donitz coal region had not the strength to mine the coal and it was necessary to burn green cord wood. The engineers used to pile this green wood all around the boiler in order to dry it as much as possible so that an engine looked a great deal like a moving wood pile. This green wood did not make much steam and the firemen had a hard time to get along. They then received a large number of tank cars from the Canadian Car Company in which they transported the oil from other territory. Last winter they converted a great many of the engines into oil burners and last March they were giving us a very good movement.

A large part of this material was transported 1000 miles and they were moving it at the rate of about 35 miles per day, except at the important junction points where there was some congestion. This material was handled through a farming country where the people were starving and yet the material was arriving practically intact. The total loss of our food stuffs in Russia was not greater than 1% which is an extremely marvelous performance. The railroads belonged to the people, operated for the people and the people did as they pleased with them. When a man wanted fire wood he went to the nearest siding and tore down a box car and burned the wood. They also used them for houses. They simply set them off the trucks, tore up the switches and proceeded to set up housekeeping in the car. There were thousands of these cars used in this manner and they made very comfortable houses.

In the southern part of the country where the revolutionary armies had been operating, they had destroyed all the water works and the water supply for locomotives was gone. Each locomotive carried a small hand pump somewhat like the old fashioned village fire pump. When they ran out of water they simply stopped the train, placed this pump on the bank of the creek and pumped their supply from that point. At times the Red soldiers compelled the passengers, at the point of the bayonet, to volunteer to pump the water

for the locomotives. This occasioned delays of hours to do this, but this meant nothing to a Russian as he had all the time on his hands that he wanted.

We requested ships carrying supplies bring also lumber for car repairs and we established a big force of men for repairing cars. These men were not paid in any way except by food. Anybody would work for you if they could get something to eat. We brought in not only food stuffs but we purchased several million dollars worth of supplies from the American surplus such as hospital supplies, medicines, etc. The hospitals had nothing, no medicines or instruments. The patients would lie on the floor with all sorts of diseases, all their excrement, vomiting, etc., went on the floor and was never cleaned. It was terrible. They also had quite a number of diseases. The worst was Typhus. It is transferred by the bite of the body louse. Not having any soap or change of clothing they were so covered with the lice that it appeared as though their clothing moved on their bodies. The bite of this louse would inflict the victim with typhus for which there was no cure. The bite of the bed bug gave another form of typhus in which the victim lingers day after day until he dies. The bite of the common flea gave a disease on the order of the Bubonic plague which had almost wiped out the territory in the Caspian Sea district. Cholera took thousands of persons in this district. They also had a terrible malaria and not a grain of quinine in the country. We brought in hospital cots and all the equipment to the amount of seven million dollars and this was distributed to the hospitals. The Doctors are very able men so that it was only necessary for us to have a skeleton organization.

In the district of Saratov I was feeding three hundred thousand children and seven hundred thousand adults. In this we had the cooperation of the Russian Government and in this work we came in contact with a great many people who had been in the United States at some time or other, which was a great help to us. This station is almost six thousand miles from here. A great many of the people are

Chinese. One day a man walked into my office, wearing a Pennsylvania System Safety First Button. I asked him who he was and where he came from and he said his name was Ramburger and that he worked in the Engine house at Harrisburg. He learned there about what a grand life you could live in Russia. No one had to work. He came over by the way of Vladavostok and when he crossed the border the authorities relieved him of all his valuables, even took from him about \$900.00 in money and then set him loose, telling him that now he was like everybody else. These kind of people in Russia did very excellent work for us, they acted as Supervisors and gave valuable service.

I received letters asking if the troubles of the people were turning them to the consolation of religion. The principal religion in Russia is Greek Orthodox which is similar to our Catholic religion, except that they do not acknowledge allegiance to the Pope. However, there are other religions such as Baptist, Lutherans, and Mennonites. They are not being interfered with although they, as a Government, do not favor religion of any kind. They have painted on one of the big churches in Moscow the following:

“Religion is an opiate administered by the Capitalistic class to make the Proletarian satisfied with his poor estate.”

This has little or no effect upon the people toward the churches and they are going on just about as usual. There are 1600 churches in Moscow alone. Most of them are still being used. There was a custom in the old days that when a man was saved from any danger, he vowed a church which he built and endowed and this, no doubt, is the reason for so many churches in Moscow.

We also had with us the Friend's Relief and these Friends did extremely good work. They picked out certain districts where they did their work and some of these were where the disease was the worst and quite a number of them died as a result. The Lutherans from the Pacific Coast also did a great deal of good work. The Lutherans populate a great part of the province of Saratov and they are German Colo-

nist who settled there under Catherine. They still conduct their religious matters in the same way as they always have. Their Lutheran friends from the Pacific Coast sent in two million dollars worth of provisions and supplies. No matter what else we may think, these German Colonists are better educated and live under better conditions than the Russian peasants. The German, no matter where you may find him, is a hard worker and cleanly and you can tell immediately when you enter into a German settlement or German Commune.

The Communistic idea in Russia has about died out. Le-nine in his last speech admitted that Communism had been a failure so they would act on new economic plan and allow free trade. Stores began opening up once more. Invariably the first store to open up was a store with food. There was not much left to sell but they secured a supply of dried fish and black bread and started in business. The second store to open was one with French perfume and soap. The third was hats and then after that was a general store for most anything. After five years no one had very much and it was marvelous the things they offered for sale. The Germans recognized the Soviet Government and inside of six weeks practically all the stores in Moscow were doing business with German goods. After the adoption of free trade it was necessary to provide some form of currency and they began printing Russian rubles. These rubles have nothing back of them and they do not claim to have. These rubles, when they get too great, are revalued by the currency system. They print an entirely new issue and cut off four zeros, and instruct you that one ruble of this issue is equal to ten thousand of the old. Last spring an American dollar was worth four million rubles.

The situation now is very much better. The harvest was very good and this has resulted in better distribution of products. The railroad situation is also very much better. Since August we have ceased to feed adults but are going through the winter with the children. We have helped them to a point where they are now able to take care of them-

selves. The children write us many letters of thanks. These people were very fond of Mark Twain as an author and they received pleasure in reading the two books, Tom Sawyer and Huckleberry Finn, which had been translated into their language. They judged the American life as covered in these two books.

We not only fed the people and took care of the hospitals, but we even tried to clean up the towns. We established a street cleaning department by paying extra rations for this work. We cleaned out the filter beds, cleaned out the sewers, cleaned out the back yards, alleys, and streets, so that in a great many of the towns in which the Americans were working were pretty well cleaned up before they left. The Russians have a habit of forming words out of the initials of certain words. The A. R. A., or American Relief Association, they coined into Ara so that they always referred to this department as the Ara Department.

The actual number of people dying of starvation will never be known. Transportation being free, the peasants took this opportunity to travel, many getting lost or dying on the way from disease, cold, or starvation. If a group of peasants heard that there was food in some other section they would all load themselves on a train; roof, bumpers, platforms were all crowded, and move, probably never being heard of again.

Under the new economic policy allowing free trade, the old Communistic plan was done away with. No longer was anything furnished by the State. Employes drew wages in money and had to pay for rooms, wood, light, food, and for all the other necessities, just as they would have to do in any other country.

The general idea seems to be the formation of a group of States with a government similar to ours in the United States. This, it is generally believed, will be accomplished in a few years, for the improvement in a few months since the new policy was introduced has been remarkable.

With a new Russia, America will find a firm friend in the Russian people on account of the aid given them in the hour of need. This aid given without asking anything in return has made a deep impression on them all.

### *Discussion*

## LOCOMOTIVE DEPARTMENT

### QUESTION No. 1

“An H8 locomotive in the back shop required a new left guide yoke which had been laid off and was at the drill press ready for drilling. An H8 working in the yard was side swiped in an accident, breaking a guide yoke, and was laid up in the engine house. There was only one guide yoke available. The engine in the house could be made available in two days by using the guide yoke at the drill press, whereas the engine in the shop will not be available for eight days. What is the proper course to pursue?”

*Group No. 1:* Messrs. Beck, Hall and Wissler discussed the question arriving at the conclusion that the locomotive in the engine house has the call for the guide yoke at the drill press, but if sufficient vigorous action is taken it should be possible to obtain another guide yoke in time to prevent delay to the locomotive in the back shop.

*Group No. 2:* Mr. Ellenberger stated that the guide yoke should be given to the engine house so as to make the engine available in two days, and then the erecting shop people could see whether or not the storehouse has one in stock, which could be used when wanted for the engine in the back shop, and if not take the necessary action to obtain one at once.

Mr. Howe stated that the erecting shop people may not want to give it up, to which Mr. Baker replied that they should give it up in order to make the engine in the house available in two days, whereas the engine in the back shop, could not be made available for eight days, and in the meantime a guide yoke could be obtained from the storehouse.

Mr. Reese stated that to take a guide yoke, put it up, line the guides and scribe the holes would be some job. This kind of work should be laid off according to the standard print and yokes kept in stock already machined and drilled.

Messrs. Spotten and Fasick stated that the Gang Foreman in the Erecting Shop should see that the Stores Department arranges to procure a new guide yoke for the engine in the erecting shop, after they have given up the guide yoke for the engine in the engine houses.

*Group No. 4:* Messrs. Reisch and Maugans felt that the engine in the house should have the guide yoke intended for the back shop engine, stating that the yard engine could be made available in two days and placed back in service and by doing so its earnings would more than offset any reasonable delay. The back shop Foreman should immediately notify the Storekeeper who should take the necessary steps to obtain another yoke for the back shop engine.

Mr. Stahler thought it would be advisable to turn the guide yoke over to the engine house but on the other hand he stated that it might cause some dissatisfaction among the men in the back shop inasmuch as it might upset some of their plans, or by taking the guide yoke might cause a money loss to the workmen whose duty it was to apply the guide yoke.

*Group No. 5:* Mr. Murray was of the opinion that the guide yoke for the Erecting Shop should be used to release the locomotive in the engine house. At the same time place a hurry through the storehouse for another yoke. The engine in house first should be the slogan in cases of this kind. It is the Foreman's part to settle any disappointment of the men, if any should arise on this account.

Messrs. Devenney and Smiley felt that while it would benefit the service to give up the guide yoke to the engine house, it would interfere with the planning of the work in the gang from which the yoke was taken and in many instances cause the gang to lose money by not being able to go ahead with their work. Furthermore a guide yoke can be applied with a better reamed hole if the wheels are out

of the engine and by taking the yoke away from the engine in erecting shop and wheeling the engine before the new yoke is received you have two guide yokes applied but it is a question whether in either yoke the reaming of all the holes is properly done.

Mr. Hall stated that by robbing the engine in the erecting shop the man would be paid for laying off the guide yoke and the company would not lose any money nor would the man in the erecting shop. But the company would benefit by getting the round house engine in service promptly.

*Group No. 6:* Mr. Mountz offered the suggestion that the broken guide yoke be welded and re-applied to the engine in the house, and that the one available in the storehouse be used on the engine in the back shop. However, in the event that the broken guide yoke on the locomotive in the engine house was beyond repair the available yoke should be used on that engine and emergency order placed to cover stock for the back shop.

Messrs. Sassaman and Schlayer were of the opinion that it would be advisable to use the available guide yoke on the engine in the house, inasmuch as it can be gotten into service promptly and the engine in the back shop would not be ready for service for a week or more.

*Conclusion:* The locomotive in the engine house has the call for the guide yoke at the drill press but if sufficient vigorous action is taken it should be possible to obtain another guide yoke in time to prevent delay to the locomotive in the back shop, by arranging for a rush shipment from some other point.

#### QUESTION No. 2

"During an acute shortage of power there was an L1 engine on the boiler wash track which was completed except building up the rods, pistons and valves on both sides. There was no power in sight for five hours although the dispatcher advised that power was desired for a special train of export grain which would be ready in three hours. The engine house Foreman found that the gang on the engine

would require five hours to build it up but by taking another gang off another engine and doubling up he would complete it in less than three hours. The gang which had the engine however, objected to pooling with another gang and the other gang objected to leaving their assigned job to double up. What is the proper course to pursue?"

*Group No. 1:* Mr. Lehmer stated that it would be necessary for the Gang Foreman to call both gangs together and explain to them the necessity for doubling up on the work.

Messrs. Mumma and Fisher brought out the thought that the Gang Foreman should use tact and acquaint the gang with the necessity for getting the engine ready as quickly as possible.

*Group No. 2:* Mr. Dean felt that the Foreman should be the judge as to whether or not the two gangs should be placed together and in doing so he should be tactful about it, in other words, put the one gang on one side of the engine, and the other gang on the other side and have some sort of competition.

Mr. Reese stated that in a case of this kind he would get the two gangs together and tell them the necessity for this move which, in his mind, should create a sort of competition and appeal to their pride.

Mr. Rice stated that the Gang Foreman should educate his men along the lines of co-operation. He mentioned a case, however, where a fellow was a good worker and produced, but that he was a regular grouch and was always kicking about the work. It was the opinion that this may have been his attitude and that he just wanted to be heard.

Messrs. Winter and Foster brought out the same thoughts as Mr. Rice.

*Group No. 4:* Mr. Buck stated that inasmuch as this was an emergency and did not occur very often the men should not put up any arguments but double up on the engine at the request of the Foreman. Mr. Fries was of the opinion that the men in a case of this kind should use a little judgment and go on the job at once.

Mr. Givler said that in this case he would explain the necessity to the men and then order them to double up; if they refused then the case should be laid before the Foreman.

*Group No. 5:* Mr. Krieder felt that after explaining the situation to the men a bad feeling may exist for a short time, but inside a half hour it all blows over. He felt confident that such situations as this, handled diplomatically, would cause no trouble whatever. The company wants the engine, irrespective of what the men say and if handled correctly, the engine will go out on time.

Mr. Batten stated that the doubling up of gangs may cause a little grumbling, but it soon wears off if the Foreman explains to the men the reason for making such a move.

*Group No. 6:* Mr. Mountz was of the opinion that the Foreman of the Shop should assert himself, explaining to the men the necessity for doing the work expeditiously and stand firm in his purpose in this regard; this in the interest of discipline and promoting the interest of the service.

Mr. Drake felt that if such a case was properly handled there would be no discontent; the Foreman can assert himself in a proper manner, in the interest of good discipline, and undoubtedly secure the obedience of the workmen and get the engine out on record time. It was his opinion that men who won't pull with other men, won't pull by themselves.

Mr. Runk stated that the gangs should be worked separately, under their respective Gang Foremen, the earnings to be properly adjusted when the job is completed; if friction is apparent in such a case, it is evident that something has gone wrong between the men in the gang or between the men in the gangs and such conditions should be eliminated by tactful measures. To make the best impression we should eliminate the word "boss." The Foremen should assert themselves but they should not use the mailed fist.

Mr. Fosnot presented the thought that the Gang Foreman should be tactful and explain the situation thoroughly to the men interested and once it was clearly defined and un-

derstood there should be no discontent. Generally speaking, men will work in harmony if the matter is handled in a gracious and tactful manner. When the men must pool to get the engine out in a certain time, they should be told the time the engine is marked for.

This question was also discussed by Messrs. Johnson, Shott and Berkheimer who presented thoughts similar to those mentioned above.

*Conclusion:* There is something fundamentally wrong with an organization which objects to doubling up in an emergency for the good of the service. It is to be doubted whether the Gang Foreman in charge had properly educated his men along the line of their responsibility and also whether the men have sufficient confidence in the Gang Foreman to accept the situation without controversy. It will be necessary for the Gang Foreman to call both gangs together and give them a brief, frank talk, explaining the necessity and also pointing out that if all hands show a proper spirit no one's earnings will be affected.

### QUESTION No. 3

"During acute shortage of power an L1 locomotive which was reported as due for firebox was found to have 75 flues with the heads so badly burned that the flues would have to be removed. The condition of the machinery indicated six months service and the firebox was otherwise in tolerable condition. A conference was held to determine whether the engine should be held for firebox at this time or whether the flues should be renewed and the engine continued in service. What was the proper action to take?"

*Group No. 1:* Mr. Packer was of the opinion that on account of acute shortage of power it would be advisable to make repairs that would release the locomotive for another period of service and while under normal conditions it is not economical to make temporary repairs to locomotives as the cost of final class repairs is not reduced, yet, as the primary business of the railroad is the moving of cars, the

money spent would be regained in the amount of service obtained from the locomotive.

Mr. Albright stated that the flues should be renewed and the locomotive placed in service.

*Group No. 4:* Messrs. Givler and Fries stated that, if after the renewal of the 75 flues the engine could be retained in service for a period of from four to six months, the proper thing to do would be renew the flues, because the revenue received during the extended life of the engine would more than pay for the firebox.

Mr. Buck felt that if the firebox was in favorable condition and little or no repairs to be made to the machinery, the flues should be renewed and the engine returned to further service unless it was certain that the engine could be taken in the shop for immediate repairs and all necessary repair parts were on hand so that the engine would not be held up for any reason after being taken in the shop.

*Conclusion:* Under normal conditions it is not economical to make temporary repairs to a locomotive as the cost of the final class repairs is not reduced thereby, and the time that a locomotive is held for such temporary repairs is practically wasted. When a temporary power shortage exists, however, it is permissible to spend money on temporary repairs which will release a locomotive for another period of service in a few days as compared with several weeks out of service for a firebox. Shop conditions are not mentioned in the question but the ability of the shop to handle the engine promptly when taken out of service should be considered in arriving at a decision.

## CAR DEPARTMENT

### QUESTION No. 1

"A large shop employing 450 men was out of bottom arch bars for 100,000 pound capacity trucks. The matter was taken up daily with the Storekeeper who had a long list of material out of stock which he was endeavoring to obtain.

It was necessary to manufacture arch bars by hand to release loaded cars and after all the iron was used up the Foreman arranged to dismantle empty cars in order to release loads. When this condition was called to the attention of the Store Keeper he remarked "That's too bad." The Foreman then called on another large shop 90 miles away and made arrangements with the Foreman for immediate shipment of 25 arch bars by passenger train, which relieved an acute situation. What was wrong?"

*Group No. 3:* Mr. Stonesifer stated that the Foreman in the case was lax in his duty and that the thing he did last should have been done first.

Mr. Derick was of the opinion that this condition was largely due to an epidemic of broken arch bars in one shop and not another.

Messrs. Eichholtz and Koons agreed with Mr. Stonesifer that many times the Foreman can get material from another shop when the store's department cannot.

*Group No. 7:* Mr. Rathvon stated that, in his opinion, the Foreman should not rest on his oars and dismiss from his mind as a finished job, when he asks the Stores Department for certain items. He should still remember that he is responsible for the output and follow up and co-operate.

Mr. Hench felt that it was up to the Storekeeper to get the material and in this case it certainly was "Too bad" for the storekeeper, to show such a lack of interest.

Messrs. Stoner and Putt felt that the Storekeeper who made such remarks and dropped the matter there would be a storekeeper in name only, as he certainly displayed a lack of co-operation.

*Group No. 8:* Mr. Shirk stated that a shop employing 450 men would naturally consume a lot of material and it must be taken for granted that a Storekeeper at this shop would have his material the same as at all other shops. Material of all kinds is hard to secure and no doubt he had a long list of this kind of material which the Foreman of each department was inquiring about, each thinking his own partic-

ular wants were the most important and should be given preference. He no doubt had a hurry order in for these particular arch bars, but along with many other things he naturally would not pick this particular item as requiring special attention over his other hurry orders. Up to this point I see no reason to censure the storekeeper but when the demand became so great as to require the making of them out of blank iron and later resorting to the dismantling of empty cars to keep loaded cars moving and this condition was called to the Storekeeper's attention, he should then have been more interested than his answer would imply. In conclusion I would say that the Storekeeper was negligent or tardy in allowing the Foreman of a Department to pull one over on him by securing this material after the Storekeeper fell down on the job, if the Foreman could find out that this material could be secured at another shop the Storekeeper could also as that is his business. In other words he should have met the emergency instead of the Foreman.

Mr. Rich stated that in this case there may have been two reasons for the development of such a situation. Since the Storekeeper had such a long list of things which were entirely out of stock it must have meant that either the manufacturer could not furnish the goods promptly or the Storekeeper did not use foresight in ordering but from the remark of the Storekeeper it is evident that there was a lack of co-operation between the Storekeeper and Foreman.

*Group No. 9:* Mr. Roberts thought it was a lack of co-operation when they saw the material was getting low. The same thing they resorted to last should have been done first. It caused a big expense to the Company to be obliged to dismantle trucks on other cars.

Mr. Wheeler was of the opinion that when the Foreman dealt direct the point having bars on hand was willing to go 50-50, whereas when the Storekeeper called up the other Storekeeper, he was trying to protect his stock and the answer was "No, I can't spare any."

Mr. Myers stated that he was not strong at criticizing,

yet as a Gang Foreman, or in any other capacity, he did not believe under the circumstances it was a proper answer to make "That's too bad." He believed the Storekeeper should have given a better answer, or more satisfactory. In a shop employing 450 men, and using a number of arch bars, there was something lacking, possibly a proper understanding between Foreman and Storekeeper.

*Group No. 10:* Messrs. Fasick, Nichols, Reed and Mager stated that a lack of co-operation between the Storekeeper and the Shop Foreman resulted in failure of the shops to produce results. Mr. Wenrick felt that the Storekeeper should educate himself along the line of the work in the shop and endeavor to assist in every way possible in producing the results desired.

*Conclusion:* The fundamental difficulty was the failure of the Store Department representatives at the two shops to co-operate for the good of the service. One shop which has a small supply of material, even though barely adequate for its own needs, should contribute to the necessity of another shop which is entirely out. The Storekeeper's reply to the Foreman and the stock conditions described indicate that he was failing to make a survey of the material situation and anticipate the shop requirements.

## QUESTION No. 2

"A large publishing house experienced trouble with deliveries on a foreign road the magazines arriving at certain cities late every month. The firm decided to route a trial shipment over the Pennsylvania Railroad to test out the delivery. The shipment consisted of five cars consigned to various cities but were delivered to the Philadelphia Division together in the same train. Two of the cars were backed off on the Philadelphia Division with hot boxes and a third car was shopped at Enola for sharp flange. The same day the car was shopped at Enola the Foreman received a message that the five cars must not be delayed and that they must be kept together as far as Pitcairn. After checking

up he found that the two good cars had already been dispatched in a westward train. What was wrong with this shipment and what is the proper action for the Foreman to take?"

*Group No. 3:* It was the consensus of opinion in this group that the only part the shop people could play in the movement of the five cars in this shipment would be to expedite the movement of the one car that was taken to the shop for repairs and deliver same to the yard as soon as repairs were completed. They felt that there was a mistake made in the selection and preparation of these cars at the point of shipment.

*Group No. 7:* Mr. Lentz felt that the cars were not properly inspected and prepared before being loaded at originating point, particularly as to lubrication.

Mr. Kinter felt that the Transportation Department was primarily at fault for failure to see, in the first place, that all parties interested were advised in advance of the movement.

Mr. Woodward stated that thorough inspection should have been made of the shipment before coming on our line, if the same originated on a foreign line, or proper inspection at interchange. If shipment was loaded on our own lines, compliance with present instructions should have insured cars going through without trouble.

*Group No. 8:* Mr. Bitting brought out the thought that first class equipment should have been used for this shipment, and if this had been done it would not have been necessary to shop a car, after travelling such a short distance, for a sharp flange.

Mr. Rich stated that the order to keep the cars together until arrival at Pitcairn was not issued in time, or to the proper persons, or else some one failed in the execution or same. If the five cars were to be kept together they should all have been backed off when the hot boxes were discovered and the sharp flange should have been in evidence and taken care of at the same time the other cars were shopped for

hot boxes. It would be up to the Foreman to hurry his part of the work as much as possible and make immediate report of the situation to the proper parties.

Mr. Bowman did not agree with the thought that it was necessary to notify everyone concerned about this movement, as the parties when making a trial shipment would want to ascertain the kind of service they would get under ordinary conditions and attention.

*Group No. 9:* Mr. Roberts was of the opinion that the Agent at the originating point did not handle this shipment in the right manner. With the knowledge that the trade with this firm was competitive and on trial, and that the cars should be kept together until they reached Pitcairn, advance information was neglected. Then if he was interested in avoiding equipment trouble he should have arranged with the M. of E. Department to make a special effort in the selection of cars and putting them in proper shape. If that was done three out of five cars would not have gone bad. As to the sharp flange, a flange won't run sharp in 100 miles unless another condition exists.

Mr. Geist stated that the cars left Philadelphia after at least receiving the regular terminal inspection and lubrication attention. Looks like someone "fell down" in the Inspection Department, and the Agent was partly at fault for not advising the nature of the shipment. After the thing happened the only thing for the Shop Foreman to do was to arrange to have the cars hurried out of the shop and report conditions.

Mr. Bordlemay felt that this was a case where the Transportation Department failed to make proper arrangements for handling special shipment, or that they did not co-operate properly with the M. of E. Department.

*Group No. 10:* General discussion of the question by the group resulted in the conclusion that lack of co-operation was the cause of the condition, and the message received by the Foreman at Enola was too late for him to make repairs quickly in order to keep the equipment together as investiga-

tion developed that a part of the equipment had already been dispatched. The only course for the Shop Foreman to pursue was to make quick repairs, get car into the yard, notify the sender of the message that car was ready to go forward.

*Conclusion:* It is evident that the equipment for this trial shipment did not receive proper attention before it was placed for lading at the originating point and also that it did not receive proper lubrication attention prior to dispatchment. It is not indicated whether the interested parties at the originating terminal were properly notified in advance, but the message received at Enola by the Foreman was too late for the most effective action. The situation requires the Foreman to get the shipped car repaired and into the yard with the utmost dispatch and also to notify the sender of the message of the repairs required and the time that repairs will be completed and also that two of the cars have already gone forward, with Engine number and time of departure.

### QUESTION No. 3

“A load of machinery was moving east over our line and the Foreman of Car Inspectors at Enola received a message reading as follows :

‘Car No. 50,000 moving east in extra 1498 loaded concrete mixer for Annapolis, Md. If this car does not exceed clearance dimensions for Baltimore tunnel it should be allowed to go forward.’

“The Foreman checked the car carefully marking the height at various points on the machinery with chalk. It was found that the shipment was too high and it was accordingly transferred to a lower car. Ten days later the Foreman received a letter criticising him for permitting this shipment to go forward exceeding clearance dimension, as it had been shipped at Baltimore for adjustment of lading. On investigation the Foreman found that the Inspector at Baltimore had been guided by his chalk marks on the lad-

ing instead of measuring it. The delay at Enola amounted to three days and the delay at Baltimore two days, and the shipper complained vigorously about the delay. What was wrong with the handling of this shipment?"

*Group No. 3:* The discussion of this question resulted in the conclusion that the car was not started right in so far as the lading was concerned, as the load was too high to proceed to destination without being transferred, and also that chalk marks on a car stand for nothing except to the person placing them there.

*Group No. 7:* Mr. Lentz stated that in his opinion the car was not properly inspected and prepared before being loaded at originating point, or it would not have been necessary to transfer the lading at Enola.

Messrs. Woodward and Rathvon felt that the man who left the chalk marks on the lading, showing the dimension, was lax in so doing and helped in that way to mislead other men. They stated that all un-necessary chalk marks on cars and lading should be erased when cars are in shop. Messrs. Kunkel and Clay argued that the inspector who accepted the original chalk marks was at fault and that he should have measured car and handled it according to instructions.

*Group No. 8:* Mr. Zimmerman stated that the lading on car No. 50,000 should have been properly inspected and measured by some responsible person and if it exceeded clearance dimensions via the normal route to destination it should have been held and the correct measurements reported by wire to the Supt. Freight Transportation through the Division Superintendent asking for route and BX authority number and when this authority was received then the person in charge should have filled out C. T. 314 excessive dimension cards showing dimensions of the shipment and the authorized route in detail. One of these cards should have been securely tacked to each side of car adjacent to the number and a C. T. 304 excessive dimension card showing the Bx authority number should be attached to the manifest. These precautions should carry the shipment to destination. In the case in question these precautions had evi-

dently not been taken and it was necessary to have the Foreman at Enola measure the load correctly to find if it would pass via normal route, he did this and found the dimensions excessive and it is a question whether it would still not have been quicker and more economical if he had then reported the correct dimensions by wire as the route would likely have been changed to avoid Baltimore tunnel thereby saving a transfer.

*Group No. 10:* Messrs. Bell, Fasick, Dawson and Fisher were of the opinion that this car of machinery should not have been received for movement via Baltimore tunnel. If car was loaded on foreign lines the inspector at interchange yard should have caught it and had car rerouted and that message received by Foreman at Enola was not clear enough and after he made his check all chalk marks should have been erased before allowing car to be dispatched and that inspector at Baltimore was at fault for not using good judgment in measuring car instead of taking for granted that chalk marks on car were OK.

*Conclusion:* The shipment should not have been accepted for movement via Baltimore tunnel. If loaded off our line it should have been intercepted at the interchange point and transferred or rerouted at that point. The message received by the Foreman at Enola is indefinitely worded. If the sender was uncertain as to clearance he should have instructed the Foreman to give the car special attention. The chalk marks should have been erased after the lading was transferred before it was dispatched. The inspector at Baltimore erred grossly in accepting existing chalk marks without making actual measurements and his action indicates lack of instruction and discipline.

## INDUSTRY IN RELATION TO THE SUPERVISOR

MR. JAMES B. HORN

January 30, 1923

Graduate of the University of Moscow

You see in front of you a man who began life with a big idea. It was in a school in Russia where we formed a secret society that this idea took root. Now what was that idea? To overcome that which we recognized as false, in the only organized society that we knew anything about. As Russians we saw nearly two hundred millions practically enslaved, not owners of their own thought, being denied liberty to eat, write, speak or walk, without a censor. The censoring, gentlemen, was strictly observed by the ruling class of Russia. Any citizen that was found guilty of violating, knowingly or unknowingly, any part of the rules laid down by the censor, was liable to be punished by not less than twenty years of hard labor at the Siberian Mines. I was nearly a victim of that crime, by just reading "God and the State", by Michele Bochumen, which was known as the most revolutionary book in Russia, and the Secret Service was always on the alert for violators. I remember it was on a cold December night, the moon was shining bright and gloriously while I was sitting absorbed in the study of socialism and communism. Suddenly my attention was attracted by the sound of footsteps, of someone pacing up and down past my window. I rose immediately; instinctively I felt that a bloodhound of the Czar was on my track. I swiftly threw a book into the fire and watched the flames devour it. I replaced that book with the Holy Bible and just before I had time to open it, a tremendous crashing fell upon the door. I immediately responded to that gentle call and admitted half a dozen gendarmes. After a search in the name of the Almighty Czar was made and every scrap of written or printed matter was carefully collected and taken for investigation, I was thrown into the cage on wheels, used for the transportation of political prisoners and I was taken to the

Colonel of the Gendarmes. There were thirty days of tortured daily examinations—and when I say tortured I mean that if my answers did not correspond according to the wishes of the authorities, five lashes of the cossacks whip were inflicted upon my body. Now, I should rather say my youthful body for I was then only 15 years old. Finally, not finding any evidence to convict me of that horrible crime of reading, I was released.

Now, gentlemen, do you blame us for organizing in secret societies to overthrow a tyrant that made it impossible for men to read? Why, this secret society to which I belonged was only one of many in Russia. The members dedicated their souls to their idea and hazarded their lives for their beliefs. Why, in front of a firing squad many of my younger associates went to the grave, others went to Siberia, and five years later I was found guilty of Bakunin principles and I found myself among a detachment sent to the Siberian mines, but part of the secret society came along with us and we had dedicated ourselves to the destruction of all government that we knew anything about. To describe to you the horrors that existed at the Siberian mines is beyond human imagination. To the men of the 20th century, it would sound unbelievable; every political prisoner, as soon as he reached his destination, was taken to a blacksmith, and was presented with an iron bracelet which is fastened by a chain, to a wheelbarrow. Here, gentlemen, I still carry the mark that held my wrist chain to a wheelbarrow for a period of eight months. Why, we were chained in pairs to each wheelbarrow, one to each handle and my mate who was weak and could not bear the tortures inflicted upon him, after three months of suffering, died. The guards being unable to secure a blacksmith immediately, I was compelled to throw my dead comrade's body into the wheelbarrow and wheel it around for three long days until a blacksmith came and removed the corpse and replaced it with a living comrade. There is much of the horrors that existed in the Siberian mines that I shall not recount but after eight months imprisonment, through the help of some comrades I escaped

from the Siberian mines. Embittered but hopeful, I was placed in a sauerkraut barrel, and right here I might mention the fact that every political prisoner known to have escaped from the Siberian mines made his escape in the same romantic way. It was not pleasant in that barrel, the odor was stifling and I confess I never have liked sauerkraut since.

Some of the comrades placed the barrel on the wagon, driven by a man who was also a member of our secret organization, and off we started for the frontier and 48 hours later we arrived in Harbin. Here some men rolled the barrel off the wagon and they didn't roll it very gently for when the barrel hit the ground I thought that the end of the world had come, but late that night, however, some other comrades came to my rescue and helped me to escape and finally I became a stowaway on a vessel bound for England and I arrived in the British Isles. I was apparently a good speaker, my theories were in much demand and I preached the doctrine of socialism and communism from the slums of White Chapel to the grassy fields of Heidelberg in London, England, but hearing of America, after being three months on British soil, I embarked for the great land of liberty. Gentlemen, words are weak, indeed, to describe and to portray my feelings, at the sight of the great Statue of Liberty as we came up the Bay. Why, with that arm outstretched, with the torch of Liberty in its grip, there was an awed silence among my fellow passengers in the steerage. Here was my big idea towering over a hemisphere; here, as I land, I thought, I will be taken into the arms of a great people and receive the patrimony of mankind. Overcome with emotion, I dropped on my knees with my arms outstretched and my head bowed. Why kneeling? Why with head bowed? Why with outstretched arms? I don't know. My comrades and I had renounced the theory of a God in the universe. Anyhow, I was impressed to the highest degree as we entered the promised land. I had belief that we were entering a land of equity and brotherhood but at the wharf in New York, other international comrades met us and I was taken

to the office of a leading socialistic paper. After being introduced around I began to express my great joy at being in a land of liberty but lo and behold it was proven to me that liberty is a word without meaning, here as in the rest of the world, and that instead of one Czar, we have thousands to overcome and whom do you think were those thousands of Czars here in America? Every employer, every foreman, was described as controlling the government and keeping their workers in slavery. I was told that through intrigue and manipulation, the liberty of this country was to scoff at. Why, some of the leaders asked me the question, why are there so many strikes occurring all over the country with regularity, if the workers were not kept in slavery? I was taken down to the slums of New York and it was shown to me the abject poverty of it all and it was pointed out to me "that's what the employers do" I looked; I listened and I was absolutely convinced. I was told of a strike that was on right here in Philadelphia and knowing my influence as a speaker on socialism and communism I was sent there and right at the corner of 5th and Pine I mounted my first soap box and the fight began. For many years I have preached the theory of socialism and communism from the shores of the Atlantic to the shores of the Pacific. I have seen the inside of many jails from Maine to California. Now, why those experiences? Why did I submit to being tarred and feathered at San Jose, California? To me, gentlemen, a big idea, idea to right wrong, a principal, a flame, which had started way back at the University of Moscow and probably I am not the only human being who has sacrificed and suffered for a light that he has seen or thought he has seen. Why, equality of rights, equality of opportunity, is an ideal, not only of acknowledged socialists but undoubtedly of each and every one in this audience. The only problem that lies before you and me as heirs of those generations is what direction to take to provide and maintain those opportunities and rights.

You will all agree, gentlemen, that every one of us is a product of circumstances and environment. The associa-

tion of our lives with things and thought makes us what we are. An eminent economist of Philadelphia said of me one day, "Why he's a perfectly natural product", meaning the conditions under which I was raised had made of me the radical that I became. Do you get the point? We would all create Utopia. Brotherhood and service is an ideal hidden in the archives of every human breast, whether it is voiced or not. How to attain that ideal has brought about many proposals. Why, beginning my life with a prejudice against all existing order it was not difficult to work myself up to the fervor and fury of the reformer. I, the same as anyone else in that position, gave much thought as to what would be my strongest appeal. I recognized the same as any other successful radical that my challenge would be most powerful if built upon that which is within the breast of every human being—dissatisfaction, with self and conditions. Now, some people develop contentment but it is an axiom, it is an undeniable truth that no one is satisfied. Have you ever thought of this? Do you not see the great power in using these forceful pleas? why, certainly you see the appeal. Everyone is looking to get more out of life and to overcome that which appears to stand in his way. The power that is over the mass is quite generally recognized and properly so. America's government is a republic and it is natural that it is run by the most leading man. Now, gentlemen, you men who are in the service of a big idea, the P. R. R., you men who are in reality the P. R. R., you are what may well and properly be termed proprietors by proxy. Other men under your direction interpret the P. R. R. as you exemplify it.

The responsibility of being proprietors by proxy is no mean or small responsibility nor one to be lightly considered. It is within your power to exemplify and teach them principals which have made America and the P. R. R. great and which can cause America and the P. R. R. to be increasingly great. I urge you with me to recognize individual responsibility for maintaining for ourselves and our posterity the constitutional privilege of your forefathers. No, you

gentlemen have a great responsibility and probably greater than you can know in this 20th Century. Why, you see in front of you a man who was a victim of acquiring what? A one-sided knowledge. Why with integrity of purpose I became a foul to civilization of the Century that represents the total progress of humanity and now, gentlemen, I am to the point of my story.

A lack of knowledge in the history of human progress and human nature, in their relation to government, is the germ from which all isms spring. I have preached the theory of the 'ism' for many years, simply because I failed to receive the practical education myself. It was early in the great war that I started to receive strange and to me confusing impressions. I became conscious that I was face to face with some strange realization. As an advocate of high and higher wages, I saw my dreams realized, but only shattered to the ground by the counter realization that higher wages do not mean any more, that prices will ride along with wages and that no one is any better off. This was my first jolt and a pretty stiff one and when Government ownership of railroads became an accomplished fact, I said to myself, now we are coming in to our own but later when I saw what government ownership did to railroads, could not help but see decreased efficiency, increased costs and the man who works paying the bill. These illustrations, while they disturbed me, yet did not disqualify me in my work and along came Russia, throwing off the shackles of the Czar and starting a 'Simon-pure' democracy and when I saw that attempt crumple I received another shock even greater than the first. Now, what was wrong, it could not be my theories, and yet, there is something that should have been like a beacon of light. Yes, sir, gentlemen, while it disturbed, I went down and kept on, until the light came to me. I have seen that I was in the wrong and I may tell you my actual and personal transformation later if you wish, that I was brought to see that all men are not born equal, that ancestry and the formation of head and body cannot be denied, that equity can only obtain when greater service by individual effort brings re-

ward, that equity must be recognized only in conformity with service rendered. Why, the so-called capitalism is merely another name for industrialism and is a reward for accomplishment in conformity with effort and service. That maximum production by each and every individual is the only way of bringing about a greater distribution of clothing, more food, better housing and the material comforts of life, that it is only through the encouragement of maximum initiative that the greatest service can follow. Now, gentlemen, these you may say are simply truths, but are they common in the way they are given to all men? Why, if they were, you would not see in front of you a man who would importune you to establish in your schools the comparative study of social system, who would importune you in authority to bring the truth upon human tendency and human relationship, upon government system for those who are in your charge. Why, my only redemption that I can see is where I can influence you to tell those whom you can reach, the truth about the industrial economics. The passing radical workers in and out of the plants and the number of paid speakers, booklets, pamphlets, that are distributed daily in this country, arguing about the destruction of our present system and our government would make one gasp and say "Surely it cannot be." Now, that to which I will point is a simple remedy. Not very difficult, but it takes diligence and patience and that is education. Now, gentlemen, don't misunderstand me, I do not mean education in the school room, I mean an education, conveying the truth, about our American Government, and our industrial system, whereby one who has received the other side of the story may compare it and get the truth.

It is a peculiar situation and not uninteresting, whereby America slumbers and it is difficult to realize the undermining process that has been and is going on. Did you ever stop to think that you—I mean each and every one of you—were born in and grew up amid the greatest industrial system and accepted it just as a matter of course with little or no thought as to its aims. The system we have today is

the development of the centuries and as you look at it, as you study it in all its ramifications you see two major fundamentals, one is that a system has brought about a workable plan which is designed to encourage maximum initiative by each and every individual. Now, turn to the other fundamental base and you will see that it rests upon the development of maximum production by each and every individual. Now, let us analyze socialism; communism or any other ism that the whole world is leaning toward: In order to grasp their fundamentals it will be necessary to squeeze them into a mass and look at them simply and clearly and what do you see.

The leveling process, all men to be treated equal regardless of his willingness or capacity for service. No one to receive more than the fellow working next to him, regardless of his efforts or ambitions or ability, what results will you get? The stifling of all initiative. Russia has tried it; in Russia they converted the shops and instead of a place where from raw material is turned a finished product, it became a place of agitation and that is why Russia is starving today. But I shall not tire you by going into an analysis of these comparative or diametrically opposed systems. You have listened to the confessed truth, this truth happened to reach me and I say happened because it has reached but a limited number of those who are in doubt. Now, gentlemen, is it not in your power, is it not an overlooked duty, to take a definite part by carrying your knowledge to others? Isn't that a fact, that after you have searched the history of all governments, that you see that each one represents the development of the mass of individuals, and after you have looked upon the slow process of civilization through all the centuries, you see represented in the republican form of government in the U. S. a plan of human associations that is far greater and much better and gives more human happiness than any heretofore devised and practiced by man. Now, gentlemen, what has caused this nation to become the greatest on the face of the earth? Isn't the cause of it the workable plan which is designed to encourage max-

imum initiative and maximum output to each and every individual? Any 'ism' that has a cause to exact these two fundamentals is not only striking a blow at the government but to each and every one in industrial positions.

Let me tell you a strange experience that I had at Bridgeport, Connecticut. It was right after peace was declared that I found myself speaking on the platform at a meeting for workers of the Singer Sewing Machine Company, at Bridgeport, Conn. Somehow or other I fell ill while there and I was taken to the hospital. My wife, who always worked, had been receiving some educational pamphlets, printed in Philadelphia, which are distributed among workers. She always urged me to read these pamphlets but I would have none of it and I told her I didn't care to read trash. She cornered me, however, while I was lying in the hospital with nothing to do. She saw to it that the only reading matter that reached me was those pamphlets that she kept for just such an opportunity. I read them over and over again and it seems to me that these pamphlets have opened my eyes. It seems to me that they have accomplished that which I thought impossible but they did it. After I came out of the hospital I looked for work, I looked for something to do, until I came to that economist that I mentioned before, who advised me that the same way that I had spread destructive thoughts was the way I could convey constructive ideas and that's the reason I'm here with you tonight. Now, gentlemen, after you've heard my experience, I know that many of you here are having questions in your minds. Now, I shall not keep you back from asking me anything that seems to be on your mind. I shall answer you to the best of my ability but you must remember, gentlemen, that there are twenty million workers throughout the U. S. that are kept in the dark, the same as I was, some of them are those who are working with you at the same bench, who are getting a constant stream of radicalism through propaganda or literature. Now then, why not use your influence by giving them the right kind of reading, the right kind of literature? Now, what is that right kind of litera-

ture; isn't it that of the simple fundamentals of the constitution of the U. S. where it gives them an opportunity to work where and for whom they will? Isn't it that of giving to them the simple fundamentals of capitalism, showing where it is designed to reward the industrious in conformity with his effort and service? Isn't it that by giving them in plain simple words, the economics of industry so that he can understand whereby they clearly see that unit production governs everything, that the less there is produced, the less there is to go around and there is no vest pocket panacea that can help the simple workings of the natural law? Isn't it that of giving to them the simple fundamentals of getting into the head that you have work to be done, that has placed some of you in the position you occupy today? Recognizing these great opportunities that you know exist for all those who recognize these fundamentals and you inspired to carry the truth within your range of influence and it is fair of your own workers to overcome that false and blind plea of the radicals. Give them a copy of the document that was penned by your forefathers, give them a copy of the manuscript that stands as the emblem and pride of your nation, of my nation, and of all the nations, a manuscript which was won through noble heroism, sacrifice, suffering and was written with blood stained mutilation and martyrdom of your forefathers, the most sublime papers ever penned by men—the Constitution of the United States. Now these, gentlemen, are the greatest antidote for radical poison reaching the workers today; give them the truth about production instead of the falsehoods the radicals are giving them. Give them for the first time the truth about capital and labor and show them where their best interests lie. Show them that we are all consumers and as consumers we must pay the bill wherever and for whatever cause industry lays down. Why, you can remove from their minds the seeds of suspicion and distrust by giving them the best thoughts of the most eminent economists in the country today.

I feel particularly fortunate when it is my opportunity

to speak with the under executives of a Company, to the rank and file, and the foreman is the company. He is the point of contact between management and men, some of our foremost students in the industrial situation have expressed their belief that half of the trouble between management and men is due to the foreman. How much truth there is in such a statement I would not attempt to presume but I do know that no other man with which the worker comes in contact has as good an opportunity for influence as the foreman. I know that every one of us will agree that if every foreman in this company gives mind to his responsibility to enlighten the men on the policy of the company and goes about it in the right way that this company would not only retain it's lead as the foremost and best managed railroad in the United States but set a pace for other railroads to follow, which in the end will dispose of every contention of the past and the future.

I know and you will agree with me that it is the foreman's business to explain rules, regulations and orders, not merely give them. The other man often has an inquiring mind, the other man may not understand an order, it may be short, crisp and the fellow who is getting it does not quite understand. Now, is it or is it not the foreman's business to have the other man understand? Without a doubt, his success as an under-executive, as a foreman, is almost in exact conformity with the understanding between him and the man under his charge. You will also agree with me that high production, I mean unit production, high output per man, is the only practical method to cause high wages to be permanent and in order for high wages to be paid to either man or foreman, understanding between man and foreman is the first fundamental.

Now, I ask you as man to man, what is the greatest penalty that you or any other human being pays in this world? You will undoubtedly, each and all, without exception, answer the highest penalty that I have paid in life has been the penalty of being misunderstood. Do you get the point? Do you see how your success, the success of the men for

whom you are responsible, the success of the company, is one and the same and can only be solved through understanding? And, gentlemen, I say that understanding will increasingly take the place of misunderstanding throughout industry. I thank you.

Q: I would like to ask Mr. Horn what progress we are making to off set this wrong propoganda that has been spread among the workers?

I would like to ask the speaker how long he has been in this country?

I want to ask if the Constitution of the United States is written in different languages so that we can give it to the men?

I would like to ask the speaker who are most susceptible to the teachings due to the propoganda which are being spread throughout our country?

I would like to ask what can be done and is being done to teach men that personal service, one human to another, with or without pay, is the greatest service?

A: Nothing at all, I am sorry to say. No progress at all was made to offset the radical teachings but the spreading in this country goes farther and farther.

Q: Is there anything really being done to offset it?

A: Nothing yet, nothing that I know of. You have all read I suppose, and all seen about the red docket, if you remember that was done to offset radical teachings, but that was done in a very wrong way; instead of giving them the right teachings, instead of teaching them the economics in plain simple language they made martyrs out of them and they have spread the propoganda more by doing it.

Q: You are making some progress here tonight by going around different places; are there other men doing the same as you are?

A: Not many of them, except that I have spoken before a great many people but I am alone in my work at the present time and I don't think I can reach twenty million even if I live a hundred years. Now, I must confess to you, I made a much better living when I was with the radicals than

I am making right now. Now, that's a fact. I can give you figures that will make you gasp and say "Can it be." How many speakers are engaged by the radicals and making a good living out of it. I never had less than \$5,000.00 a year, never had less than that and in fact, it's possible now that I'm speaking before an audience who won't believe it but any individual who wants to investigate my words, any time he wants to come up, either by letter or any other way, I will send him a photographic copy of the letters I am receiving from the radicals calling me back to do their work, because they've lost a good man. Yes, sir, calling me back to do their work and money is no object. Any man who does not believe my words, just send a letter to 1317 Spruce Street and I shall send him a photographic copy of the letters I am receiving from the radicals today.

Q: How long have I been in this country? I've been here 18 years, and for the last three years I've been speaking the American language. I speak eight different languages, and I never used the American language in public until about 3 years ago.

The Constitution is translated into about as many languages as there are in existence.

Q: Who are most susceptible to the wrong teachings? Let me tell you, gentlemen, that I can talk right to this audience, right tonight, and I can make red hot radicals out of you. I can make you raise the red flag in about an hour. So don't ask who is most susceptible to wrong teachings. There is not one who can not be mislead but the only way is to teach them the truth and if you teach the truth they can never mislead anybody else.

Q: What is the value of personal service: Now, gentlemen, you take a glass of water or anything in nature for that matter, and just touch one individual atom and the vibration will go right through the world. See what I am getting at? The smallest part of that object, whatever it may be, any effect on any one small part or atom of that object will go on and affect the whole thing. If you had here a wireless telephone, my words could be carried around the

globe. Every individual is a brick of the great building of civilization. Now, sometimes, if a man lays his work aside, if he wastes time, or if a man is working with a wrench or any tool and when he is finished, he throws it away, that means waste, and every little part counts up. Each penny, if you wish, counts up, if you take them together; in other words, every man has to do his part in our advance of civilization. When a man wastes time, I may not know it, your boss may not know it, or if you waste material, the loss is yours, you are losing by it. Of course it would take me too long to go into too much discussion about it but if you will think it over, you will find that my words are right. I thank you.

### *Discussion*

#### QUESTION No. 1

“Two men were appointed Gang Foremen in the same department about the same time and it was observed that one of them immediately began to seek opportunity to educate himself along the line of his job by taking up correspondence work, night school work and enrolling in training courses whenever offered. The other man and his wife were socially inclined and had a large group of friends with the result that he was able to give very little thought to his work after leaving the shop. After three years the first man was promoted as he was fully qualified for a better position as the result of his preparation. The friends of the other man, however, persuaded him that discrimination existed and as a result complaint was made on his behalf to the Master Mechanic. What was wrong in this case?”

*Group No. 1:* Mr. Mumma brought out the thought that both men were evidently possessed of ability, and the first man studied at night thereby obtaining greater vision of his work both practically and theoretically. The second man depended on his friends and failing to advance he should have gone to his Foreman and asked what the trouble was that he did not progress, instead of having his friends appeal to the Master Mechanic.

*Group No. 2:* Mr. Tomlinson stated that as these two men

were appointed Gang Foremen at the same time, and the one immediately started to acquire knowledge so as to adapt himself to the supervision of work, while the other was apparently satisfied to go with what he knew and attend social functions, it was the best policy to promote the man who adapted himself or who prepared himself for new responsibilities. The man who is studying for the higher things in life is the man most likely to grasp the fundamental principles quickest.

Mr. Howe stated that a good many men expect promotion without preparing themselves for the promotion, and that the promotion should be given to the man who is willing to dig in and acquire the knowledge to fit him for the next position higher up, but again in selecting a man who is studying at night school, you may be deceived in picking him. The other fellow may be attending social functions, and at the same time may be studying to prepare himself, unknown to others.

Mr. Ellenberger stated that "All work and no play makes Jack a dull boy," however, a man should always be preparing himself for the next step up the ladder.

Mr. Knier was of the opinion that the man who does not study, or who does not try to obtain knowledge that will help him in his present work, or fit him for more responsibility, will eventually find himself in a rut from which his friends cannot lift him.

Messrs. Baker, Winand and Spotten also entered into the discussion agreeing with the comments of Mr. Howe.

*Group No. 3:* Messrs. Stonesifer and Adams argued the point that there was no discrimination in the promotion of the one man over the other, first, because there was only one man needed for the job, and second, that ability and efficiency should come with education; and the only reason the second man thought he was discriminated against was because some one told him so. In other words he never thought for himself, which was a good reason for promoting the other man.

Mr. Derick stated that it does not always follow that a

man with a good education is fit for promotion. If he does not have the ability to put his learning to good use then his education stands for nothing, and further that a man may have ability that makes him efficient and fitted to the job, rather than a good education, but the three combined; ability, efficiency and education are what is needed to get results.

Messrs. Koons and Eichholtz argued that it was a case of one grasping the idea quicker than the other, but they felt that the fellow who works all day and studies all night will soon be of no benefit to himself or any one else, and would be like an American citizen having to inquire who was President of the United States due to being so unfamiliar with the ways of the world that he knows nothing but work.

Mr. Rice entered the argument at this point with the statement that it was his honest opinion that an employer does no object to social functions so long as the man came on the job in the morning fresh and with a clear mind, knowing just where he left off the day before.

*Group No. 4:* Messrs. Maugans, Reisch and Givler stated that the Gang Foreman who had failed to receive the promotion was entirely to blame and that the case should not have been brought to the Master Mechanic. This man no doubt had listened to advice from so called friends who had advised him in the wrong manner.

Messrs. Beane and Fries were of the opinion that while a little play or a few social events were desirable, no man should allow it to stand in the way of his future success. All present decided that the man should have gone to his Foreman and talked the matter over with him, rather than allow his friends to cause him to feel that he had not received a square deal.

*Group No. 5:* Mr. Murray stated that the second Gang Foreman should not have permitted his wife or friends to interfere in his business.

Mr. Keller was of the opinion that the man who worked and studied was justly entitled to promotion, as every man should stand on his own merits.

Messrs. Yost and Hall stated that probably the first man was too good to remain as a Gang Foreman and his superiors could not help promoting him, as the man who made good on the job as Gang Foreman was the man for the higher job when opportunity presented itself, and the man who permits social affairs to interfere with his work is not thoroughly alive to his job nor his work, and as a general rule it is bad practice to permit friends to use influence in obtaining a promotion.

*Group No. 6:* Messrs. Sassaman and Johnson were of the opinion that the Gang Foreman who was not promoted evidently was influenced by his wife, hence followed the social game rather than concentrating on his job, giving little or no thought to his work when off duty. The Gang Foreman who was advanced doubtless owed his promotion to individual effort, same being directed in the right channels. He doubtless read good literature of an educational character, technical books, etc., hence had a thorough fundamental training for his job and something higher.

Messrs. Schlager and Shott advanced the thought that the Gang Foreman who was promoted was on the right track, and was interested in his future welfare as well as that of the Company. He studied his job and took advantage of all opportunities that presented themselves, thus making himself more valuable to the Company. The Gang Foreman who was not promoted was not interested in his own future welfare nor of the Company, his time being taken up with social activities. Therefore, when opportunity presented itself he was not qualified for promotion.

*Group No. 7:* Mr. R. F. Sebourn presented the following verses for the consideration of the group:

A bird in the hand is worth two in the bush  
We were taught by our dads and the rest of the push.  
But, here is a motto that's equally fine,  
The man fully qualified is promoted in good time.

The man fully qualified has made the best move,  
This fact, may another great principle prove,  
His interest at Tech. and at work each day,  
Prepared him for promotion without delay.

Messrs. Skeen, Woodward and Payne then discussed the question to the conclusion that true friends are with you under all circumstances when you are right and are frank with you when you are wrong. In this particular case they were poor advisers and therefore poor friends, and such actions will make men look on the dark side and have a bad effect on the force. The man who prepared would show it and if the boss knew it, the other man would also know it, also the men would be well pleased with the selection.

*Group No. 8:* Messrs. Bowman and Norton stated that a Gang Foremanship may seem very ordinary and unimportant, but it is a very important job with no few responsibilities. A Foreman to be a leader must be qualified theoretically, mechanically and practically in his specific line of work. His neglect of study, failing to properly familiarize himself with the rules and instructions governing the handling of his work would automatically disqualify him, not only for promotion, but to retain his present position.

*Group No. 9:* Messrs. Geist, Myers, Daley and Bender brought out the thoughts that the first man studied and took advantage of his spare time in educating and enlightening himself in regard to his work which fitted him for something better. The second man may have been as well equipped in a practical way, but apparently what was wrong was the fact that the second man permitted outsiders to persuade him that favoritism was shown. Loyal friends will not take this attitude toward a man. Possibly, however, they did not realize that the first man was better educated to handle the promotion. They also repeated the saying that "All work and no play makes Jack a dull boy" but felt that it was necessary for a man to give some time to study while off the job. It may be possible too that the social activities of the second man were encroaching on his thoughts while he was on the job which resulted in impairing his efficiency, and have a tendency to throttle his interest in his work.

*Group No. 10:* Messrs. Albright, Fisher, Rhoads and Dawson reached the conclusion that the man who adapted him-

self to his work and made an effort to educate himself for further advancement should receive the promotion rather than the man who passed his spare time in social activities.

*Conclusion:* It is evident that both workmen were competent mechanics and possessed administrative ability or they would not have been promoted to Gang Foremen. It is granted that a Gang Foreman who is a thorough mechanic and who has sufficient natural ability can probably get by with his job successfully without the necessity of outside study, providing he does not permit his outside interests to interfere with his health and reduce the amount of rest to a point where his efficiency is impaired. The value of friendship is not to be discounted but friendship alone cannot be considered as a qualification for promotion. The friends of the second man were poor advisers. They should have advised him to go to his superiors in person and ask for a frank explanation rather than attempting to intervene in his behalf. Ill advised sympathy only makes a man discontented and further impairs his efficiency. True friendship calls for honest advice even if it hurts.

#### QUESTION No. 2

“In a shop which was recruiting new men and training them in student gangs, Instructor ‘A’ and Instructor ‘B’ both reported two men available to take their regular places in a gang. All four men were accordingly shifted to a gang in charge of Gang Foreman ‘C.’ From the start the two men from Instructor ‘A’ made good and at the end of six weeks they were averaging 20% above their hourly rate. The two men from Instructor ‘B’ working in the same gang were not successful and at the end of six weeks went to the Foreman and complained of favoritism in the matter of assigning work on the part of Gang Foreman ‘C.’ What is wrong?”

*Group No. 1:* Messrs. Ellis and Campbell expressed the opinion that Instructor “B” passed the men along to the Gang Foremen to get rid of them. Gang Foreman was at fault in not sizing up these two men and after giving them

proper instruction, should have returned them to Instructor "B" if, in his opinion they were incompetent and not wait until they felt that favoritism was being shown, while in reality it was their own short comings.

*Group No. 2:* Messrs. Gamber and Faust felt that the men who complained of favoritism may not have been giving their best efforts or that the men who were instructed by Instructor "A" adapted themselves better to the work, or that possibly the instructions received by the men under these two instructors may have been so different that the one set of men were better able to go ahead than the others.

Messrs. Manahan and Knier were of the opinion that the nature of the work assigned these men may have been such that more progress could be made on the one job than the other. The instructions received may have had something to do with it, but Gang Foreman "C" erred in not making some kind of a change after the first week. He should have tried to find out what the trouble was that the men from one instructor could make out and the others could not, without waiting six weeks and giving the men a chance to complain.

*Group No. 3:* Mr. Zeigler stated that if these two men would have devoted the time to their work that they spent in watching the other fellows, their earnings would have been increased. The thought of Mr. Zeigler was that every man should devote his time to his own business first and then if he has time left help the other fellow out. This question was discussed by Messrs. Gerheart and Hassler who expressed the same thoughts as Mr. Zeigler.

*Group No. 4:* Messrs. Maugans, Reish, Bitner and Womer stated that it should not have taken more than one week to know that these two men were not qualified. The Gang Foreman should have investigated their cases at the end of the first week and when it was found that they did not measure up to standard they should have been returned to the Instructor for further education along the line of work. At the same time the methods of Instructor "B" should be

investigated to learn whether or not he was giving his students the proper course of training.

*Group No. 5:* Mr. Oberholtzer stated that some men may be instructed well but do not have the capacity to remember things, and in that case the instructor should not be blamed. Mr. Green felt that one instructor probably explained the work and then showed them the best way to do it, while the other instructor may have explained the work but did not show them the best way to do it. Mr. Mumma stated that some men do not seem to learn that some jobs require more skill and accuracy than others and no matter how well they are instructed they do all work in a slovenly manner.

*Group No. 6:* Messrs. Schlager and Berheimer expressed the thought that the failure of the student repairmen was up to the supervisor, as they evidently had not been properly instructed, were advanced too early, and were therefore working under a handicap, causing them to earn less than their daily rate. In such cases the Foreman should get wise to the situation and refer the men back to the instructor for further training, and not wait until they complained of favoritism. It is evident that the two men from instructor "A" were well trained and thoroughly fitted for their work when promoted, this not being the case with the two men from instructor "B." Under such conditions it should not have been necessary to wait six weeks for Gang Foreman "C" to ascertain this condition.

Messrs. Meadath and Runk discussed this question and presented the same thoughts as Mr. Schlager.

*Group No. 7:* Messrs Stoner, Rathvon and Kunkle were of the opinion that Instructor "B" should not have turned the men over to the Gang Foreman until he was reasonably sure that they were competent to go ahead, but that it should not have required a period of six weeks for Gang Foreman "C" to ascertain whether or not they were competent to go ahead.

*Group No. 8:* Messrs. Rich and Karper stated that the two men from Instructor "A" evidently had different training, or were faster mechanics than those from instructor

"B" else their earnings would not have been 20% above their hourly rate. It is evident that instructor "B" erred in his judgment when he reported his two men as being ready to assume their places in the gang. On the other hand Mr. Norton felt that it should not have taken six weeks for the Gang Foreman to discover that these two men were inefficient, but should have taken such action as to forestall any claim of favoritism on their part.

*Group No. 9:* Messrs. Eckert and Quaid felt that the fact that the two men from Instructor "A" made good showed up good for the method of training employed by him, coupled with the fact that the men in question were not afraid to take hold of the work. Never-the-less Instructor "B" may have been just as sincere in his training of the two men who did not make good.

Messrs. Bankes and Myers were of the opinion that the first two men were more interested in their work while they were under instructions and the second two men did not make good because they failed to absorb the instructions given them. It should not, however, have taken Gang Foreman "C" six weeks to ascertain that something was wrong and corrected it. It may have been possible that in absorbing these men in the gang a wrong move was made and that the trouble could have been remedied by splitting the men and placing them with other mechanics thereby increasing their interest in their work and at the same time boost their earnings and prevent any complaint of favoritism.

*Group No. 10:* Messrs. Albright, Westfall and Bell expressed the thought that Instructor B and Gang Foreman C were both responsible for lack of judgment. First, the instructor for reporting the men out before they were prepared and the Gang Foreman for failure to properly size up the men after a reasonable time.

*Conclusion:* The two men from instructor "A" need no comment as they were qualified to take hold of the work when they were placed in the gang. It appears that Instructor "B" and Gang Foreman "C" were both lax in the handling of the other two men. It is very doubtful if they

were competent to go ahead with the work when they were reported out from the student gang. In any event Gang Foreman "C" should have had them sized up at the end of a week and arranged to give them the necessary instructions or else report to the Foreman that they were not able to hold up their end of the work. To permit them to go on until they imagined that they were the victims of favoritism indicates poor handling on the part of the Gang Foreman.

### QUESTION No. 3

"It was decided to place a certain shop operation on a piece work basis and a system time study was accordingly arranged and the prices set. Two shops found that their men were unable to make out on the prices set. Shop "A" inquired from the piece work Committee what shop was handling this work successfully and sent men to investigate. After investigation they revised their methods and provided the proper tools. After two weeks trial they found they could handle the job successfully and at the end of two more weeks improvements were suggested which made possible a further reduction in the labor cost of 15% with accompanying increase of output and time studies were submitted recommending a reduction in the price. Shop "B" made exhaustive time studies of the operation according to their methods and submitted recommendations for increases in prices to take care of their conditions. Discuss the initiative and morale of the supervisory organizations at shops "A" and "B."

*Group No. 1:* Messrs. Lehmer and Packer brought out the conclusion of this group in stating that Shop "A" was supervised by a good organization and after ascertaining that another shop, working under the same conditions, were making out visited that shop and profited by the information received in this manner, which resulted in their showing improvement over the other shop after due trial, which brought out the fact that there was co-operation between the supervisory force and the workmen. Shop "B" was either lax, or they permitted other duties to prevent an

analysis of the conditions and after the same was eventually brought to the attention of the supervisory force no action was taken to remedy the same, which resulted in the men becoming dissatisfied.

*Group No. 4:* After discussion it was generally agreed that Shop "A" looked at matters square in the face and endeavored in every way to meet the requirements. The men and supervisors of this shop worked in harmony with each other. By offering suggestions and making improvements, giving personal time and attention to the job they were successful in handling the situation. Shop "B" only made studies of their own shop conditions. They should have sent men to observe conditions at other shops which were making out on the operation in question.

*Group No. 6:* Messrs. Mountz, Runk, Smiley and Johnson stated that it is evident that Shop "A" made an intelligent survey of the matter and after having worked on the operation to the point where they could handle the job with facility and earn fair wages they further interested themselves in pursuing the matter to a point where they were able to bring about a reasonable reduction in the rate. In other words Shop "A" handled this case as it should have been handled at all points. The men interested, from the Foreman down, should have a follow-up system, proving the rates and establishing economy by fair reductions were possible. This is the true spirit of the "Payment by Results Plan" as it produces a fair wage to the workers and means increased production. The failure of Shop "B" to follow the case up as was done by Shop "A" and the fact that they failed to make out on the job is satisfactory proof of this contention.

*Group No. 7:* It was the consensus of opinion that there would be enough pride in the supervisory force of any shop to feel that they can do as good as the other fellow and after they investigated they found that they could. Shop "B" was evidently lacking in this pride and if they had the proper shop atmosphere and initiative they should be able to equal or excel shop "A."

*Group No. 8:* Messrs. Bowman and Norton stated that proper facilities and revised methods seemed to be the solution for the problems that were confronting these two shops. The difference between the organization of Shop "A" and that of Shop "B" was the difference between success and failure. Shop "A" was willing to investigate, change their methods and add to their facilities, if necessary, in order that success might be the reward of their efforts, while Shop "B" was too self centered and disinterested to inquire of other points where the same prices were successfully handled.

*Conclusion:* Shop "A" met this situation in an ideal manner. After receiving the instructions to put the operation on a piece work basis it was kept under close observation and as soon as it was evident that the price was based on methods superior to those then used at the shop they investigated. The fact that improvements were suggested after four weeks of operation indicates that the idea had been properly sold to the workmen and that they were interested in making the best possible success of the operation. It also appears that the Foreman at this shop was master of the situation and had his job sufficiently well in hand to give analytical study to the new operation. The situation at Shop "B" indicates a disgruntled workman who was permitted to struggle along against odds until he registered a complaint to the Foreman of his diminished pay check. It also indicates a supervisory force who were overburdened with detail which interfered with proper observation of the new operation and even resulted in improper conclusions after the workman registered his complaint.

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## FOREMEN AND LABOR TURNOVER

By G. M. BASFORD  
Consulting Engineer,  
Lima Locomotive Works, Inc.

February 5, 1923

If we are good foremen, labor turnover will drop.  
Are we fitted to be foremen?  
Think it over!

Foremen are conspicuous. They stand out where they can be seen. Anyone who does that is subject to observation and criticism. What did we think of our foremen? We thought we knew what a foreman should be and planned to be ideal ones when promoted. Have we kept those ideals in mind? What do the men on the track, in the shop gang, on the machines, on the signal job think of us? If a chief clerk what do the boys in the office think of us?

Foremen are the "Top Sergeants of Industry," the most important officers of all. But men in the ranks have been known to shoot down their own officers at the first opportunity and the men in the ranks are doing this in one way or in another whenever they feel like doing it. Foremen's work is made up of the work of others. Those others are in position to make or ruin you. It is up to you which they do.

"Give me a bunch of good foremen and the yard will run itself," says the ship builder.

"War is a question of generals. Generals are made by their selection of the right men for every important duty," says the historian.

"Such success as has come to me is due to the men I picked and trusted," said Carnegie.

Discussions on reducing cost of transportation do not really begin before someone mentions the real key to the situation which is effort of the individual all along the line to improve his production, to save. The next thing mentioned is the foreman and supervision. The foreman today

is the most vital influence on the road because the word foreman itself represents and suggests direction, leadership, supervision and training.

The character of an organization is up to the character, ability and progressiveness of the foreman. No matter who or what the captain is, the company is practically useless unless the top sergeant is right. If the foreman is a time server, as sometimes he has been taught to be, the men will be time servers also and the result is well known. Who on any road other than this one ever gets shop foremen or yard foremen together to tell them how important their jobs are and to show them that to their men they represent the railroad? Are they encouraged to know the manhood, ability and possibilities of their men? Does the foreman look with his own eyes alone or does he look with the eyes of the management? Does he know his men when off the job? Is he their friend and advisor? When you want something done do you tell the foreman? Do you explain it and tell him to explain it to his men?

How is a new foreman selected when a foreman leaves? As to the men in the ranks—everything depends upon the foreman. He may be most skilled with his hands and may be most proficient with his own work, but he must know how to manage and operate the most complicated, most delicate machine in the world, a human organization with intricate problems always present. Is he usually told about the management of men and is he helped and supported as he should be in that management? If the new foreman should be made to feel that the employer is his best friend and if he understands the importance of so doing he would, in a short time, pass the feeling along to his men.

Remarkable results on this railroad are being obtained by leading the foremen to realize that they are really administrators of human affairs, that they require wisdom as well as ability, that an army is what its commander makes it, that the gang reflects the leader and that the leader must know and have the confidence of the men he leads.

### THE TRAVELING ENGINEER

It is well that traveling engineers should strive to "improve locomotive engine service on American Railroads." This is the object of the fine association of the traveling engineers. Is it possible that these vitally important men can get closer to the men on the engines and represent to them the ideals and the humanity of the wonderful organization of a railroad? There is no finer body of men than those who run our engines, but as a body what do they know, what do they see of the management? It is represented to them by rules, the breaking of which means trouble. These men can affect the treasurer's figures more than any other class of men on the road. I believe that a 10% saving in fuel lies in the hands of those men whenever the desire to save it is made an ideal with them and when the idea of saving is "sold" to them.

### ROUNDHOUSE FOREMEN

Here is the man who must be the manager of his men. He is often isolated and must rely on himself and frequently faces great difficulties of weather, lack of facilities, even of conveniences and without sufficient subordinate supervision in his work. His work is a continuous emergency. A big roundhouse job is as big as the head of the department had a generation ago. Here is a good place for a start to be made in reducing idle time of engines. Here is an opportunity for the foreman to put up arguments for machinery, facilities and for the training of men. This foreman must tell what he is up against and must make the management come across with necessary facilities.

### TRACK FOREMAN

Here are men who work alone. Weather, flood and unexpected trouble add to daily routine. Here training and encouragement count as everybody knows who has had occasion to rely on these remarkable men in emergencies. In the case of track foremen industrial intelligence is of great value because of the nature and conditions of their work.

These men have a wonderful opportunity to effect small savings that in the aggregate are huge. To take proper care of track today requires a knowledge and experience that should be a fine preparation for promotion. The management should recognize this.

#### SHOP FOREMEN

This is the official you know most about. The position is rapidly becoming one of the most important on the road. It presents remarkable possibilities for management of materials, machinery and men, on the one hand; it presents temptation to just hold the job on the other hand. My old foreman retired not long ago as Superintendent of Motive Power.

#### CHIEF CLERK

Let us think a moment how chief clerks are selected. It is a personal matter with the officer. Chief clerks sign the officer's name, take action for him in his absence. I have seen over one hundred officers of a certain road in conference for several days at headquarters in Chicago while the chief clerks ran the road. Because this is personal service these men are selected with personal care and from men who have been through long periods of training. Naturally they make good. We should therefore think of two things in this case.

First: These men are often good material for promotion. Think of this—The chief clerk is close to his superior. He absorbs from his superior the things that made that superior successful. He grows by his contact with a bigger man. This is training, of the sort we most greatly need. Moreover the chief clerk is in an exposed position where good work shows up quickly and clearly. Let us get the obscure men into a brighter light and see what happens.

Second: Every man on the road must and does act for the boss in his absence and should be selected with equal care and should be trained as well. By the way, chief clerks train their men. The very reason why you are fussy about

your chief clerk is the reason why the filling of every job should be just as fussy and you should do it as carefully. Every man signs the name of the boss on every job he does and the railroad is about 150 feet to 200 feet wide and perhaps 2,000 miles long. The boss is away most of the time from most of his subordinates.

The late Mr. Robert Quayle has said that the boss is constantly being made a bigger man because of his contact with his chief clerk.

#### LABOR TURNOVER

To engage new men, teach them their duties and launch them into service costs a lot of money. To engage, train and then lose them in large numbers is a very serious loss. It is one of the biggest leaks in industry. To hire and lose a skilled man costs from \$250 to \$300 in one industry which has been studied. It must cost railroads more than that because in many cases great damage is done by such men. A man well known to many in this audience told me that on a certain division of his road two-thirds of the locomotive firemen changed every month, an average tenure of forty-five days for all the firemen on the division. Let us hope that this is an extreme case. It serves to suggest the value of the study that at least one western road is making of its labor turnover and the causes. There must be some reason for this and probably a remedy would be suggested by the reason. In contrast I know of one large railroad shop which for three years in fairly busy times had not found it necessary to go beyond its own apprentice graduates to supply all the skilled talent needed and in that period no skilled workman was hired from outside.

Mr. L. F. Loree says that it costs \$5000 to educate an engineman and \$1,000,000 to educate a general manager. He also says that, in a big terminal, the difference between the value of the services of a good yardmaster and a poor one may equal the President's salary.

Therefore, as it costs proportionately to educate every foreman every workman and every clerk it is worth while

getting the benefit of the education. The foreman can save many a "turnover" by knowing his men. He can save many a young and valuable man by getting close enough to him to be asked for advice.

#### INSPIRATION

A large majority of men take pleasure in the accomplishment of a good piece of work. Making something, repairing something, or making a good run over the road brings satisfaction and is in itself an inspiration. Praise is often in order but must be used with discretion, so also censure. Notice taken in either case indicate that the company cares whether work is done well or not and most men will respond.

I once stopped at a boring mill going through a large shop with the Superintendent of Motive Power of the road. The day before the machinist had turned out a particularly satisfactory job in quantity and quality. The favorable comment of the boss was very evidently an inspiration to the men. This showed the value of individual notice and incidentally the importance of quick records. That this is a factor in the training of men is the point in this case. The boss must see to it that the men in the ranks knows that he is on earth.

In another case a road had three shops far apart and a flue job at each. One of the flue gangs had made a record. The leaders of the gangs at the other shops were sent to investigate. They went back and beat the record. This was not all. All three flue jobs were overhauled, new machinery installed and a lot of money saved. Mere expression of interest inspired those men to do good work, and they were happier for doing it. It is a part of training of men to show them that the job they are doing is of great importance to the road.

When we ourselves worked at the bench or ran a machine or leaned over a drawing board a little notice from those higher up certainly went to a point deep within us. I was a draftsman in an overflow office over the car shop. One

day the Superintendent of Motive Power came down a quarter mile through the slush to give me a bit of his time, though he did not need to—I was not working directly for him. Many of the draftsmen were sick. He came to show his interest and to tell me not to work too hard. The good effect has lasted until now. This was a part of this officer's way of training his men.

This was Mr. Godfrey W. Rhodes formerly of the Pennsylvania. Every man of us was working for him personally. Why?

#### APPRENTICESHIP

This word takes us back to earlier days and especially to mechanical trades. In fact it represents training in those trades involving skill of the hands. Everybody knows that it represents training in the most complete sense of the word. In the olden days it involved training within a half inch of the very life of the poor little chap who was the victim. But it made good workmen of the survivors. Today a different idea is in order but something new that represents the good features of the old system is very much wanted. I use the word apprenticeship with hesitation simply because to most people it suggests merely "trades." It really represents training, thorough training of the hands, of the mind and of the morals of the lad. What we need today is a modern up-to-date substitute which will fit the times and the change from an employer with one employee to the multiple employer with thousands of employees. The principles involved remain the same.

Let me quote from a report of a Massachusetts Commission on Industrial training, a quotation I have used before because it so exactly expresses the need for training in every department of every railroad.

"In many industries the processes of manufacture and construction are made more difficult and more expensive by a lack of skilled workmen. This lack is not chiefly a want of manual dexterity, though such a want is common, but a want of what may be called industrial intelligence. By

that is meant mental power to see beyond the task which occupies the mind for the moment, to the operations which have preceded and to those which follow it—power to take in the whole process, knowledge of materials, ideas of cost, ideas of organization, business sense and a conscience which recognizes obligation.”

#### FRIENDS

Everybody needs a friend. Every young man finds a turning point in his career, a point in his life when he wakes up to a realization of his responsibility and his opportunity. It may be that a word of advice, of caution, of recommendation given at the right time will make, and the absence of it will break, a career. It is most fortunate if this friend is his employer or the representative of his employer, the foreman, the general foreman, the master mechanic, the train master, the chief dispatcher or in short the man the young man works for. In older days when organizations were small it was the boss himself. In these days of big things it is the representative of the boss. The most important thing a big organization can do is to provide the thing that big business has outgrown,—personal contact with big unselfish minds, minds big enough to give a point of view to an individual. The employer is really the best friend of the employee. If this is not true in any case it must be made true. Then it must be understood by every officer and every workman. How shall this be done? It must be somebody's business to get it done.

#### GOOD SOLDIERS

Nobody ever wanted “good soldiers” as railroads want them now. Railroad men are good soldiers but who are their leaders and why? Most men are followers, in fact everyone is a follower of some sort. We worship heroes and ideals. We follow leaders more able, capable or perhaps more dominant than ourselves. Shall we follow our superiors? That depends upon their leadership and we are company men or organization men depending on the influences

and their strength. What is to be done about it when others lead our people away? Is there nothing we can do? Let us remember that the "Old Man" used to be the leader and let us consider the possibility of regaining some of his leadership in the days that are to come. It will be needed. Men always have followed and always will follow those whom they think "get" them most. It is important to find a way to discover, recognize and reward individual ability.

### DISCUSSION

Talking things over brings co-operation. When people get together for discussion responsibility is necessarily forced upon those present and the natural tendency is to look at the question from the other man's point of view. This is the value of meetings, especially when the object is to reveal and develop the importance of the person who has a tendency to consider himself obscure and overlooked. Nothing in any organization helps so much as for this man and that man to stand up and tell in his own way what or who is holding him back. When the accused must answer the chances are that more complete understanding will be reached. The chief who is present is not the only one who will begin a liberal education from discussions with his foremen or his men.

### SELLING AN IDEA

Experience in selling something to people who think they do not want it would help the leaders of big organizations more than they know. An organization must have ideals. To succeed these must be sold to those who are to carry out the principles, the official staff, and by them they must be sold to the rank and file. Is the ideal of reduced cost of transportation sold to the men in the ranks? Do many of the men say "What do I care, there is more coal, more material, and more time where this came from?" When the ideal that the roads are working for is sold to the men the present labor problem will be simplified. Foremen and subordinate officials can and I believe will accomplish this in

the future, but selling necessarily involves something to sell, which in this case is not lacking, and ability to bring the purchasers mind to the mood to buy.

### LOOKING AHEAD

How are we to look ahead when we have so many troubles in hand? Troubles we shall always have and if years ago we had looked into the future on the personnel question our difficulties today would be less. If we do so now they will be less ten years from now.

In the development of railroads a lot has happened since the day when a road was so small that the Superintendent was the only operating officer—when the Master Mechanic and everybody else, having to do with operation, reported to the Superintendent. Then the “Old Man” knew everybody on the railroad, from the crossing tenders up. Those were the days when it was customary to print a circular and send it to everybody along the line saying that tomorrow, February 22nd, at 2 P. M., a special will start over the road. Up to a few years ago I had such a circular. This is mentioned to show a contrast between the big railroad systems of today and the little roads of years ago. Many things have changed and changed for the better. The old “Czar” system has gone. In that system the “Old Man” held everyone’s job in the palm of his hand, hired and fired as he liked, rewarded and punished as the old time head of the family rewarded and punished his children and there was no one to question him. In those days the captain of a ship held little more power than the railroad official. The labor union was the direct result.

There was something fine about the old method when the highest operating officer knew everybody. In spite of the faults of the system, which really was the best system for the time, it has left us some of the best traditions and has given transportation service some of the best of men. It gave co-operation. Co-operation had to be because there was someone on hand to enforce it.

This effect of co-operation has probably done more than

any other one thing to tie railroad men together and make so many of the old time railroaders feel that any man in railroad service was, in a large sense, a member of his own family. This feeling is not as strong today, co-operation is not as common, but it is, and will remain, a factor that we cannot do without. It must be provided.

Another feature of old time railroading was the training of men. I refer not only to apprenticeship, but to the careful training of every new man for his job. As a matter of course boys entering the shops were apprentices, so also were firemen, brakemen and switchmen and all the rest. In those days somebody had time to instruct new men. Years ago I watched instruction given to new locomotive firemen on a road I knew well and the like of this training I have not seen since boyhood. A personal friend of mine was promoted to be an engineer. He was trained for the job for months after years of firing, and then was not made a full fledged engineer for a sufficient length of time to enable him to show what he could do with a fuel record. Whatever else we say of those days, certain features of the times indicate a thoroughness which we do not get today.

In days of old, promotion was controlled by prejudice, by favoritism, sometimes by family ties, but with all the faults of the early days, men were seldom imported from other roads.

No one wants the old days back, but it is fitting to consider features of the old which should be provided with the new. Some of these are the careful selection and training of new recruits, the spirit of the railroad men of older days, co-operation and the intimate knowledge of the men in the ranks on the part of someone in authority. Of all the things we need to take out of the past and apply to the future, the things we need the most are the selection, the training and the knowledge of men. Railroads are too big, even departments are too big to permit the operating officers to know who are working for them, but some substitute for these features of old times must be found. A way must be found for foremen at least, or sub-foremen thoroughly to know the

men working for them, their personality, their capacity, their ability and their qualifications for promotion. This and the selection and training of men may be supplied under present conditions and may yet make railroad service as happy as it ever was, but to accomplish this requires a lot of thought, a lot of time and a definite plan which will enlist the co-operation of the men.

Co-operation means friendly team work. It has been said that a mule can not kick when he is pulling and that he can not pull when he is kicking.

In closing let me remind you that every successful officer, foremen or man in the ranks may rise if he trains his own successor. He can not rise unless he does this.

On the magnificent railroad you represent there are many ideal foremen. In the broad conception of the title of "foremen" your President leads the list. He is the *Super-Foreman*. He is surrounded by other great foremen. But their lives are like your lives. They are the lives of foremen. They live in the lives you lead. Their problems are your problems combined into mountainous proportions. That is the only difference. Every one of you is a personal assistant to the President. Do you take your job that way? Do you consider it that big?

Now what are we going to do? Our souls are saved every Sunday but what about Monday?

What are you doing for your people to prepare them for promotion? What are you doing to interest your boys in the Frank Thompson Scholarship? What are you doing to induce the management to restore apprentice schools generally? You have inherited. What will you bequeath?

### *Discussion*

#### QUESTION No. 1

"A mechanic seeking employment reported to the office and was told that the Foreman was in a certain part of the shop. After some hunting he found the Foreman and after waiting patiently until the Foreman seemed free requested

a position. The Foreman said "I am at the office a thousand times a day, go up there and wait till I come." The man went to the office and waited two hours, after which the Foreman came in and interviewed him with the result that he was employed and instructed to report at 7.00 A. M. the next day. He reported the next morning and on approaching the Foreman was told "Wait outside the door till I come." He waited an hour and a half before being assigned to work. What was the situation in this shop with respect to labor turnover?"

*Group No. 1:* Messrs. Shade and Mumma felt that the Gang Foreman should be trained so that they could put new men to work, with the consent of the Foreman, as newly hired employes should not be required to hunt the Foreman in the shop; applying at the office should be sufficient.

Mr. Lehmer stated that this department is not functioning properly in regard to inducting new men; the Foreman is trying to carry the load of his department by himself. He should have some one trained to handle important questions for him so that prompt action could be taken, but as the shop is now conducted a large labor turnover can be expected.

*Group No. 2:* Messrs. Knier and Gamber expressed the thought that it was wrong for a man to have to go around the shop and hunt the Foreman, when applying for work. Some method should be set up whereby the man would apply to the office, where he could be taken care of by some one authorized to do so, or arrangements made whereby the Foreman could be reached on short notice.

The question was also discussed by Messrs. Keet, Reese and Deen, who were of the opinion that the Foreman in this particular case did not properly induct this man into the service. The first impression a man gets about a shop is generally a lasting one, and has a great deal to do with the extent of the labor turnover in that department.

*Group No. 3:* Messrs. Eichholtz, Gerheart and Derick after discussing the question agreed that the Foreman

lacked the art of Foremanship and his knowledge of inducting new men into a shop had never been a real factor in his work.

*Group No. 4:* Messrs. Handschuh and Maugans stated that the Foreman's actions in this case might be the cause of good men losing all interest in the work which would have a tendency to increase the labor turnover. It is evident that the training of men in this department was sadly neglected and the Foreman had the idea that he himself was the only one to be considered.

*Group No. 5:* Messrs. Baer and Hall stated that the Foreman in this case was too autocratic and should have taken care of the man more promptly on both occasions, and if he was too busy to look after the man promptly he should have instructed some one to take charge of the case.

Messrs. Smiley and Batten were of the opinion that the Company should have an employment agency where all workmen would be hired and sent to the Foreman for whose department they were employed. Mr. Smith agreed that this would be an excellent idea if the agency was manned by competent persons to judge the caliber of the men employed, but that he still felt the Foreman was better qualified to know the man who would fill his needs.

*Group No. 6:* Messrs. Schlager and G. H. Smiley felt that a man handled in this manner, by a Foreman would lose patience and finally conclude he was not very badly needed; they being certain that a good mechanic would not stand for this kind of treatment and would leave the premises after waiting a reasonable length of time. The Foreman of this department should have some set-up whereby a man, applying for employment, could be taken care of promptly, whether the Foreman was present or not.

It was the concensus of opinion that this man should not have been permitted to wander through the shop in search of the Foreman, but after he found the Foreman, the Foreman should have taken the time to return to the office with him and dispose of his case promptly, one way or the other

and thus prevent the man from becoming discouraged before actually starting to work.

*Group No. 7:* The consensus of opinion of the group was that there was no question of the importance of the Foreman having a talk with candidates for employment, as he could at that time outline the rules and regulations necessary to retain employment and receive advancement. It is impossible to properly induct new workmen into a shop by the careless methods employed by the Foreman in question, as he apparently is running a one man shop. After hiring the man he should have set up an arrangement to have the man report for duty without the necessity of waiting on him.

*Group No. 8:* Messrs. Norton and Rich expressed the thought that this shop appeared to be a one man organization and the Foreman failed to set up the necessary arrangements after the man had been employed for his prompt assignment to work when he reported the next day.

Messrs. Schlosser, King and Shirk also discussed this proposition with the conclusion that the Foreman was striving to run his department alone and in so doing was not properly inducting workmen into the shop, which would discourage the man and be the means of producing a high labor turnover.

*Group 9:* Mr. Roberts stated that he did not see how a shop with such a method of employing men could attract new recruits, or even keep them after they had been employed. He felt that the man in question would form an opinion of the Foreman on his way home, which was unfavorable. This condition, the first impression gained by the new man, would sow the seeds of discouragement and discontent to such an extent that the labor turnover in that shop would be near to perpetual motion.

Messrs. Bender, Dolbin and Bordlemay also discussed the question, arriving at the same conclusion presented by Mr. Roberts.

*Group No. 10:* A general discussion of this question was entered into by Messrs. Harro, Fisher, Dawson and Mager

who agreed that the functions of inducting and training new men in the shop, to say the least, were very lax and in all probability the man was discouraged and ready to quit before he started to work, and as a result the labor turnover in this department would be enormous.

*Conclusion:* It is evident that the important function of inducting and training new workmen is being seriously overlooked in this shop department. It would also appear that the Foreman is making a one man job of his operation. While it is essential that the Foreman personally interview candidates for employment he should be able to find the time promptly unless some emergency exists in the shop, which does not appear from the statement of the case. This workman was undoubtedly discourgaed, if not discontented, before he actually began work and we can expect a high labor turnover from this department.

#### QUESTION No. 2

“There are two railroad shops of practically the same size, same character of work, same facilities and working conditions and located in industrial cities of approximately the same size and the supply of skilled mechanics available in the two communities is approximately the same. Shop “A” has 95 apprentices, which is all they can use, and has a waiting list of 30 boys, many of them high school graduates, who have applied for positions. Shop “B” has 14 apprentices and has not recruited any new ones for two years, although they have frequently advertised in the local papers for young men to learn the trade. This condition is a puzzle to the Superintendent Motive Power who calls in an experienced Foreman from a distant point and asks him to investigate and report on the causes which created this condition. Along what lines should he make his investigation and what are some of the conditions which he will probably find?”

*Group No. 1:* Investigation should be made of treatment accorded apprentices, the training they get and rates of pay in outside industries in the two localities and compare them

with the shops in question, to ascertain what is wrong. On the surface it would appear that Shop "A" was equipped and supervised in an ideal manner. This conclusion was submitted by Mr. Lehmer.

Mr. Beck stated that some great attraction was such a drawing card at Shop "A" that they had a waiting list. Shop "A" evidently had a Foreman who was on the job, which was known to the people of the surrounding territory and was as efficient an advertisement as Shop "B" circulated in the local papers. Shop "B" lacked the co-operation and training which was apparent at Shop "A."

*Group No. 2:* Mr. Knier expressed the opinion of the group in stating that the shop which is widely advertised for its morale, good mechanics and the cheerful conditions of the shop surroundings has a great deal to do with the labor turnover. From the question it would appear that Shop "A" was known for these qualifications, hence it had all the apprentices it could use and had a waiting list, while shop "B" was known for the opposite conditions and hence had trouble in obtaining apprentices.

*Group No. 3:* Messrs. Derick and Adams agreed that Shop "A" must have possessed a friendly, frank business atmosphere which was a drawing card for apprentices; not only the supervisory forces but the workmen as well, while shop "B" did not possess these qualifications. It was argued that it is not always the Foreman who draws and holds apprentices in shops of this character, but the disposition of the men, as many good apprentices have been lost to a shop on account of the disposition of the first man with whom the apprentice is placed.

*Group No. 4:* Mr. Handschuh felt that the investigator should go to each shop in turn to observe their methods of working, he should observe if the Foreman of each shop was interested in the apprentice. In many shops the Foreman or Gang Foreman does not take the proper interest in apprentices or new workmen, with the result that they easily become dissatisfied and will spread harmful propaganda to outside parties to such an extent that many good men have

no desire to become employees of that plant. Messrs. Givler, Maugans, Beane and Fries felt that a little recreation, similar to the eliminations now held on our own railroad, should be mixed in with the daily work of the men. In the first shop there was an interest taken in the men by the supervisors and the labor turnover would be slight, as the men would be satisfied and have no desire to make a change. In Shop "B" the conditions would be the reverse.

*Group No. 5:* Messrs. Jones and Reigel felt that Shop "A" must have had a reputation for turning out good mechanics, and the employees of that shop were so satisfied with their conditions that they carried home their ideas of the shop which naturally impressed their sons and neighbors and made them desirous of working in the same place. They stated that the results obtained at Shop "B" did not indicate such a condition. The class, after some discussion, were of the opinion that these men had brought out the conclusion.

*Group No. 6:* Mr. Bowers was of the opinion that an investigator would first of all make a careful survey of the systems in vogue at the shops in question, thereby learning the conditions that exist, thus enabling him to arrive at the proper conclusion as to the reason the one shop failed to recruit apprentices.

Mr. Johnson stated that the shop that failed to secure an ample number of apprentices was lacking in organization. It is further evident that harsh treatment had been dealt out to the employees, which facts spread rapidly and would go a long ways toward keeping applicants away. It is also possible that the shop that failed had poor tool equipment.

Mr. Schlager stated that it is evident that investigation would reveal the fact that the shop that had plenty of apprentices on the waiting list had good environment, good tools and equipment and good conditions in general, thus enabling the men to live in a good atmosphere; to earn good wages and as such information is spread rapidly this would bring the men to such a shop. In the shop that failed it is evident that conditions were reversed. Regarding the han-

ding of apprentices he felt that shop "A" had a favorable schedule.

*Group 7:* Mr. Skeen brought out the thought that the men employed in shop "A" were well satisfied with their conditions and encouraged their friends to seek employment at this shop, which resulted in the following conclusion being reached by the group: The conditions and morale in Shop "A" were such that pointed to keen interest on the part of the Foreman toward the workmen and apprentices. He evidently gave them the full benefit of his experience and knowledge. This was its own advertisement, while shop "B" was forced to depend on the local paper for its advertisement.

*Group No. 8:* Messrs. Shirk, Norton, Bitting and Zimmerman presented the conclusion for the group in stating that they felt the Foreman of Shop "A" was of the friendly, frank, businesslike type, while the Foreman of Shop "B" was not, and this fact carried from the two shops by the men employed there controlled the number of young men making application for apprenticeships.

*Group No. 9:* Mr. Geist stated that the investigator should start by looking into the conditions in both shops, such as sanitary conditions, safety devices, condition of tools and spirit existing among the men. He felt that in Shop "A" he would find pleasant surroundings, the Foreman had the good will of his men and the force was pleasant and agreeable among themselves. At the second shop he would likely find the Foreman uncivil and evasive, just as much as to say "Don't come in here."

Mr. Roberts felt that the conditions in Shop "A" were ideal and one boy would tell his friends about what a good shop it was to work in, stating that the human tongue is the best advertiser. Our American boys of today are looking for something better, hence if conditions are not what they should be at a certain place the information will soon circulate, and it is evident that the conditions at Shop "B" were not held in high regard, by the fact that these boys were not attracted by advertisements.

*Group No. 10:* The opinion was general that the investigator would find that Shop "A" had good, wholesome working conditions and that the Foreman took a personal interest in the mechanic and apprentice to build up the morale of the shop, which spoke for itself in the matter of candidates. This condition did not exist at Shop "B."

*Conclusion:* Before any conclusion can be formed it will be necessary for the investigator to determine the morale existing in the two shops, the relation between the Shop Foreman and the workmen, the attention paid by the Foreman to the training and instruction of apprentices, the kind of mechanics which apprentices make on completion of their apprenticeship, and the labor turnover among mechanics at each shop for a period of years. We should expect to find at Shop "A" a wholesome condition with respect to morale, well trained apprentice graduates who have not only been instructed, but who have had ample opportunity to perform important operations themselves, and close personal interest on the part of the Foreman in the welfare of their apprentices, and each apprentice graduate and mechanic in the shop acting as a voluntary recruiting agent for desirable apprentices by the simple method of telling their friends about conditions in the shop. We should expect to find this condition either lacking or reversed in Shop "B."

### QUESTION No. 3

"In analyzing his labor turnover statistics the Shop Superintendent observed widely different conditions in three shops departments where the character of work and working conditions were practically the same. The Foreman of Department "A" is mild and friendly in manner but possesses a firmness and thoroughness which commands the respect of his men. Discipline is excellent in this department. The Foreman of Department "B" is snappy, all of his orders are given with a "punch," he accepts no excuses for poor work or violations of rules, but takes the blame when things go wrong, if he is to blame. He never passes the buck to a workman. This man has the respect of most

of his men but some of them are afraid of him. The Foreman of Department "C" is noted for being quick tempered and for "blowing up" easily, and often bawls out his men when they do not deserve it. He is always sorry for it afterwards and tries to straighten things out. The men recognize his judgment and ability but his reputation for blowing up is so well known that the cooler men do not take him seriously and the more sensitive men dislike him. What conditions with respect to labor turnover does the Superintendent find in these three departments?"

*Group No. 1:* The opinion of this group in regard to labor turnover was that Department "A" would have very little turnover, Department "B" would not be so good as Department "A" but Department "C" would be high.

*Group No. 2:* General discussion resulted in the conclusion that there would be very little difference in the labor turnover in Departments "A" and "B," but that department "C" would not be comparable with the other departments due to the methods employed by the Foreman of that Department.

*Group No. 3:* Messrs. Derick and Zeigler argued that the methods of Foreman "A" should produce a well organized and disciplined shop with very little turnover, while Foremen "B" and "C" managed their departments in such a way as to produce higher labor turnover than shop "A."

*Group No. 4:* It was decided that Department "A" would have practically no labor turnover as the conditions were all that could be expected, although Mr. Maugans felt that Department "B" would have no more labor turnover than Department "A" as he was of the opinion that most men admire a Foreman of that type. It was generally agreed that Department "C" would have low production and high labor turnover, and that corrective measures should be taken to place it on a level with Departments "A" and "B."

*Group No. 6:* It was the consensus of opinion that the labor turnover of department "A" would be the lowest, Department "B" medium and Department "C" high, but that

with certain individuals it would be necessary for Foreman "A" to resort to certain measures characteristic of the other two Foremen.

*Group No. 7:* The group as a whole decided that the manner, bearing and thoroughness of Foreman at Shop "A" commanded respect. He had ability and tact which resulted in fair treatment, high production and practically no labor turnover. Shop "B" would be next best, with very little consideration for shop "C."

*Group No. 8:* It was the unanimous belief of all present that the Foreman of Department "A" was ideal. Department "B" was fair but not so good as Shop "A." Not one of the group felt as though they would care to work in a Department such as that described for Foreman "C" although it was stated that there are times when a Foreman is justified in blowing up, and the men receiving the bawling out are better for having received it, but this should be carefully restricted to the individuals who can be made to profit by it.

*Group No. 9:* Messrs. Roberts and Geist expressed the opinion of the group in stating that the labor turnover in department "A" would be very low, on account of the satisfaction existing among the men in that department. Department "B", would have some turnover, as it is not a good idea to have any of the men in the department in fear of the Foreman. Department "C" would have a large labor turnover.

*Group No. 10:* The decision of the group was that the Foreman of Department "A" was the right man for the job and would keep his labor turnover to a much lower point than either Department "B" or "C."

*Conclusion:* The conditions with respect to labor turnover will be good in Department "A," Fair in Department "B" and poor in Department "C."

### **KEPPELE HALL**

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## WAGE SYSTEMS

By KEPPELE HALL, Consulting Engineer  
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February 13, 1923

I always welcome the opportunity of addressing a group of foremen on any subject relating to industry because I believe the foreman occupies a position the importance of which is frequently not properly estimated by those who should appreciate it the most and very often not correctly evaluated by the foreman himself. He is the closest contact between the management and the worker and is the medium through which the policies of the former must be transmitted to the latter. Instead, without his intelligent co-operation these policies can never be successfully executed. The mere direction and supervision of work, important as it is, is only a very small part of his job and to be a real foreman he must possess far greater ability than that which is necessary to see that the work under his supervision gets done. He must have a very clear understanding as to just what the policies of his company are in regard to work and the worker—the degree of excellence which is required in the performance of each task, the mental and moral development which is expected of the worker, the reasons for the method of compensation used, the discipline which it is expected he will exercise. First of all he must be thoroughly in sympathy with these policies, for to retain a position of responsibility involving the direction of others, if this were not the case, would be nothing short of dishonest and would certainly disqualify him from being able to fulfill the next requirement, namely, to be able to sell the ideas to those who are under his supervision. He must command their respect and friendship and above all he must inspire them with confidence in him as one from whom they can always count on receiving a square deal.

Equal in importance to the foreman's responsibility to his employer is his responsibility to his men and he must always be courageous enough to insist upon justice and fair play for them even when this necessitates questioning the actions of his own superiors whenever he knows that through misunderstanding, accident or even design, some action unfair to them has taken place or is contemplated.

The foreman must possess ability, courage, common sense, honesty, and sincerity and a knowledge of his job. A man so equipped is able to run his shop, his office, his department or his gang with credit to himself, profit to his employer and contentment to his men—in a spirit of confidence and good will rather than in one of suspicion and distrust. Finally, the successful foreman is one who is personally interested in the progress of those who are working with him and who conscientiously strives to afford every opportunity for the development and expression of those great creative instincts that are inherent in every human soul.

Before taking up in detail a consideration of the various methods of wage payments it is well to consider just what the importance of wages is in our industrial organization. To the employer it is an element of cost—one of the expenditures that is made in producing his output whatever that output may be—a manufactured article for public consumption, or a service for public use, but in every case an expenditure for which he expects to receive and must receive a proper return in human effort in order that he may market his output at a price that will permit or induce the public to consume it and afford him or his company a fair return on an honest investment.

To the worker his wage is a medium of exchange for which he must receive his food, his clothing, his home, the education of his children, the care of the family health, their recreation and advancement, and a provision against sickness, unemployment and old age. The exchange value of this wage determines the extent to which he may enjoy the necessities and the luxuries of life, and its comparative purchasing power from year to year indicates the progress he

is making or failing to make in attaining a better standard of living. To the worker a high wage means but little if the term of employment is in doubt. And the feeling of uncertainty as to how steady his work may be, the dread of losing his job with all of the attendant hardships to himself and his family, is one of the greatest cause of the industrial unrest that sweeps over us from time to time.

Important as this matter of wages is to all parties interested the mistake must not be made of considering this the one important factor in production. Its importance as an element of cost has often been exaggerated or perhaps more properly speaking, other factors have been too lightly regarded,—the inefficient application of labor to industrial activity, the lack of careful analysis and standardization of work, the absence of proper planning and scheduling of jobs and an ignorance of the necessity of coordinating all the elements of production; in other words failure to develop and maintain real management has been responsible for more industrial disasters and social distress than the most extravagant policy of wage payment ever practiced.

Fortunately the old idea that high wages are inconsistent with low costs has been very positively disproven and modern methods of Scientific Management are demonstrating today in all lines of activity that the lowest costs are often obtained when paying the highest wages. But this in turn always implies *production, great in volume and excellent in quality.*

The various methods of wage payment in use today are all evolved from the original "straight time" method either for the purpose of obtaining some definite measure or quantity of work to be accomplished in return for a stated compensation or for the purpose of combining with such an understanding a guarantee of a steady flow of work. It is needless to say that the first of these were proposed by those who paid the wages and the last by those who received them.

The DAY WORK system in which the worker is paid a stated amount for a day's work of a certain number of hours

is seldom used except in the case of clerical or office work where the amount of work to be done has not been predetermined or standardized and hence it is necessary to have a force on hand during certain defined office hours when a more or less regular amount of routine work is done.

More usual than this method is that of **HOURLY WORK** where instead of a "daily" wage a stipulated amount of so much per hour is paid for whatever time is actually employed on work. When there is work for only a portion of a day or a reduced number of days per week the worker is only paid for the actual number of hours worked unless he is retained in order to maintain an organization in slack times or for the purpose of having someone in readiness to attend to an emergency job, but in such cases the worker is definitely retained on an hour work basis.

In **PIECE WORK** the worker is paid on the basis of the quantity of work done, each job or each operation having a unit price set and the earnings being the unit price times the number of jobs or parts, or operations completed and accepted.

There is probably no method of pay which has given rise to more bitterness and contention than the piece rate system, not from any inherent weakness in the method itself, but owing to the ignorance and stupidity which were displayed by those who were trying to employ it. In the first place the rate was often set on what someone "thought" a man would do in a day in case he were paid according to the quantity of his output instead of by the number of hours he worked; or the foreman or some special workman gave the job a "try out" and the result of his accomplishment arbitrarily qualified by "opinions" or someone's "judgment" led to the setting of a rate. No previous standardization of equipment, tools, supply of materials or other conditions was thought of. Perhaps the worker could make out on this rate, perhaps he could not. If he were easily able to exceed it and made use of this ability to earn large wages the rate was adjusted too high and promptly cut in order to hold the worker down to earnings that were considered

suitable. It does not require much imagination to picture what took place. Workmen became suspicious and resentful, they held back their output deliberately in order not to subject themselves to a cut, they perfectly naturally applied their ingenuity to soldiering as much as possible without being detected so as to keep well on the safe side. In fact so general was the distrust of the piece rate system that in large shops employing hundreds of men, and indeed throughout entire trades, an understanding would be reached by the whole body of workers by which no individual would earn on piece work more than a stipulated and modest amount more than what he would have earned had he been working "day rate" at his own particular trade. The whole method of pay by piece work or by any other system of compensation based on quantity of output was consequently thrown into disrepute and years of honest effort were necessary to remove the stigma which attached to piece work on account of the almost criminal stupidity of management in attempting to decide arbitrarily and autocratically a matter that could only be honestly settled by scientific analysis, study and standardization, with the understanding and co-operation of the wage earner himself.

The DIFFERENTIAL PIECE RATE system is a modification of the regular piece rate system in which the rate per piece increases with the quantity made. Or possibly better stated, it establishes a high rate per piece in case a quantity standard is attained or exceeded and a lower rate per piece in case of failure to reach standard. Suppose for example a man worth \$5.00 per day is working on a job for which the standard output is 10 per day. He might be paid 60 cents a piece in case he makes more than 10 and only 50 cents a piece in case he makes 10 or less. Another form of differential that has been used is to pay one rate on each piece made up to a certain standard quantity and a higher rate on such pieces as are made in excess of that. The purpose of the differential rate is to provide a still greater incentive for large production. In cases where the overhead burden is heavy and the machine hour rates consequently high, the

actual unit cost can be very materially reduced when high wages are paid for greater output, thus distributing this overhead on a greater quantity and reducing the cost per piece.

The PREMIUM method of payment establishes a standard time for the accomplishment of a task and pays the worker a premium on all time saved. For example, the standard time for doing a job has been set for 6 hours and the man working on it is being paid at the rate of 60 cents per hour. He is allowed a premium of 50 per cent of the time saved. If he completes the job in 5 hours instead of 6 he will earn for the 5 hours \$3.00 and for half of the hour saved 30 cents, or \$3.00 plus .30 equals \$3.30 for 5 hours work or at the rate of 66 cents per hour instead of 60 cents.

The BONUS system like the Premium method is based on a standard time in which the job can be done and a bonus of a definite fixed amount of money is allowed in addition to the regular hour rate of the worker in case he does the job in standard time or less. The amount of the bonus varies under different conditions but as an average generally runs about 33 1-3 per cent of the standard labor cost of the job. Let us illustrate: A worker whose rate is 60 cents per hour is assigned a job, the standard time for which is 4 hours. The bonus for the job is 80 cents. Suppose the operator does the job in just the 4 hours standard time then he will earn

4 hours @ 60c. equals \$2.40 plus 80c. bonus equals \$3.20  
(in which case he will earn at the rate of 80c. per hour).

But suppose by some extra effort he manages to complete his job satisfactorily in 3 hours, he will earn

3 hours @ 60c. equals \$1.80 plus 80c. bonus equals \$2.60  
(in which case he will earn at the rate of 86 2/3c. per hour).

In the second case he will have finished his 4 hour job in 3 hours and will have earned \$2.60 or 86 2-3 cents per hour and will start on a new job at once with the opportunity of earning more bonuses on other jobs. But what happens in the event of failure to complete the job in the 4 hours standard time? Assume it takes him 5 hours. In this event he would be paid his regular hourly rate of 60 cents for the 5

hours he worked or \$3.00 for the job, but would have failed to earn any bonus which was offered as an incentive for doing the job in Standard Time.

The methods thus far described have had particularly in mind the matter of securing a definite measure of work for a certain compensation. I now wish to call your attention to another method which was designed to accomplish this object and at the same time insure to the worker a steady flow of work. This plan was known as the system of DAY WORK with STANDARDS. It originated from the organized workers in one of our basic national industries where the piece work system was rather generally in use. An objection was raised to working on piece rate but at the same time an offer was made to work Day Work with an agreed upon standard of output and submit to a reduction in the Daily Wage by an amount in proportion to the degree of failure to attain standard. In other words the proposition might be stated thus: "You admit that I am worth \$8.00 per day; we agree that a fair day's output is 80 units per day, consequently for the \$8.00 I agree to produce 80 units. Upon failure on my part to produce this number you may reduce my \$8.00 by 10 cents for every unit less than 80 which I fail to produce." The question at once arises, "What is the difference between that and a piece rate of 10 cents on a daily standard output of 80?" Well the difference is just this,—If the worker was at his job ready and willing to work and the employer failed to provide him with work in sufficient amount to permit him to work steadily and so turn out the agreed 80 per day it could not be termed a "failure to produce" on the part of the worker. He was ready to perform his part of the contract. If the employer failed to uphold his end by having the work so poorly planned that he did not deliver to the worker materials to do the work bargained for, the worker should not be penalized for the other's failure. It was a very interesting case where management was squarely confronted with its own responsibility. The proposition was sound and just and the method was successfully employed. Spurred on by the fear

of being compelled to pay for something for which he received no return, the employer was obliged to adopt other methods of management and this in turn resulted in greater production with a resulting reduction in *unit* overhead expense and a consequent lowered cost of production.

One other method of pay but little used today is CONTRACT WORK. In this system the employer lets a contract to perform the labor on a certain job to an employee at a given price. The latter in turn hires what additional labor he may need, paying them whatever price he can bargain with them for out of his own contract price. The method is not satisfactory for many reasons. In the first place it gives rise to a variation in the rates of pay for the same kind of work in one plant that is very demoralizing. Secondly, where the workers use the machinery and equipment of the employer they have no responsibility for its proper maintenance and very rapid deterioration and depreciation result. Finally, the method is a distinct attempt to shift the responsibility of management in some of its most important features on to the shoulders of the worker and he is obliged to undertake risks and assume responsibilities that properly belong to his employer.

There are numerous variations in the details of the application of the foregoing methods. Many of them are called by new names. Some apparently involve new procedure, but with the illustrations given we have pretty well covered in principle the bases of the wage systems in use.

It now remains to discuss in considerable detail the technique that must be followed in developing any method of compensation for work, the value that can be attached to the system of wage payment itself, the relation that it bears to other factors of industrial activity, the principles that must be considered in applying it and the results that can be predicted or expected from its use. By way of bringing out these various points specifically, concretely and practically to you rather than discussing the matter in a theoretical or academic way, I am going to describe to you in detail what I consider the most scientifically developed method of

wage payment in use anywhere, for I believe in so doing I will bring out the points and the principles that it is necessary to emphasize in a way that I hope will be interesting and helpful. And as we go through this subject step by step, I ask you to forget for the time your own problems and to come with me a long way from your own shop. Don't think of what I am going to tell you in detail as something that you can or cannot apply to your own jobs but look rather for the principles that governed the development of this method I speak of for I do know that these principles are scientific and sound, and after you get them in mind go back to a consideration of your own problems and I know you will find much that you may apply or seek to have applied that will be of some help and benefit to your own job.

A prerequisite to doing anything in the matter of determining proper rates of pay is a classification of all operations on which rates are to be set. By classification in this case we mean forming groups of operations which have the same value in relation to the job and then arranging these groups in the order of their values relative to each other from the lowest to the highest. For example, we may have 300 separate and distinct operations to be considered. We find that a certain number of these are equal as regards the amount of skill required in their execution, the length of time it will take an operative to fit himself to do the work and the degree of sustained mental and physical effort requisite to a consistent performance of work. There may be say 20 operations all requiring these attributes in equal degree. These would constitute one Class. Another group of 15 would require them to a greater degree. These would form a higher class. Still another group of 30 operations would fall into a lower class and so on. Now, having formed these various sized groups amounting to say 12 in all we arrange them according to their relative values and have a range of grouped operations or classified operations in 12 steps leading from the lowest or least skilled class at the bottom to the most difficult and highest skilled class at the top. This is our classification to start with but it is incom-

plete until we have attached to each group of operations a value based on what that particular group or class is worth in terms of an hourly rate of pay. Our classification may now be completed in this instance by fixing as an hourly rate some amount, say 25 cents for the lowest class, 30 cents for the next higher, 35 cents for the next and so on by steps of 5 cents until we reach the highest class at 80 cents per hour. At this point we have classified all of the 300 operations by locating each in some one of the 12 classes, each class having an hourly rate commensurate with its value as an element of output which should be earned by every operative working on any operation in it who reaches a set Standard of Performance.

In order to arrive at a proper Standard we must know how many times each operation should be done in an hour and set this number as the Standard. If the operation in question be in the 80 cent class and 20 of one operation can be done in an hour, 10 of another, 8 of another, etc., then the production standards for these would be 20, 10, and 8 respectively and if we wish to set piece rates on the various operations or jobs it is simply necessary to divide 80 by 20, 10, and 8 successively and obtain as standard piece rates 4 cents in the first class, 8 cents in the second and 10 cents in the third. By the same method a piece rate can be fixed for each of the 300 operations according to the hour rate of its class and the standard of output.

But in compensating a worker are there not other factors which can be taken into account other than the mere doing of the work itself? Should not what he is paid for include other things of definite value? In other words, can the wage be divided into a number of component parts each one being a stated portion of the whole earnings? I am quite sure that the first thing of this nature that occurs to you is QUANTITY. We all appreciate that the worker who can be counted on for doing a large volume of work is of more value to the organization than one who does less. So it certainly is a sound idea to provide some additional compensation for increased output. But when we reach this conclu-

sion we are simultaneously conscious of another very essential factor, namely **QUALITY**. Increased output is of no value unless quality is maintained at a high standard. So if an additional incentive is offered for quantity of output it should be accompanied by one offered for quality. So far so good, but how great should these inducements be and what is the value of one relative to the other? In the case I am describing it was first thought that quantity was more important than quality but experience proved this to be a fallacy. In fact the two are so dependent on each other that they proved to be of equal value when considered as reasons for additional pay, and as a consequence an **OUTPUT BONUS** of 15% is paid on the piece work earnings if standard output is reached or exceeded and a **QUALITY BONUS** of 15% is paid if quality is maintained. In other words 30% of the piece work earnings is added in the form of these bonuses as an amount which it is justifiable to pay from the standpoint of cost. Increased volume of output automatically reduces cost by lowering the unit overhead expense. The combination of these two permit the offering of this additional bonus incentive as a means by which the worker can share directly in the profit he is creating through excellence of performance. A high initial degree of quality precludes the annoyance, delay and expense of subsequent repairs and the resultant interference with the steady flow of production.

Now for a matter of detail about the application of these bonuses. The Output Bonus cannot be earned unless quality has been earned. This is obvious for unless quality was up to standard, increased output would be an ultimate detriment to production rather than an asset. It is equally clear that unless a certain standard of output is reached no quality bonus or any other bonus could be honestly earned, for the payment of either bonus is made possible by the amount of the right kind of work produced. Consequently, having set a Standard at which Output Bonus becomes operative we must establish some *minimum* of output at which it is possible to earn Quality Bonus. This minimum is set

at 80% of Standard. Hence if a worker is on an operation whose standard piece work earnings are 60 cents per hour, the Minimum would be 80% of that or 48 cents per hour and at Minimum or above he can earn Quality Bonus but of course no Output Bonus until he reached Standard. Our earning possibilities now look something like this:

15% O	15% Q	Standard Earnings Per Hour	Minimum (80%)
1.04		.80	.64
.97½		.75	.60
.91		.70	.56
.84½		.65	.52
<hr/>			
.65		.50	.40
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<hr/>			
.32½		.25	.20

Just one more remark before disposing of these two bonuses. Assuming that a man exceeds minimum or reaches or exceeds standard and his quality is 100% he will of course earn both bonuses or a total of 30% of his piece work earnings. Let us suppose he has worked on 500 pieces or done 500 operations. If they all pass inspection but one piece, if 499 are O. K. will he lose his entire Quality Bonus? It seems a very severe penalty and it is, so this arrangement has been made, viz.: the worker must have more than 95% of his output approved for quality in order to earn any quality bonus, but from that point up he can earn from 0 to 15% in this fashion:

Quality O. K. Per Cent	Bonus Per Cent
100.00	15
99.66	14
99.33	13
99.00	12
<hr/>	
98.33	10
<hr/>	
96.66	5
<hr/>	
95.00	0

From this it is clear that the man referred to above would be entitled to 14% Quality Bonus for only missing one out of his 500, the 499 being 99.8%. And he would earn some Quality Bonus for any accepted quantity above 475, this being 95% of his 500.

Can we go further in our search for elements than can rightfully be considered components of the wage? The matter of Attendance, regularity of attendance, is certainly an element of value to be reckoned. Nothing is more disturbing to production than absenteeism and tardiness. You must all have had the experience of having a job well under way when some morning one or more of your men failed to show up and you know the delay caused by trying to fill their places with other unfamiliar with the work in hand. You know how much better, quicker, and cheaper any piece of work can be done if the individual or the gang working on it can start and finish it without change in personnel. Absenteeism necessitates a shifting of operatives to fill the most serious vacancies generally at the expense of both the job they are leaving and the one they are substituting on, and it always exerts an expensive, disorganizing influence on work. It does not always matter whether an absentee is a high class or a low class operative when the resultant interference to production is considered. Frequently the absence of an individual from a low class position can be just as serious or more so than if he belonged in the highest class. For these reasons the method of pay we are considering contains an ATTENDANCE BONUS and this has been fixed at 50 cents per day for every individual irrespective of what his earning capacity or his class may be. But the earning of this bonus for any day is contingent on the individuals reporting on time for work the following day. In other words, if I have been present and on time today, I earn 50 cents Attendance Bonus for Today *provided I report for work on time tomorrow*. Tardiness invalidates Attendance Bonus and an unexcused, deliberate absence entails a forfeiture of five consecutive days Attendance Bonus.

One more element of value can certainly be said to exist

in the wage earned and that is the length of time the individual has been in the employ of the company. In spite of the recognized value of length of service, it is often found embarrassing to know just how to compensate for it. We have all had the experience of being asked by one of our men, "Don't you think I ought to get a little more money than Bill? We're both working on the same job at the same money but I've been with you for ten years and he is here only a year. Surely I ought to get something more for just that." And the man is right. Length of Service in any organization has a very real and tangible value. The older the employee is in the service the more familiar he has become with methods and policies, the better his capacity is understood by his superiors and the more he has become a real tried and tested part of the organization. If some determined standard compensation can be given in addition to other earnings for this factor it provides a much more satisfactory way of adjustment than if left to the judgment of any one or a number of persons. For this reason the wage method we are discussing includes a **LENGTH OF SERVICE BONUS** of 5 cents per day for every year of service for every individual irrespective of his class in addition to any other earnings. With this method John does not have to worry about his pay compared to Bill's for he knows that he is receiving 50 cents a day for his 10 years of service while Bill is only receiving 5 cents for his one year. Incidentally, it should be mentioned that this Length of Service Bonus increases up to 30 years of service after which it becomes static at \$1.50 per day and further that it does not increase after the age of 60 years is reached. It is designed to serve as a means of accumulating a pension fund and is pretty generally withdrawn from the pay and deposited at interest at the option of the employee. It will all be withdrawn upon leaving or on retirement and may be used for insurance purposes in the event of there being a protracted season of unemployment. This latter contingency never has arisen however, as yet.

In order to show a variety of earnings under this method, a number of cases are given.

CASE I—Employed 13 years	
Operation Class 75c.—60c. (minimum)	
Piece Work Earnings	\$5.75
3 Quality Returns, Output 244, 99.0 per cent o. k.	
Time Worked 7.3 Hours.	
Average Piece Work Earnings .787 per hour	
15 per cent Output Bonus	.86
12 per cent Quality Bonus	.69
Attendance Bonus	.50
Service Bonus	.65
	<hr/>
	8.45

In this case the operator earns Output Bonus because standard of output has been reached, combined with 99% of Quality, entitling the operator to a bonus of 12% for quality.

CASE II—Employed 1 year	
Operation Class 50c.—40c. (minimum)	
Piece Work Earnings	\$3.98
1 Quality Return, Output 163, 99.7 per cent O. K.	
Time Worked 8.4 Hours	
Average Piece Work Earnings .473 per hour	
No Output Bonus	.00
14 per cent Quality Bonus	.56
Attendance Bonus	.50
Service Bonus	.05
	<hr/>
	5.09

In this case no Output Bonus has been earned because of failure to attain standard of output (50 cents per hour). But a Quality Bonus of 14% is earned because operator's quality was 99.7% O. K. and the output earnings, .473, are above the minimum of 40 cents per hour.

Our discussion thus far has dealt with workers in the shop. But in all large organizations there is another very considerable force of office workers, store keepers, clerks of all kinds, porters, maintenance men, etc., etc. These are all hour workers, but they too are classified according to the kind of work they are doing and the relative value of that particular work. In other words the classification of these hour work jobs has been made just as carefully and completely as the one for shop operations and the classes

range between high and low hour rates according to the value of the work and the qualifications necessary to perform it. Groups of positions are formed of such as are found to be equal and these several groups rated into classes. Such positions will range from 90 cents per hour to say 30 cents per hour and the minimum of the class has been fixed at 60 per cent of the maximum, so we would have the following:

Class	Minimum
90	54
85	51
80	48
75	45
—	
—	
40	24
—	
—	
30	18

Any person holding a job in one of the 80 cent positions would be earning something between 80 cents and 48 cents per hour. Everyone knows just what class every Job is in and the matter of earnings within those limits depends upon the achievement of the worker. There is no haphazard method of paying on any other basis than that of the classification and the gross inequalities and injustices that are inevitably found in practically all other systems of compensation for this class of work are eliminated. If one is a Pay Roll Clerk, an Elevator Operator, a Scheduling Clerk, a Messenger, a Maintenance Man, a Janitor, or any other, he or she knows just what the limits of every position are as well as which of them can be reached by excellence of performance and promotion if one wishes to progress. This class of work earns ATTENDANCE BONUS and LENGTH OF SERVICE BONUS in addition to hourly earnings on precisely the same conditions and in the same amount as prevail in the shop.

Before going any further let me inject a comment here as to promotion and advancement. Every opportunity is offered, in fact great effort is exerted to encourage all workers

in shop or office to apply for higher class jobs than the ones they are filling and to fit themselves for greater responsibilities. There are invariably vacancies at the top. The high class operations and positions being the most difficult to fill offer at all times the greatest opportunities, and from the highest shop and office positions are recruited candidates for executive and managerial positions.

This then in outline is a method of Wage Payment which seeks to compensate in a perfectly definite way and in a stated amount for each factor that goes to make up the wage. It offers an opportunity for remuneration according to the kind, quality, and quantity of work done. It affords every possible assurance that more pay will go to the better man, and it provides exceptional opportunity for rapid and steady advancement in earning power and self development.

But we started the description of this system with a statement that it was a *scientifically* developed method. So far we have said nothing to substantiate that assertion. It therefore is necessary to find out how various conclusions have been reached and what methods are used that merit the claim to scientific accuracy.

In the first place before any attempt is made at classifying any operation or job it is analyzed, separated into all its elements, and carefully studied in order to make comparison with other operations similarly analyzed and to determine its value to the whole job in comparison with the value of other operations. The items that go to make up this value are largely attributes which must be possessed by the individual who is to do the work, the attainment of which is accomplished by a degree of skill, dexterity, training, intelligence, physical excellence, education and experience.

After a classification has been made by means of which operations and jobs of equal value have been grouped in classes, it is necessary to grade these classes by assigning to each an hourly earning value commensurate with its relative importance to others. Several considerations are taken into account in determining the low or starting rate.

First it must afford an income that will permit of living at a standard consistent with the age, family obligations and social status of those who will comprise it. Then it must bear some relation to prevailing rates in similar kinds of work in the same locality and it must differ from the higher classes in an amount that will furnish a sufficient incentive to strive to reach the top by successive efforts at advancement. Starting from such a basis and proceeding class by class to the top we shall finally reach an hourly compensation that compares favorably with the highest paid and most skilled workers in the industry, with the intervening rates between low and high fairly representative of the progressive and relative value of the operations in all the classes. Work of this kind involving analysis and close study cannot be done except by one with a mind trained in scientific thinking. It is no field for the employment of snap judgment or opinion but rather for the application of analysis and synthesis based on fact and truth.

Again, the determination of standards on which the fixing of rates is to be based can only be done by applying engineering methods to the job or operation under analysis. Time study and motion study must be used as the instruments by which all the elements are measured, but this cannot be done until conditions of work and equipment are first standardized and an assurance made of a proper and continuing flow of materials and supplies. A task of this kind is distinctly one for the engineer. It is an imposition on a foreman to expect him to develop such a set of standards quite as much as it would be to require him to prepare the blue prints and specifications for the job he is to do as well as to use them in its execution. He has neither the training nor the aptitude for such work and is only taking time from the work for which he is really best qualified and most valuable and productive, namely, seeing that work is performed according to established methods by instruction, encouragement and discipline.

Assume now that our classification and standards have been scientifically established, our rates set and our Bo-

nuses determined, in other words, our method of wage payment is set up. How can it be utilized? Will it work of itself? Obviously no. Before such a carefully worked out method can function it is necessary that all equipment be arranged and maintained at all times in the location and condition that has previously been determined as requisite to the attainment of the standards set, and this involves a maintenance activity that will keep all equipment in perfect mechanical condition. Moreover, a steady and continuous supply of work must be maintained for each worker. If we are contracting to pay him for a definite output of an established quantity and quality we must see to it that he is furnished promptly with a new job as soon as he finishes the one he is working on. This implies a Scheduling Department in which work is arranged before hand with provision of all materials necessary well in advance of the time needed. But work cannot be scheduled unless a very positive control of materials is possible and this in turn makes necessary dependable records of just what is in stock, available and on order, and a careful system of stock keeping, requisitioning and delivery.

After work is started it must be routed from operation to operation and a record kept of its condition and its location. This is imperative in order that there shall be no interruption in the progress of work with the incident delay in furnishing jobs to operatives. Furthermore, an adequate number of qualified workers for all operations must be available and these must be assigned to work and transferred from one operation to another as shortages of help in one quarter and surplus in another makes this necessary. This again necessitates the functions of Employment and Assignment.

Now as the earnings are dependent on doing work in a standardized way previously established, in a standard time, and of standard quality, we must have a very complete system of supervision which will be responsible for instructing all workers as to how work should be done, maintaining a close and constant inspection as to quality, and securing

the requisite volume. This means a large force of foremen for Quality, Output, Inspection and Instruction.

But again all these arrangements for providing work and trained workers and securing production would be incomplete unless we have a prompt and reliable record of accomplishment, a means of measuring this by achievement in earnings. So we must have a pay roll organization who not only figure the earnings of each worker but who collect the items of pay in its component parts so that we may judge the accomplishment in each of the details that the method of pay is designed to compensate.

Every worker must know promptly just what the earnings have been in each of the items for which a standard should be attained and the foreman must also know this as well as the names of those who are falling below "minimum." If people are properly instructed and supervised and still fail to reach standard it is more than likely that they are not suited to the kind of work they are doing and should have opportunity offered on a different kind of job. Many an apparent failure on one job has been most successful when shifted to other work for which he is better qualified and it is the responsibility of management to keep both the foreman and the operative constantly advised as to the latter's accomplishment so that help and instruction may be promptly given when needed.

Finally, all records of output and earnings must be collected and collaborated and arranged so that the results can be measured finally in terms of cost and exact information given us to just what results have been achieved as indicated by this final absolutely conclusive measure.

We now see that in order to make our scientific system of Wage Payment effective we must have in connection with it an equally scientific provision for Scheduling, Materials Control, Time Study, Routing, Employment, Assignment, Supervision, Pay Roll, Statistics and Cost. These are so interdependent that no one is of isolated value but only insofar as it co-ordinates with all the others. Like the various wheels in a watch they are only of value as they con-

nect with others and the finest wheel in the world would not make the hands go around unless it fitted in with the others.

Even at this, our obligation is not complete for there must be a constant check up of all activities, and revisions of rates and methods whenever necessary. In the case described every rate and every class of operations is reviewed four times a year and adjustments made when thorough changes in operations or variations in results expected, the requirements of the job are increased or lessened.

Most essential in the matter of the determination of wage payment or the establishment of rates or the changes in classification is the participation of the worker in such actions. Every rate must be explained and accepted by the operative as fair and just. Any complaint as to amount or rate of payment or the specifications of work must be promptly reviewed, and remedied if the complaint is justified. No revisions up or down can be made unless the reasons for so doing are clearly understood and approved by all parties concerned. The intelligent co-operation of the worker is easy to obtain if he realizes that his interest in this vital matter is being properly safeguarded and that he is having his say in the determination of policies in which he has every right and reason to be considered one of the contracting parties.

An effort has been made to outline in some detail a method of wage payment largely with the desire to bring out the great responsibility of management in properly assuming its share of the responsibility in planning and directing work. If the factors here mentioned are given their true evaluation and if the principles involved are honestly respected, I think that you will agree with me that the method of wage payment will be satisfactory whatever name is applied to it, for if the scientific method is applied to the determination of classification and rates it matters but little whether this is converted into a piece work, bonus, premium, or day work system.

In illustrating how essential other factors were in connection with the operation of any scientifically determined

wage method, emphasis was purposely placed on all the extra provisions that must be made—all of the large departments that must be maintained. These fall into the dreaded class of “indirect expense” or “overhead” or “burden” or “non-productive labor” as it is variously called. But if the results of any subdivision of work can secure the output at a lower cost it makes no difference what this division may be. There is no such thing as “non-productive” labor in a scientific method of management. In the case described work is done at a cost for direct labor, including all bonuses, at about one-half of that in any other establishment making the same product. And of the one-half saved, less than 50 per cent. is expended in the indirect items enumerated.

Finally, Scientific Management does not justify the expenditure of one cent in the elaboration of any method unless such an expenditure can be positively proven to reduce the cost of the article or service produced or to improve its quality (which is equivalent to a reduction in cost) or to furnish some information necessary to the intelligent conducting of the business.

I asked you at the outset to consider my remarks from the standpoint of the principles involved rather than from that of the method applied. And I submit that these principles if honestly utilized in the determination of wages or the development of any and all of the equally important factors of industry can only result in the reduction in cost of the output, an increased income to the wage earner, and an honest profit to the owners irrespective of whether the output be transportation, a service rendered by a railroad for public use, or any article of manufacture for public consumption.

NOTE :—The method of wage payment described in this paper is that in successful use in the clothing manufacturing factory of The Joseph & Feiss Company, Cleveland, Ohio.

## *Discussion*

### QUESTION NO. 1

"In a large shop department "A" supplies its mechanics with hand, portable and pneumatic tools, permitting them to keep them out indefinite periods of time or until a job is finished. In Department "B" mechanics are also supplied with hand, portable and pneumatic tools but all tools are required to be returned at the end of each trick. Which method will promote the greatest efficiency?"

*Group No. 1:* It was felt that the proper manner of handling the tool question would be to turn in at the end of each trick all tools, except those which are listed for weekly lubrication and inspection. This would insure the tools being kept in proper repairs and ready for use at all times.

*Group No. 2:* Mr. Faust stated that if tools are kept locked up by the trick to which they are originally issued they will not get the attention which they require and are not available for the following trick in case they should need such a tool, which brought out the conclusion that the method in department "A" promotes inefficiency while the method employed in department "B" is for the best interests of all concerned.

*Group No. 3:* The group in summing up the ideas offered came to the conclusion that since tools are the assistants of man in the earning of wages it is well for every one concerned to see that all tools are kept in first class conditions, which can best be accomplished by following the method in department "B."

*Group No. 4:* Mr. Buck felt that tools should be assigned to a gang and then hold them responsible for same; at the end of each day the tools should be carefully examined and any that need repairs should be turned into the tool room. Tools which do not require mechanical repairs should then be well lubricated and locked up until morning, thus saving much valuable time by having the tools at hand rather than go to tool room and wait your turn for the tool room attendant to issue the tools. Mr. Metz agreed with Mr. Buck but

emphasized the importance of holding the man responsible for the condition of the tools. Messrs. Givler and Stahler stated that all air tools should be turned into the tool room at the end of the day so that the tool room mechanics could give the tools necessary intelligent attention. This discussion resulted in the conclusion that small hand tools should be retained by the workmen, but all other tools, especially air tools, should be turned into the tool room at the end of each tour of duty.

*Group No. 5:* Mr. Yost stated that if the course pursued in Department "A" is carried out it would require many more tools to keep the gang going, than the method followed in Department "B." Air tools should be turned into the tool room each day to be cleaned and oiled, at least once each day in order to keep them in perfect condition. He expressed the opinion of the group in stating that the method followed in Department "B" would be the most efficient.

*Group No. 6:* Mr. Workman stated that tools should be returned to the tool room at the close of each trick, that they may be properly inspected and protected, tools to be handled by a competent man to insure same being in fit condition when called for. All pneumatic tools should be lubricated at proper intervals and the place to do this is in the tool room.

Messrs. Meadath and Mountz expressed the opinion that the method followed in department "B" is correct, inasmuch as the tools should be turned in at the close of each trick to determine their condition and have defective tools placed in proper repair and made available for the following trick. This was concurred in by the balance of the group.

*Group No. 7:* Mr. Kinter felt that the best idea was to have tools turned in each day as they might need repairs and the man in the tool room was the proper person to look after them, also for the reason that another employee might need the same tool and would know where to get it instead of hunting around the shop for the man who has it and at the same time the man who has it out is not using it most of the time but simply holding it because it is a good tool.

The conclusion reached was that where a gang has tools in constant use they should be permitted to have same assigned to them with the understanding that same shall be turned into tool room at least once a week. Under all other circumstances tools taken from tool room should be returned promptly after serving the purpose obtained for.

*Group No. 8:* Messrs. Rich and Bowman stated that it is far better to have the tools returned at the end of each trick, for in a case such as Department "A" one or any number of tools may be put out of repairs or broken, and if they were not returned until the job was finished, it would mean that they would be out of service that much longer and perhaps another job would be held up pending their repairs. In this case too responsibility for lost or broken tools can be easily shifted and blame for the damage done placed on the wrong man or group of men. In the case of Department "B" each man would know that he was responsible and would take better care of the equipment. For this reason the method followed at Department "B" would promote efficiency.

*Group No. 9:* Mr. Roberts felt that if a gang has a big job and the tools they have are in good condition it would save time for them to keep the tools until the job was finished, the understanding being that the Gang Foreman would check the tools and report to the man in the tool room.

Mr. Geist was of the opinion that the method followed in Department "B" would promote efficiency, although he felt that certain tools should be kept by the gang and turned in only for periodical inspection and repairs.

Mr. Bordlemay stated that the question does not say that Department "A" does not keep in touch with the tools through a tool room system, but he thought that the method at Department "B" was the most efficient as they could check up tools and place responsibility for damage. Department "A" may have a good system for handling their tools, which is not brought out in the question, but it appears that Department "B" provided means of placing responsibility, and had less tools tied up, hence would naturally speed up production.

*Group No. 10:* Messrs. Fasick, Bell and Dawson stated that the method followed by Department "B" would promote efficiency and give the man in the tool room a chance to inspect and lubricate the tools and keep them in good condition at all times, although it was felt that in some departments good results might be obtained by placing a set of tools in the hands of a gang and hold them responsible for the same.

*Conclusion:* The method in department "A" promotes inefficiency because if mechanics are permitted to retain tools they will lock a good machine up in their cupboards when it is not actually in use, which deprives the balance of the shop of the use of the tool. The method in department "B" insures all tools being available when required and if proper attention is given to the inspection and lubrication by the tool room force it also insures tools in first class condition at all times.

## QUESTION No. 2

"In a machine shop operating on a piece work basis the Foreman is experiencing a great deal of trouble from spoilage. In order to reduce it he issued orders that the men will not be paid for spoiled parts. This did not bring about the desired results in that the parts spoiled increased instead of decreased. What was the trouble?"

*Group No. 1:* Messrs. Lehmer and Hall felt that lack of supervision was responsible for this condition, and that closer supervision and proper tools would eliminate spoilage.

*Group No. 2:* Mr. Ellenberger stated that after these men were told they would not be paid for spoiled parts they evidently became anxious and in speeding up they spoiled more than before. Mr. Tomlinson was of the opinion that the workmen were not properly trained and the tools they were using may have been in poor condition. The consensus of opinion was that the men became comprehensive of their earnings on receipt of the orders, were not properly trained

or had poor tools. If the tools were in proper condition and the workmen properly trained the only conclusion was that the spoilage was due to carelessness.

*Group No. 4:* It was unanimously agreed that if the Foreman had properly instructed the men, and the tools and machinery were in good condition the cause of the spoilage was directly due to gross carelessness, or a setup among some of the men to discredit the order.

*Group No. 5:* Mr. Murray felt that this condition may have been caused by a turn over in the labor and new men being taken on, also might have been due to improper orders on the part of the men bringing in jobs from other departments, or again it may have been improperly trained men doing the work.

*Group No. 6:* Mr. Kissinger felt that indifferent workmen would not be effected by a penalty for spoiling work, and that penalizing them for bad workmanship would not make them nervous, but that good workmen, who had been properly instructed, would not be guilty of spoiling work.

Mr. Runk was of the opinion that spoilage reflects on the management of the department in that the men are not properly instructed.

Mr. Bowers felt that spoilage was possibly due to bad tool equipment and the order for penalizing was, no doubt, issued without investigation of the true facts, thus demoralizing the personnel of the shop.

*Group No. 7:* It was the concensus of opinion that if the men were properly fitted to the job and properly instructed, together with machines in good condition, material should not be spoiled. It was therefore concluded that this is a matter of supervision.

*Group No. 8:* Messrs. Karper and Shettel were of the opinion that it must have been the machine as there was no let up in spoiled parts after the order was issued in regard to the spoiled parts. Therefore the Foreman was largely responsible for this condition due to the fact that he did not take the proper interest in the condition of the machinery. If the Foreman had properly instructed the men and the

tools were in good condition, it then developed into a case of carelessness on the part of the workman, who should be replaced by one who took more interest in the work.

*Group No. 9:* Mr. Bordlemay was of the opinion that the main trouble was improper supervision. Mr. Roberts felt that some of the trouble lay in the fact that the Foreman took the place by storm in issuing the order referred to. If he had reasoned the proposition out first he may have found conditions, if corrected, would have removed the cause. The order either scared the men or made them sore. If they were sore the increased spoilage may be pre-arranged among the men to take turns at spoiling work.

*Group No. 10:* General discussion brought out the conclusion that if the tools were in proper condition and the Foreman had properly instructed the workmen, and all orders were carried out the trouble should have been corrected. If it was not, it appears that the cause could be attributed to only one reason—carelessness.

*Conclusion:* The circumstances in this case indicate improperly trained workmen and also possibly improper tools. If the tools were all in proper condition and the workmen properly instructed the spoilage would be chargeable to carelessness and the Foreman's instructions, if properly followed up, should have corrected the trouble.

### QUESTION No. 3

“Blueprint letters were issued covering the following changes:

1: New style main rod with a new style front end main rod key.

2: Two inch blow-off cock in place of 1½ inch.

3: Striking plate castings for freight cars. The letter required that the new style striking plate be applied for renewal to all Pennsylvania System cars but there are a large number of foreign and individual cars handled at our shops which are equipped with the old style striking plate.

On receipt of this letter the Store Keeper cancelled his stock cards for the old style front and main rod keys and

substituted the new style. He cancelled all his stock cards for 1½ inch blow-off cocks and repair parts for the same. He cancelled his stock cards for the old style striking plates. The result was that when a shop called for the old style parts to be used for necessary repairs they were turned down with the information that the parts were obsolete and would no longer be carried in stock. How should this matter be handled?"

*Group No. 1:* Messrs. Campbell, Goodyear and Albright brought out the conclusion that the supply of old style parts should have been carried in stock unless they were interchangeable with the new style. The case of the blow-off cock repair parts should be carried for the 1½ inch cocks but no new ones should be ordered.

*Group No. 2:* General discussion resulted in the conclusion that the marking of a blueprint obsolete, and the issuance of a new print, should not make the old style obsolete unless the new style material is interchangeable with the old and does not require the change of other parts. The Storekeeper should keep a supply of material on hand that is not interchangeable, until the new part is equipped on all locomotives. The cases in question call for co-operation between the store keeper and the Foreman or General Foreman.

*Group No. 4:* It was decided by the group that on receipt of a letter calling for certain changes in material or causing a part to be made obsolete the storekeeper should immediately get in touch with the parties interested in this material; first, to learn if the new design is interchangeable but should in no case cancel his stock cards or dispose of the old style material until he had received assurance that this was the proper course to pursue, and second, the storekeeper should immediately get in touch with the Foreman or General Foreman and go over the situation fully.

*Group No. 6:* Mr. Berkheimer expressed the opinion of the group in stating that when a letter reaches the hands of the Storekeeper indicating change in design of equipment, the blueprint should be checked against the old print and if the

parts are interchangeable make necessary notation on the stock card to govern future ordering.

*Group No. 7:* Mr. Hensch stated that when instructions are received making a piece of material obsolete, the stock card should be marked "Do not order" but not to do away with the item as it is often required for running repairs. However, sufficient material is generally accumulated from destroyed cars and trucks to keep repair material on hand and if not the storekeeper should keep in touch with the Foreman and co-operate with one another along these lines.

*Group No. 8:* Mr. Rich felt that in cases of this kind the change should be made less abruptly by the storekeeper, for as long as the shop is handling foreign cars and as long as the foreign roads have not issued the same orders it is better and cheaper to maintain some of the old style material in stock, both from the standpoint of time and labor expenditure.

*Group No. 9:* Mr. Roberts was of the opinion that the storekeeper or stockman made a mistake when he done away with stock cards covering items that are made obsolete but that there is still a call for on certain equipment that the new style material cannot be applied to. He also felt that the storekeeper should take the matter up with the General Foreman to see whether the new style was interchangeable with the old style, without change of other parts, in which case the stock cards should be cancelled without any trouble arising.

*Group No. 10:* The consensus of opinion was that the practice of storekeepers destroying stock cards and blueprints when same are marked obsolete, was the wrong idea, unless the parts so marked were interchangeable with the new parts without changing other equipment. It was felt that this was a case for conference and close co-operation between the storekeeper and the General Foreman.

*Conclusion:* This case calls for co-operation between Storekeeper and the Shop Foreman. The issuance of a new blueprint and the mark "Obsolete" on the old print do not make the old style obsolete unless the new style material is inter-

changeable with the old and do not require the change of other parts. In the case of the main rod key the new style key applied to the new style main rod and was not interchangeable. In the case of the blow-off cock no new 1½ inch blow-off cock should be ordered but a stock of repair parts should be maintained to wear out those in service. In the case of the striking plates both old and new style should be carried in stock and the question raised with the Superintendent Motive Power whether the new style could be applied to foreign and individual cars the same as our own cars with a view to eventually eliminating the old style plate. Such questions can only be determined by conference between the Storekeeper and the Foreman, General Foreman or Master Mechanic.

## JOB ANALYSIS FROM A TIME STUDY BASIS

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Wilmington, Del.

February 20, 1923

### INTRODUCTION

I have been asked to deliver tonight a talk on the subject "Shop Analysis," my first thought was the story of the Shoe Salesman who got fired, and I must say that I cannot imagine any subject that is of more vital importance or productive of greater results toward efficient and economical Shop or Department Management; as it involves every phase of our daily life, and in undertaking an analysis of this subject details which are daily passed over as of trivial importance will frequently loom up as mountains and an apparently simple problem may require strenuous and unusual efforts to solve.

In this solution you will have involved questions ranging from tools, material, shop physical conditions and the weather, to the most important of all—"The Human Equation," for after all, material and physical conditions have been satisfactorily disposed of. The main question is—"Subject to change without notice," and is therefore the most difficult to keep up with.

In the olden days when a mechanic was all that the word implied and skilled in all the branches of his craft, taking great personal pride in both the quantity and quality of his work, there was perhaps, less lost motion and therefore less apparent need for an exhaustive and detailed analysis of our every day operations; particularly in the smaller shops or departments, the difference being made up by the personal initiative of the individuals.

### THE PLACE OF JOB ANALYSIS IN SHOP MANAGEMENT

The place of job analysis in shop management was early recognized and has been given more or less thought down

through the years in the M. of E. Department on the Pennsylvania System. There was a time on the Railroad when an engine was taken in shop for repairs there was no thought on the part of anyone of setting a date when it would be completed and returned to service. The same was true of cars and of detailed jobs that were passing through the various departments for their repairs. This meant that there was very little recognized necessity for individual job analysis and the common understanding was that jobs would be turned out when completed, which to say the least did not mean much.

These conditions were later changed and when engines were taken in Shop a date was set when they were to be out, depending on the class of repairs. It naturally followed that all departments concerned had to establish dates for their portion of the work and this scheduling and dating has developed to an extent that we are now analyzing to a very minute degree each job that is to be handled; whether it is a locomotive or a car to be repaired, a bolt to be made or a car load of freight to be transferred.

We all have fond memories of a "Bill" or of a "Jim" who used to work here and was the idol and inspiration particularly of the younger men in the shop because he always had his work done ahead of time and was never known to make a mistake or turn out a bad job. That meant, Gentlemen, he was doing just exactly the analyzing and anticipating that most of us do for him today. It wasn't just luck on his part or entirely a matter of his individual skill as a workman, he was a job analyst from the ground up; but to quote a popular newspaper comic caption;—"Them days is gone forever."

The field has broadened and departmental questions become more complex, the individual must be studied and his operations analyzed with regard to his relation to the department as a whole.

## DEVELOPMENT OF JOB ANALYSIS AND INTRODUCTION OF PIECE WORK

As a precedent to the development of our present day situation in job analysis and introduction of piece-work, we have only to go back in our Biblical History to the building of the temple of Jerusalem by King Solomon, where for the successful carrying out of this vast undertaking it was necessary to plan the work step by step for each succeeding day's labor. The workmen were segregated into various groups, with a specified portion to perform, depending upon his skill, but bearing a definite and pre-arranged relation to the building as a whole. I cite that instance to illustrate to you that there is nothing new in the idea of job analysis; however, there is yet a great deal to be learned.

It was early recognized that in order to make the maximum use of our facilities and develop our study of the individual job that it would be necessary to introduce something in the way of a reward that would justify a man to give his best efforts as well as his skill to the completion of a job in a minimum time. To accomplish this piece-work was introduced, the principle of which is increased pay for increased production.

Piece work was first introduced on the Pennsylvania Railroad in the 12th Street Shop at Altoona about the year 1888 and in the Enginehouse at Altoona about 1896.

The method for establishing rates we might say was rather crude and was done something like this:

A foreman from his general knowledge of the job would talk it over with a workman and say, for example, hanging a set of guides on an H1 engine, he would say to him, "I will give you \$21.00 for hanging those guides, including all work." The workman might or might not agree, but to any event the rate was established. If the man pulled out and made too much the foreman immediately adjusted the job by taking a little off; incidently my best authorities on this subject are unable to recall a case where anything was put on when the man failed to make out, that was his hard luck.

The prices in each department were thus set by the fore-

men over all the Railroad, and as a result the fitting of guides that paid \$21.00 in one place paid \$15.00 in another, \$12.00 in another and \$8.00 in another, with each foreman adjusting the earnings to about what he thought each man should earn. After a few years of this kind of rate making it was recognized that we were not working piece-work in the truest sense of the word and some definite plan would have to be established in order that a fair rate would obtain for each job consistent with the hourly rate the man was receiving and that once the rate was established the men were given to understand that he was expected to make all he was able to and the price would not be cut unless a change of method was introduced.

It was also recognized that a job should pay the same in one shop as in another, all things being equal. This problem was difficult if not impossible of solution at that time, owing to the variety of rates paid in different shops throughout the system.

The first real progress made in this direction was the introduction of M. W. Forms, which at first only endeavored to make the nomenclature the same for all points. The old rates then in use at each shop were continued in effect and only on new rates that were introduced was uniformity attempted. With a discontinuance of piece-work for a period of time and the establishing of uniform hourly rates, it made it very desirable to introduce uniform piece work rates when piece work was again established.

At this point we should endeavor to clear up the thought that is in many of our minds and particularly in the minds of our workmen, when we speak of uniformity of rates, the rates are only uniform when the conditions are similar; for example, we have a rate of renewing a pair of wheels with a crane and another rate for a drop table, another for a drop pit jack and still another rate for a whiting hoist; each is different. You have different rates for turning bolts on turret lathe and a center lathe; different rates for planing a job on a quick return planer and a planer equipped with a slow return.

It is therefore apparent that there is no reason why rates should not be alike for similar operations in Harrisburg, Wilmington, or any other Shop; bearing in mind the similarity of conditions.

#### THE TIME STUDY

In the making of a time study there are a number of factors which cannot be overlooked without imperiling the successful operation afterward and the ultimate acceptance of the rate as a fair standard.

"The Time And Place" are unquestionably on the job and in the shop under the conditions which must ultimately be met by the individual shop management and workmen involved.

Before getting into the matter too deeply, however, a general survey must be made to determine the necessity for the individual operation in question.

2. Whether surrounding physical conditions are arranged to the best advantage, and I will later cite several instances illustrating the point.

3. The party making the time study is in an ideal position to analyze the moves or operations requisite to the most successful completion of the work at hand.

To gain this end and obtain the complete co-operation of the workmen, frankness is highly essential in dealing with him, in fact is of paramount importance, as a feeling of distrust on his part will not only hamper your immediate efforts but will be carried throughout the shop and react most unfavorably on the outcome of this as well as other operations. Here again you have the all important man question.

It may be a poor analogy but at least is a picture we can all vision. You have here your wonderful Susquehanna; the largest unnavigatable river in the world. In the summer time when it is flowing peacefully and quietly with concerted efforts between its banks, it presents a beautiful picture far different from the spectacle presented by a spring or fall freshet, when the waters instead of flowing

smoothly on are running in swirls and eddys, frequently breaking its banks and causing untold havoc to everything within reach. It is then we realize its power for evil. The point in all this is that the flood is not tracable to any one source but is caused by innumerable small tributaries, each with its private bulk to be disgorged until the whole becomes a very muddy and troublesome affair.

The workman on the job will have his own ideas and some of them very good ones as to the possible difficulties to be overcome, so that their dealing with him will encourage his honesty of effort and go a long way to promote confidence, the effect of which may be far reaching. Care must of course be exercised to pick the right man for the job.

The average man's motto today is, "If you like your job say nothing, if not, tell everybody."

#### METHODS

The methods employed in the taking of a time study are not at all complicated, the prime requisite being an intelligent sizing up of the job beforehand, so that you know exactly what you want done and how you are going to accomplish it. A speedometer or revolution counter, or a cut meter, together with an ordinary watch is about all the mechanical equipment required. A stop watch is not at all necessary and is not generally used in this work, as sufficiently accurate time can be obtained with an ordinary Ingersoll.

In the preliminary as well as the final analysis of a time study, the question of setting up work; tools, material; interruptions and delays, both avoidable and otherwise, must receive individual thought and consideration. For example, if the job consists of a single unit operation, the preliminary work of setting up a machine or obtaining necessary tools to perform the work, becomes a part of the job; whereas if the work to be performed is in sufficient quantity and only one initial set up is required, for example, an automatic or semi-automatic machine or turret lathe, a separate study

may be made of the setting up operation and a proper rate allowed for this portion of the work.

Special tools can frequently be devised to avoid unnecessary changes in the set up of the work, here particularly is the intelligent and honest co-operation of the mechanic on the job a valuable asset. I have in mind a case which recently came to my attention of a simple tool devised by a man on the job for the purpose of planing box type cross-heads, reducing the setting up of the crosshead from three to a single set up.

It had been the practice for years in the shop in question to turn Rod bushings singly either chucked or on a single expanding mandrel, making a new and laborious set up necessary for each bushing. Eventually, however, necessity forced the development of a multiple mandrel, holding from four to six bushings, depending on the power and size of the machine permitting the operation of turning complete (to individual diameter if necessary) including facing both ends with a single set up; thereby increasing the output of that machine to an unheard of figure.

While there perhaps was nothing remarkable in either of these cases, and all of you possibly could cite examples producing more wonderful results, they do show what can be obtained by the simplest form of job analysis from a time study basis, these jobs have been done for years in the same machine and in the same old way, so many times, in fact, that it hadn't occurred to anyone that the method could be improved upon.

In the study of a particular operation it may frequently be necessary to take into consideration the shop operation as a whole, for example, the machine tools of an Engine-house Machine Shop may suffer innumerable interruptions and delays in the changing of machines from a stock job or work in connection with a laid in engine to meet the requirements of light or running repair work; whereas, in a larger shop handling class repair work, or on a manufacturing basis, such conditions might be entirely eliminated or reduced to a minimum by confining them to certain ma-

chines. The same general conditions hold true in car repair work as divided between light, heavy running and class repairs, each division having its own problems to be met.

#### SYSTEM STANDARDS

One of the most important steps in the advancement of our knowledge and study of the job analysis and our piece-work system, was the introduction of the job analysis by system standards versus local standards, and nothing since the introduction of the most elementary piece-work system had such an immediate and far reaching effect by giving each shop or department a means of comparison of its methods with those of a dozen or more other similar shops or departments on the System performing identically the same line of work and varying perhaps only in quantity of equipment.

It immediately established a common goal by the settlement of which we can at least rest reasonably assured that we have instituted the best known practices and reduced lost motion to a minimum.

Nowadays when a new price is introduced, setting new standards for some old and well known operation, after satisfying ourselves as to just what is included in the operation, the first and most natural question, and incidently the one productive of most result is, "How do they do it?" Right there is the key note of the success of the whole idea of System Standards. I don't believe there is a man here tonight who has had anything to do with the application of local standards to a System Standard Basis; who has not at some time asked the question and probably followed it with the statement, or at least mental reservation, "Well, we can't do it here." However that question was an acknowledgment that someone else knew something that we didn't know, or had developed methods we had not yet thought of, and a job analysis was immediately in order; also while not realizing it, we were acknowledging the prime advantage of a System versus a Local Standard.

## FACTORS IN THE APPLICATION OF SYSTEM STANDARDS

In the application of the System Standard entered a number of factors which must be taken into consideration.

We can all realize that from the point of view of the Management who were in a position to compare the individual efforts and standards of the different shops throughout the System, some means was necessary to establish the cost of maintenance, as there was no reasonable reason why a certain class of repairs should cost more in one shop than in another having the same general lay-out and equipment.

The first step in this direction was the establishment of a uniform hourly rate, the establishing of a uniform piece-work system was then the logical conclusion.

With these rates established the points of high and low production immediately asserted themselves and it then became the problem of the Management as a whole, (you and I included) to identify these variances and find a reason why, with the point in view, of course, of equalizing production. There is today a very keen rivalry between different shops on the System, and if you don't give me away I will tell you that Harrisburg Shop recently handed a knock-out to another Shop in the Eastern Region on a certain job that had been the center of attraction for some time past, and Harrisburg found the answer while the other fellow was busy declaring that, "It could not be done."

Admitting all of the advantages claimed, etc., for the institution of such a system, it is really in the determination of these controlling factors that the actual work begins and the first stumbling block in its execution is met. Right here is the big job today for all of us.

There was a time when we, "Figuratively speaking," took off our hats to the Doctor, Lawyer, Mechanical, Electrical or Civil Engineer, but there is a new sun coming over the horizon and his heat is just being felt, that is, "The Production Engineer." Railroads today are probably bringing up the rear in a parade acknowledging the new creed and so ably demonstrated by any number of large and successful manufacturers, in fact we are so far behind in some cases

that we can't even hear the band. This was particularly brought home to us in the very interesting and instructive talk on the subject of wage Systems by Mr. Hall, who I understand was here last Tuesday.

We have all heard time and time again of the wonderful production methods of the Ford Plant in Detroit, admired them, perhaps, then let the big idea roll off with the remark, "Oh, well, that's a different proposition," "We can't do that here."

Perhaps we can't assemble or repair locomotives on a movable track, the material falling down chutes, coming in the windows, etc., and dropping into place, but there may be a leaf in that book somewhere that is a parallel of our own difficult positions and worthy of comparisons. For example, in a published interview with Mr. Ford, he recently said in answer to a question as to his idea of production and Shop Management. "The main thing is to make every move count," he replied. "In most places there is too little thinking in the office and too much lifting in the plant."

We found in a job analysis, that our engine blocks were traveling more than 4000 feet from the time they entered the plant until they were installed and ready to run away under their own power. By a little shop planning we reduced this to 300 feet. Considering that we make a million cars a year, you will see that we saved carrying 300,000,000 pounds of steel two-thirds of a mile.

Gentlemen, that wasn't guess work or luck, it was the result of conscientious effort on the part of an organization supposedly already far ahead of any other in their class, but there is encouragement for us in the thought that if the best are not perfect and can still find room for improvement, we may have a large row to hoe but there is hope.

Now then as an exact comparison to the above conditions, I will try to follow a driving box through a certain shop and if I don't get lost as the boxes sometimes did, will also show what was done to remedy the situation and thereby illustrate my point.

Let us say the set in question, eight in number, weighed collectively 3000 pounds. They were dismantled anywhere in the erecting shop the engine might be located, and carried from there to the lye house, a distance of approximately 500 feet, after cleaning were returned to the machine shop and taken to the bushing press, another 400 feet; from the bushing press to the babbitt fires, 200 feet, from there to a planer where they planed them one at a time, 200 feet from there to the boring mill 100 feet, then to the drill press 100 feet and back to the erecting shop 300 feet, provided everything was all right, and they didn't have to do it all over again.

Those boxes traveled a total of approximately 1700 feet back and forward and around corners, because there was no systematic arrangement of the machines and equipment necessary in the handling of this class of work and no real thought in the routing of the work to avoid duplication of movements.

That same shop today is handling its boxes from the point of dismounting to remounting, including all the necessary operations, in an actual movement of approximately 600 feet, or a saving equivalent to the movement of over 800,000,000 pounds of metal one foot (on a year's output), which in itself was a stupendous task.

You can call that common sense, or the newer term, "Production Engineering," as you will, but it lets us into the secret of the fact that all the possibilities for improvement and all the brains to accomplish this improvement are not peculiar to the "Ford Establishment."

Again I might cite an instance of a certain wheel shop which was never known to be ahead of the game, or even less than a week behind in its production schedule.

In the determination of the factors entering into a study of these conditions brought to light by the application of system standards, it developed after a very elementary job analysis with the aid of a cut meter, revolution counter and an Ingersoll watch; first, the axle lathes were only being operated at half speed. The foreman offered the informa-

tion that he had asked to have them speeded up a couple of years ago but the Miscellaneous Shop Foreman whose lot it fell to do the job, said it couldn't be done because the structural work supporting the shafting wouldn't stand the increased vibration; so he got out of the job for the time being and the matter rested at that until "Old Man System Standard" came along, then somebody got busy and put in the necessary braces on the structural work; the machines were speeded up, the Production Engineer washed his hands and called it a day and here lies the morale, "They are getting out axles on a System Standard Basis." The question of "How do they do it," was answered once more and reminds me of nothing so much as the nursery rhyme about, "This is the cat that caught the rat that ate the malt that lay in the house that Jack built.

I don't think too much can be said about the Shop combinations in the grouping of similar machines, or machines in allied lines of work, as both saving in time and material can be seen in the increased use of floor area, which immediately re-acts on your overhead charges and in the least handling of material. Again the grouping of similar machines may in some cases facilitate crane service which should be applied to the fullest possible extent, and while on the subject of cranes, I have in mind an installation, while small, resulted in saving labor, and can be readily applied to any shop; that is, a small swinging jib with a miniature trolley, applied to the cap or bearing on an engine lathe for carrying a chuck or face plate, particularly the former. This little device when applied not only saves a man's time, his temper, but frequently his fingers. The universal chuck for 12 inch or 14 inch lathes is heavy and with use of this appliance can be removed and swung out of position in a matter of a few seconds; whereas, the removal in the usual manner not only consumed several minutes but required the assistance of other men.

Again in grouping of operations along similar or allied lines of work, open stock sections containing material used in that particular line, maybe maintained convenient

to the work and due to the different grouping reduces this amount of stock to a minimum and again saves floor space in the storage of such material.

Where such machines are required for the performance of specialized lines of work, such as pin and bushing grinders for link motion work; small brass lathes or speed lathes for valve repair work; such machines, of course, should be located in the immediate vicinity of the point of repairs of such parts. This facilitates scheduling as well as saves time in the handling of parts.

Again where the shop is large enough and class of output permits it, it has been found practical and very profitable to group similar machines; such as planers in one group, lathes in another group, drill presses in another group; and heavy duty planers, slotters, etc., handling heavier castings or forgings, such as cylinders, frames or other heavy parts and requiring the service of heavy duty cranes, in groups of themselves.

The relation of the tool-room to the shop as a whole also has a material bearing on shop output and should be taken into consideration in a general analysis on the subject and should be located nearest to the point requiring most tool-room service. This is not necessarily the center of the shop; except in an erecting Shop.

In some instances of shop lay-out, it has been found most profitable to issue small hand tools, such as open end S wrenches, or other small inexpensive tools, to the individual mechanics, for it has been found that the time required to go to and from the tool-room for such material far over-balances the actual value of the tool itself.

This is particularly true in the departments where the work may be specialized and it is the general trend today throughout all departments, if not an actual necessity to specialize to the greatest possible degree where there is sufficient quantities of individual lines of work to permit it.

In departments handling a manufacturing line of work it is of the utmost importance that the closest co-operation be obtained between the Stores Department and the manufac-

turing department, so that orders may be placed by the Storekeeper in sufficient quantities to permit manufacturing at the most economical figure; for example, a certain line of finished bolts is to be ordered which are going to be manufactured on a turret lathe, and while the Storekeeper may only see an immediate need, or have an immediate use for 30 or 40 such bolts, the unit cost may be materially reduced both in transportation, machine set up, time of changing position, etc., by the ordering of a hundred, as the advantages of quantity production have been and are being daily demonstrated in almost every manufacturing line.

There is no department on the Railroad today that does not find some use and profit from the underlying principles of shop, of job analysis. This is particularly demonstrated in the freight handling department, or so called transfer platforms. Time was when the idea existed that the only thing necessary to transfer freight from one car to another was a man and a truck; however, when the job at transfer points reached a certain stage the cost of handling such material per ton became an important factor and by a thorough analysis of this particular situation, innumerable unnecessary moves were found to be made and material transported over a great distance by hand; whereas, a re-arrangement of cars reduced this to a minimum, so that at some points the cost per ton of trucking was reduced by half.

I might dwell on this subject indefinitely because it reads like fiction and is far more interesting, but you all undoubtedly have witnessed similar experiences and may find it a dry subject, but in addition to all the foregoing facts and factors, the crowning and absolutely uncharted field is the question of Administration. For after the Production Engineer has done his best, or his worst, the question of administration still stands.

Faulty administration may at times be checked up and corrected by a job analysis as a court of last resort.

I have in mind a case of a man working on a heavy duty milling machine. It was the decision of the Management of that shop that the work of machining main rod brasses

ties and the Milling Machine with its special chucks and could best be done on that particular machine. Special chucks were made up and all went well for a time until the question of cost arose. It then developed that the man specially trained on this machine and with all possible tools and equipment to assist him, could not compete on a cost basis with other shops in the completion of this operation.

The man was conscientious and took it as a personal matter that his pet machine was falling down on the job, but he finally had to give up and the Production Department called in to find out why.

Their immediate and correct conclusion was that it was the wrong machine and not adapted to that operation. In the first place it would only handle one brass at a time, second, the motor drive was too light to force the machine to its fullest production and to prove it put on feed and speed with heavier fuses until the Electrical Shop Foreman plead for mercy. With the result that the job was sent back to the planer where they are now being roughed out in quantities and the Milling Machine with its special chucks and cutters is now doing very nicely at higher speeds on an individual finishing operation. I might add that in this case it was found that 60% of the time was involved in operations other than actual milling.

By Administration then I mean the intelligent application of the Job Analysis, both facts and theory and requires the application of all the talents of engineering and management. To effect this application successfully requires co-operation, patience, tact, a willingness to assist and explain and perhaps a re-analysis of the whole situation from a manager's view point.

Right at this point while on the subject of administration and its effect in all departments, I feel there is nothing more pertinent to the subject than the statements made by Mr. Atterbury before this Club a year ago in outlining the Pennsylvania Policies.

## CO-OPERATION

Before Shop Foreman's Club, Harrisburg, Pa., March 9, 1922

First of all, let me extend to you my hearty congratulations upon the spirit and purpose of this Shop Foremen's course.

When I was told of the course of study that you Foremen had arranged for yourselves, I was at once impressed with the influence for good which it held out.

Good—not only for you men yourselves, but also for the Company that we all serve—most of you, like myself, serving for many years.

Many of you men I have not seen since before our country entered the war, and tremendous changes have come about since that time. In fact, the last five years have been a trying period in American life and industry, particularly for those of us who make our living on the railroads.

Irrespective of whether or not there was warrant for the Government's taking over the roads, there can be no question that upon their return to their owners they were in a state of demoralization.

Not only as to such physical factors as under-maintenance of roadway, complete dislocation of equipment, etc., but far and above all other considerations was the blight that was sapping the morale of our forces. This applied to the employees and management alike.

A great improvement indeed has been brought about during the past two years.

It is in order here to touch upon a Pennsylvania policy that is really more than a policy; it is one of the fine traditions of our service.

The highest positions within the power of the Company to bestow are given to Pennsylvania men who have, through years of service up through the ranks, demonstrated their fitness for the trust and responsibilities imposed upon them.

The men in the lead today are men who yesterday were in the ranks; and in the ranks today are the men who must be the leaders of tomorrow.

There is a thought for reflection in this that should be a source of inspiration to every person connected with the Pennsylvania System.

The one great problem concerning us today, in common with all other great industries, is that of the cordial relationship between the employees and the management.

Most of the troubles in this world are caused by misunderstanding which should be explained away, and this should be particularly easy in our Pennsylvania service, where intelligence is the rule and not the exception.

We are today endeavoring to bring about a situation where our employees from the ground up will understand that we are asking their co-operation in developing the service of the railroad. It is the hope of the management that through the shop committees our men may feel that they are a real part of the organization.

Now, right here you come in to make or mar our program. I repeat that what you are in your dealings with your men, so the management is in the eyes of the men with whom you deal.

You may lead or you may drive. The elemental forces of love, hate and fear are always present, together with the perhaps less elemental but still real forces of respect, confidence and indifference.

If you are a born leader you have the respect, the confidence, the love and the affection of your men. If you are a driver, you have the indifference, the hatred and the fear of your men. And what you are, so is the Company to your men.

The men will follow you anywhere if they believe in your honesty, sincerity and impartiality. On the other hand, you may be able to drive them, but not far, if fear, hatred or indifference are the impelling motives. If the men believe that they are getting a square deal, there is no limit to what you can accomplish.

What is a square deal as applied to your duties and mine? Simply this: treating the men under us exactly as you and

I would want to be treated if positions were reversed and we were in their places.

In the organization of our shop committees, and also in the case of the corresponding committees in the other branches of our service, it is my hope that the men can be led to the realization and appreciation that this is what the management is endeavoring to accomplish.

If dissatisfaction and grievances can be eliminated and co-operation substituted, think how much it will lighten your work; think how much it will increase efficiency and production.

How much more livable life would be to you and to your men; how much greater the spirit with which all would face the next day's work, if the Golden Rule were more closely followed in our dealings with each other, and co-operation rather than opposition were our watchword!

Gentlemen, I thank you for your attention this evening and only hope that we will some day find ourselves in that frame of mind whereby we can better recognize glaring inefficiencies as we meet them day by day in our own departments.

### *Discussion*

#### QUESTION NO. 1

"The General Sup't. Motive Power decided to put a certain shop operation on a piece work basis and appointed a Committee consisting of three Foremen from different shops to investigate the matter and report to him. The Committee analyzed the operation and asked six different shops where the work was being performed to submit a time study. When the time studies were received the Committee found that one shop reported the total time required for the operation to be 17 minutes. Another shop reported 85 minutes. The other four shops reported times in between these two extremes. The Committee then went to the first shop and found that the operation was being performed properly and the standard of workmanship was excellent. What further action should the Committee take?"

*Group No. 1:* Messrs. Caum, Hook and Lehmer presented the conclusion of the group by stating that the Committee should first ascertain if the first shop is performing the work correctly, and if so then arrange to recommend the adoption of the same methods at the other five shops, providing each shop was equipped with the same line of tools and machinery.

*Group No. 2:* Messrs. Gamber, Baker, Manahan and Tomlinson discussed the question and arrived at the following conclusion, "That the Committee should go to the first point and satisfy themselves that the operations were being done in the proper manner and according to standards. They were then in a position to make their recommendations. After the price was set on the Committee's recommendations it is up to the other shops to go to the point that does the work in less time and see what the trouble is with their plant, and act accordingly. The evil of poor workmanship should, however, be guarded against.

*Group No. 3:* Mr. Allen stated that it was the duty of the Committee to investigate conditions at the first shop to see if they were doing the work properly, and then conditions at the other shops to see if they were using the same tools and working under the same conditions, if not, then introduce the same methods at the other shops and set the price according to the first shop. Messrs. Adams and Hassler agreed that this was the course that should be pursued.

*Group No. 4:* Mr. Womer stated that it would be well to investigate the methods used at the first shop from all angles then go to each shop in turn to observe the methods used. The methods used at the first shop should be the standard for all the shops, if tools and equipment permitted.

Mr. Eberle was of the opinion that the committee should make their recommendations on conditions found at the first shop, if they were proper, and suggest that the Foremen of the other shops visit the first shop and study the methods employed.

*Group No. 5:* Messrs. Mumma and Baer stated that the Committee should investigate conditions at all shops before

making their report, and if the shops with the higher time were doing the best possible with their equipment should recommend betterments for the shops which are high. Mr. Batten felt that possibly the shops with the high time were not equipped with special tools and jigs while the first shop had suitable tools for doing the job, and felt that the supervisory officer of the other shops should visit the first shop to observe conditions.

*Group No. 6:* The conclusion of the group was presented by Mr. Schlager who stated that the committee should investigate the different methods employed at the various shops, but should not inform one shop of the others' methods, and report back to the Superintendent Motive Power as to the conditions found and their recommendations. He also felt that the Foreman at the shop having the 85 minutes time should go into the conditions thoroughly at his shop to see that everything possible was being done to perform this work in the least possible time.

*Group No. 7:* Messrs. Stoner, Skeen and Steigerwalt discussed this question and felt that the Committee did right by going to the first shop where the work was done in the least time and find out that all operations were up to standard and then recommend the same standards for the other shops, setting the price accordingly.

*Group No. 8:* Messrs. Zimmerman, Shirk and Ferry were of the opinion that after the committee had ascertained that the work was being properly performed at the first shop they should have recommended that the other shops be brought to the same standard as the first shop, in the way of tools, machinery and method of doing the work.

*Group No. 9:* It was the consensus of opinion of the group that the conditions at the shop doing the work in the shortest time should be studied and used as a basis for a recommendation that the other shops be placed on the same basis as the first shop.

*Group No. 10:* Messrs. Wenrich, Rhoads and Reed stated that the Committee should first ascertain that the work performed in the shop with the lowest time was correctly done

and then make their report with the recommendation that the practices and equipment at this shop be adopted as a standard at the other shops.

*Conclusion:* It is important for the Committee to satisfy themselves that the operation is being properly performed at the first shop, with no deviation from standards and no practices which will have harmful results. After this is done they are in a position to make their report with a recommendation that the other five shops adopt the methods used at the first shop, and that prices be issued based on this operation after they have had a reasonable time to get it going.

## QUESTION No. 2

“Two shops located 45 miles apart are both called upon to true a large number of journals on car and engine truck axles due to hot journals, etc. At Shop “A” the time required to true a journal complete, from floor to floor, is 24 minutes, while at Shop “B” the operation is performed on a lighter machine and requires 43 minutes. The Superintendent Motive Power desires to standardize this operation on a piece work basis. Investigation develops that the standard of workmanship is excellent at both shops and that the time study represents the best possible production from the machine without sacrificing quality. What is the proper action to take?”

*Group No. 1:* Mr. Shaffner suggested shipping all wheels to Shop “A” and discontinue work of this nature in Shop “B.”

Mr. Lehmer felt that they should ascertain the cost of heavier machinery for Shop “A” and purchase same for Shop “B” so they can compete with Shop “A.”

Mr. Campbell suggested that piece work charts be issued with two prices, one based on the machine at Shop “A” and the other based on machine at Shop “B.”

*Group No. 2:* After considerable discussion by all members of the group they felt there were three solutions to the problem, as follows:

First: Install a modern machine in Shop "B" so as to standardize both plants, if the saving in cost would warrant this installation.

Second: Discontinue truing journals at Shop "B" and ship all wheels to Shop "A," comparing of course, the handling, hauling and labor involved with the increase in cost to true them at Shop "B."

Third: Issue piece work charts covering two different prices, one for Shop "A" and one for Shop "B."

*Group No. 3:* It was the consensus of opinion that the proper solution of this question was to equip Shop "B" with a machine similar to that at Shop "A."

*Group No. 4:* It was unanimously concluded that the operations at Shop "B" should be discontinued and ship all the wheels to Shop "A," at the same time making Shop "A" the source of supply.

*Group No. 5:* Mr. Weaver presented the following, which was agreed to by the group: In order to standardize the price machines similar to those at Shop "A" should be installed at Shop "B," or else discontinue the turning of journals at Shop "B" and transfer the work to Shop "A." Another remedy would be to issue piece work charts with different prices based on the different conditions.

*Group No. 6:* Mr. Sassaman felt that the wheels should all be shipped to Shop "A" for turning. Mr. Runk stated that the Committee should go into the proposition and ascertain if the number of wheels turned and the savings effected would justify the installation of a machine at Shop "B" similar to the one at Shop "A."

*Group No. 7:* Mr. Wells was of the opinion that the conditions should be studied to see if it would pay to transfer the work to another shop doing it at a cheaper rate, taking into consideration the handling and hauling, and if not a different piece work price would be necessary, or else install a similar machine at Shop "B." The other members of the group felt that this question could be decided only after a careful study along the lines offered by Mr. Wells.

*Group No. 8:* Mr. Bowman brought out the conclusion of

the group by stating that since there is nothing in the report to indicate that there were any other conditions except the difference in machine equipment he felt that two piece work prices should be set, based on the conditions at each shop, until such time as another machine could be installed at Shop "B."

*Group No. 9:* Mr. Geist stated that if the time study represents the best possible production from these two shops, and the workmanship is satisfactory, then the machine at Shop "B" is too light and should be replaced.

Mr. Eckert was of the opinion that it might be better to have the work sent to the shop which was equipped, as the cost of a new machine might exceed the saving effected by its installation.

Mr. Parker felt that it was doubtful if either of these solutions would effect a saving and suggested that two piece work prices be established in accordance with the two types of machine.

*Group No. 10:* Mr. Rhoads stated that a new machine should be installed at Shop "B" because the cost of handling and transportation of the wheels to another shop would soon amount to the cost of the machine.

Mr. Bell felt that a heavier machine should be placed at Shop "B" so the same amount of good work could be turned out at both shops, at the same piece work price, consequently sufficient saving to cover the price of a new machine.

*Conclusion:* There are three possible solutions to this problem:

First: Discontinue truing journals at Shop "B" and ship all wheels to Shop "A." The cost of handling and hauling should be compared with the increased cost of truing journals at Shop "B."

Second: Ascertain the cost of a modern machine for Shop "B" which will permit them to meet the performance of Shop "A." If the saving in cost justifies the purchase of a new machine suitable recommendations should be made along this line.

Third: Issue piece work charts with two prices, one based

on the job on machine at Shop "A" and the other one based on the job on machine at Shop "B." This should only be done after it has been determined that neither one of the other propositions are feasible.

### QUESTION No. 3

"In a certain shop the "A" trick gang left a rush job approximately half completed. A gang on "B" trick was assigned to finish the job but found work which was improperly laid off and fit up by the "A" trick gang, making it necessary for them to retrace part of the work which they had already put up. The usual method of payment at this shop for jobs of this kind is to pool both A and B trick gangs and pro rate the earnings on the basis of the hours each gang puts in. The "B" trick gang claimed that they should not be penalized by the time required to do over the bad work. What is the proper action to take?"

*Group No. 1:* Mr. Mumma felt that as the "A" trick gang had failed to preform its work properly the pool should be broken up and not pro rated, but each man paid for the work he performed.

Mr. Lehmer stated that if it had been the practice to pay men for spoiled work before then pay the "A" trick in this case, but if they have not been paid for spoiled work prior to this case then deduct the amount for the spoiled work and pay the same to the "B" trick.

*Group No. 2:* After considerable discussion the following conclusion was reached :

"First, a very thorough investigation should be made of all conditions pertaining thereto, and if the supervisory force is in any way responsible the men should not be penalized, but if it was found that the men are at fault the total earnings should be pooled and pro rated on the basis of the hours worked, exclusive of the time required to perform a portion of the work over, which would have been their earnings if the work had been right from the start; then pay "B" trick men at this hourly rate for the entire time he

worked on the job, and give the balance to the "A" trick men, it being understood that such a solution would not establish a precedent as all cases should be taken up on their merits."

*Group No. 3:* Mr. Gerheart felt that the "A" and "B" trick gangs should give and take in a case of this kind. Some other time it may be possible that the "B" trick gang would make a mistake and "A" trick would have to remedy it.

Mr. Allen was of the opinion that if "A" trick does a job and the Gang Foreman on the following trick knows the job was not correct the time should be taken from "A" trick and allowed to "B" trick. In any event the "A" and "B" tricks should not be pooled at any time, but there should be separate cards issued for each gang at all times.

*Group No. 4:* Messrs. Givler and Handschuh felt that the "B" trick should be paid for the time actually consumed in correcting the "A" trick error, but the "A" trick should be paid up to the point that their work had been properly performed.

*Group No. 5:* Messrs. Smiley and Hall stated that the "B" trick should be paid for the work not properly done by "A" trick. Mr. Mumma felt that it was bad practice to pool two gangs on different tricks and that separate cards should be issued for the work actually done by each gang and payment made accordingly.

*Group No. 6:* Mr. Schlayer stated that the first thing to do was to thoroughly investigate the case to ascertain who was at fault for improper work and adjust the matter accordingly. He further stated that a Gang Foreman in giving out partially completed work should in the first place see that the work has been properly performed up to that point and that the men taking up the work were thoroughly competent and properly instructed as to what was to be done.

*Group No. 7:* It was the opinion of the group that "B" trick gang should be paid for the work improperly per-

formed by "A" trick and "A" trick should lose, no matter whether it was an hourly rate or the piece work unit price, covering the improper work performed by them.

*Group No. 8:* Messrs. Norton and Rich stated that the "B" trick gang should not be compelled to pay for the mistakes of the "A" trick gang, and to take care of a case of this kind the Gang Foreman should inspect the work when giving it out to know whether it had been properly performed that far by the other gang.

*Group No. 9:* Mr. Dolbin was of the opinion that the proper way to handle this case would be to make out an extra card for the work performed by the "B" trick gang, pro rate the earnings and deduct the duplicate operation from the earnings of the "A" trick gang.

*Group No. 10:* Mr. Rhoads stated that it was only possible to pay for the completed job what the price calls for and the men who performed the wrong work should have the amount deducted for that work and paid to the other trick, but the "A" trick should be paid for the work which they performed properly. This brought out the conclusion that any time and money lost to the "B" trick gang due to poor work on the "A" trick should be made good to "B" trick, and "A" trick made to lose a like amount.

*Conclusion:* The case calls for thorough investigation. If the lost time was due to poor work on the part of the "A" trick gang and would have been avoided if they had used proper care and if the "B" trick gang made every reasonable effort to complete the job efficiently, it will be proper for the Foreman to make report of the circumstances, giving the result of his investigation, with the recommendation that this pool be split as follows: Figure the hourly rates of both gangs as a unit with the time required to do over part of the work thrown out. This would have been their earnings per hour, if the job had been done right from the start. Then pay the "B" trick gang at this hourly rate for the time put in doing the job over and deduct the sum required from the total earnings of the "A" trick gang.

## SHOP SCHEDULES AND SHOP DELAYS

ELIOT SUMNER,  
Supt. Motive Power  
New Jersey Division

February 26, 1923

During the Harrisburg Club course of lectures last year, Mr. A. C. Davis covered the subject of shop planning by describing to you the general practice in the selection of locomotives for shop, giving all consideration to the condition of locomotives and the necessary repairs required to give the best possible service on the road for a reasonable expenditure of money. He also described to you the processes in the course of repairs generally followed at our shops.

Mr. Davis has given you the schedule; let me try to drive home the importance which is attached to it by the officers in charge of locomotive repair work in order that we may get the largest possible number of serviceable days out of locomotives, and one way of doing that is to reduce the number of days in shop.

This paper, however, will be devoted to that part of the work which is covered by the class repairs to locomotives in the back shop. While it is just as essential to expedite the work of running repairs and return the locomotives to service as promptly as possible, these repairs are of greatly varying character, and each case must be dealt with as the necessity requires. It is well recognized, however, that the class repair work in the back shops can be systematized so that all locomotives requiring the same class of repairs can be handled according to very much the same routine. A shop which is properly organized and equipped, so that the individual part of each locomotive will be handled in the same way, and come back to the locomotive in the erecting shop according to schedule, will materially reduce the length of time locomotives are out of service, and also reduce the cost of repairs.

When the subject of shop schedule is proposed to shop foremen, there is usually a great deal of objection to it. The foreman will tell you that he has all his troubles in his vest pocket, that he sizes up the situation every morning, and informs everybody concerned, when he wants repaired parts or new material delivered in his department. He believes that all of the work is going along in high gear, and he does not see where it can be improved upon.

I fully appreciate the problems which many of the shop foremen and gang foremen are contending with every day, also the irregular moves that must be made, and which upset all calculations. You must drop the work on one locomotive to give preference to another. You run short of material and you have machine tools that are not modern, which restrict the output. When the locomotives have been stripped you find that more extensive repairs must be made than were at first anticipated. All of these things come to us in the course of our daily work, but what I want to impress upon you is that if you do not have a schedule, these irregularities are simply reported to the foreman as a reason why the work is not going along as it should; but if we have a schedule, and each foreman knows that the other departments are working along that plan, he is sure to take some energetic action to overcome the difficulties as they arise. Men can be shifted from one engine which is held up, to another which is not, and then brought back again to speed up the work on the first locomotive, so as to partially, if not entirely, get back to the original schedule.

If, instead of specifying only the date when the locomotive is to go out of shop, we specify intermediate dates when the detail operations must be completed, we are simply subdividing the operations, and the gang foreman must step in and take the responsibility for conforming to these dates. The gang foreman, however, must first be convinced that it is just as important for him to conform to the schedule of detail operations as the foremen feel where there is no detailed schedule, that they are responsible for conforming to the date the locomotive is to be completed.

After a shop schedule has been in effect for a few months and data is accumulated showing which engine failed to meet the schedule and in what particular operation, the Master Mechanic and Foreman can very shortly find out the sub-departments or the machine tools that are not up to proper capacity, and recommend a remedy.

Whenever we have any especially important piece of work to carry out, we always make a schedule. Why should we not do the same thing for locomotives receiving class repairs?

Shop planning is the application of task work instead of day work. A specific piece of work is assigned to each shop or department, to be completed in a given length of time. This sets the task for the shop, and everybody interested must arrange the details accordingly, and, if the subject is undertaken in earnest, we will get the desired results by watching the schedule instead of watching the clock to see when the day's work is done.

Let me give you a few examples of setting schedules:

Aside from the requirements of train rules, suppose that we do not give the engineer of our passenger trains a schedule showing the time, (of the train that he is to run), at intermediate points. I am sure that he would, for his own information, divide up the total running time over the division to show the time that he must pass intermediate points, knowing that unless he does so, he can not go to destination in scheduled time.

Last year a new turbo-generator was installed in the Long Island Power Plant. The work was started in March, and began to drag. We called a meeting and put down some dates when the manufacturer would make delivery of various parts. It looked as if we would not be ready for them. We doubled up so that more than one operation was going on at a time, and finally narrowed it down to the one job of digging a big hole in the concrete flooring and piling, to make our intake and discharge water connections, and when we found that this was going to hold up the job, we put it on three tricks, and caught up with our schedule

June 30th, so that we were ready when the machine began to come. Then the strike broke on us so that all of our attention was turned to operation of the plant, and the construction work suffered. However, we got the turbine started in January, just in time to carry the heaviest load we had ever had. We could not have done this without the schedule, by which each one knew the date he must meet, and made such special arrangements as were necessary.

One of our shops put through a class 2 repair in 81 hours and 45 minutes, from the time that the engine was taken into the erecting shop until it went out under steam. This record could only be accomplished by most careful planning of the work beforehand, so that each detail operation would fit with the next, and without one man getting in the way of another. The case is not cited as an example of good economical operation, because we of course appreciate that the work on other locomotives was set aside to give preference to this one, but it shows what could be accomplished in one special case by efficient planning.

We also have plenty of illustrations of the advantages to be derived by more systematic planning of our work, even if we do not set a time for each detail operation, for example:

In order to get a little better system into the handling of locomotives at our enginehouses, and thereby expedite the movement, the Pennsylvania Railroad System inaugurated the outside inspection pit. As soon as the locomotives arrive at the engine terminal, they are inspected so as to learn what repair work must be done. We must watch every detail movement of the locomotive in service, so that we will get the maximum use of it on the road. It is the general practice, therefore, at our large terminals, to offer freight locomotives to the Yardmaster as soon as the Enginehouse Foreman receives the inspection pit report, and can determine how much time he will need to prepare the engine for the outbound trip. During times of shortage of passenger power, the same practice is followed at our engine terminals. If we did not have the inspection pit, but waited until

the engine arrived in the house for inspection, I am afraid that many of our passenger trains would stand in the train shed.

This is mentioned as another illustration of the value of a schedule to expedite the movement.

Now to come back to the handling of locomotives at our shops for class repairs :

We are all familiar with the grand rush at most shops to get out locomotives at the end of the month to meet the classified repair output which has been set up for the shop. All sorts of efforts are made to accomplish this, which are quite generally successful. We naturally ask ourselves why we do not get an equally good output the first week of the month as the last. We well recognize that to some extent the big output in the last week of the month reacts unfavorably on the first week of the following month, because the forces are doubled up the last few days in the month to finish locomotives, whereas these men should be engaged in carrying along the repair work on other locomotives scheduled for the following month ; but this big output at the end of the month is not all accomplished in this way. Very much of it is due to the more concerted supervision by foremen and gang foremen, who, in turn, hurry material on other departments, so that there will be no lost motion, in time, or unnecessary operations, and that their men may be used to the very best advantage. If this same active supervision is given to the smaller details in the work distributed to the various departments, we know that the output of the shop will become more regular. This very thing is accomplished by the shop schedule board, where the shop work is carefully planned and sufficient interest is taken by the Master Mechanic, Foremen, and all concerned in living up to that schedule.

We do not expect to iron out all of the difficulties by a schedule, because we know from the very nature of things that locomotives do not wear out in the same way, but we must emphasize the advantages to be gained by a shop

schedule which will accomplish what we are after, and that is a reduction in time in shop.

The object of a shop schedule is to expedite the work and reduce the time locomotives are out of service. Let us, therefore, consider the value of a locomotive per day, for those charges which must be borne by the railroad company, whether the locomotive is in service or out of service. Based on the cost of our freight locomotive, the L-1s, built before the war, the interest and depreciation alone amount to \$15.80 a day. For the passenger locomotive of the K-4s type, the interest and depreciation are \$14.93 a day. Therefore, for every day that these locomotives are unnecessarily delayed, this money is expended for no return whatever.

In order to arrive at a fair figure to indicate the loss per day on locomotives out of service, I have taken the average rental rate of 500 locomotives of all types, which is \$18.03 per 100 miles, and as the average miles made per day for the year 1922 was 98.4, you can see that the average value of these locomotives is turning out approximately 30 class repairs per month, or, for convenience, 1 locomotive a day for the entire year, and 1 day can be saved for each locomotive, in the length of time out of service, that shop can make the gratifying saving of approximately \$6,500.00 per year, equivalent to the interest and depreciation on the investment necessary to construct one new modern type locomotive.

In the same manner that we have shown the value of a locomotive per day, we should take into account the days out of service of passenger equipment cars for class repairs, and see what can be done to reduce that time. The cost of repairs, on the basis of 120 miles per day, plus the interest and depreciation, give the value of a class P-70 coach of \$8.068 per day, and of the MP-54 coach, \$7.048. We have more of the P-70 cars than of the MP-54, but we also have a large assignment of less valuable cars, so that for the purpose of argument, let us assume \$7.50 per day for the value of passenger equipment cars. One day reduction in the time out of service for each car, at a shop turning out a car a

day, would effect a saving of \$2,737.00 in a year, or the equivalent of the interest and depreciation on the investment required for 1-1/2 new steel coaches. I am confident that this can be done at many of our shops by a detailed analysis of the work, and making various operations dovetail together, and with very little, if any, additional cost.

Now how are we going to reduce the time in shop.

It goes almost without saying that we must have an efficient management of any manufacturing shop, to obtain good workmanship and good output. It is our constant aim to develop competent men to fill vacancies and also fill such new positions as are necessary to round out a good organization. It should be the aim of each member of that organization to develop the promising young men under him, so that when he is asked to recommend a man for a higher position, he will have one ready. When we speak of developing men, we do not mean to develop only mechanical ability to do a first-class job, but also the ability to manage men and to lay out the work, no matter how small it may be, so that it will be carried through expeditiously and give us a good job at a low cost. If every member of the organization is impressed with the necessity for developing men, we will have a department composed of men who are interested in their work, all striving to better the output for the good name of the department, and will, thereby, create a personnel of the highest efficiency.

In developing men we must be very considerate of those who have some particularly good characteristics, but who may be weak in other respects. We may have a first class mechanic, but a man who is not competent to manage men so as to get the best results. He should be encouraged and shown how he can develop those traits which are weak, and thus become a more effective man. If, in this way, the General Foreman or Foreman can round out a good leader, he is not only doing the greatest service to that individual, but he is showing other men in the department how they can become more proficient.

The cost of transportation of material around a crowded

shop has become so great in recent years that it is necessary to distribute the tools in the various sub-departments and arrange the movement of the work so that transportation is reduced to a minimum. For example, at these shops which are located adjacent to the enginehouses, it was customary, when necessary to perform any machine work, to take the parts to the back shop. As the work grew heavier in the enginehouse, and we undertook more extensive running repairs, the transportation of the material became very burdensome, and at most of the larger enginehouses we have established small machine shops in the roundhouse, or attached thereto, assigning such tools as would normally be kept busy on enginehouse work. To put it another way, instead of having all of the planers in a row, side by side, and all of the lathes in a row, and the boring mills together, and the drill presses, we have picked out such tools as are needed for enginehouse work and placed them at the enginehouse. Now-a-days the same idea is being carried out in the arrangement of tools in the machine shop proper. For example, in a large shop where the number of driving boxes to be overhauled monthly is large enough to require the entire output of several tools, they should be located in a group together, such as press, lathe, slotter, planer, babbitt furnace, boring mill, and drill press.

It has been recognized for years that such a grouping is necessary for tire turning and driving wheel work, comprising such tools as tire lathe, axle lathe, quartering machine, wheel press, keyway machine, tire heater.

The same system of grouping can be followed for other important classes of work such as piston rods, heads, rings, and cylinder heads in one group; guides in another; shoes and wedges in another; valve motion in another; main and side rods in another; and in the boiler shop it is our regular practice to follow this grouping system for the flue work, and of late years, the overhauling of superheater units comprises another group.

Engine and trailer truck work should be assembled in another group, with the necessary machine tools.

In laying out the new locomotive repair shop at Juniata, this plan has been carried out admirably. This shop has been designed for an output of 100 class repair locomotives per month. A very careful study has been made of the number of parts going to each group per month to be overhauled, based on past practice as to the proportion of such parts which must be repaired, and those which will be replaced by new.

The capacity of the machine tools, many of which are specially designed for maximum production, determines the number of such tools required in each group and the best arrangements of tools so as to reduce the handling and transportation. Each group is arranged without any back movements and frequently in the approximate form of a circle or rectangle, served by jib cranes or pillar cranes. Excellent results should be obtained from this careful planning of the work through the shop, to the end that the repair work will be done in a first-class manner, and the time of the locomotives out of service for repairs will be reduced to the lowest possible point.

This is mentioned as a model of the scheme of group machines, which it is well for all of us to keep in mind when we have an opportunity to rearrange tools.

We like to picture the improvements in our own particular shop, which we think are the most important on the System, because we think that we can see the wonderful results that can be accomplished. Unquestionably the cost of production can be very much reduced by the substitution of modern high-powered and high-speed tools replacing old ones, and re-arrangement of tools in a shop, or the shops themselves that go to make up the complete unit, so that the work can be handled more expeditiously. Magazine articles treat of such questions and show us what can be accomplished, and it is commendable that our men take interest in such matters, so that when the opportunity arises, we can make a suitable recommendation to our superior. Unfortunately, in the last few years, however, railroad operating expenses have increased enormously, and more in pro-

portion than the revenue, so that we have not had liberal appropriations for renewal of tools, and, therefore, such appropriations as are made must be applied at the large central shops where the greatest saving can be made, and we must apply ourselves at the smaller shops to improve the output with such facilities as we have, or with small expenditures most wisely be distributed, so as to do the greatest good. We have, from time to time, distributed blue-prints showing shop kinks which have been developed at one shop, and which can, to advantage, be used at other shops. This is a very desirable practice, and I am inclined to think that during the last year or two we have not paid so much attention to it as we should. We are always ready to receive suggestions for shop kinks, but it is of course important that when sending in these suggestions, the time saving and cost saving should be conservatively estimated, so that we will be sure to realize the results that are claimed.

We are all beginning to feel the material situation very acutely in our shop work. We have been through a year which started with a large stock on hand, and having a moderate consumption and good deliveries. It was necessarily our object to transfer material from places where it could be spared to others which were short, and very great progress has been made along this line, without any real shortage of material which could not be made up in a reasonable time by transfer. Towards the latter part of 1922, the time of delivery of new material began to increase very perceptibly, and as our shops were gradually getting into better order towards the end of the year, our consumption was likewise increasing. These two factors have very much changed the whole aspect of the material problem, so that we are now beginning to be pinched in many ways because of the shortage of material. The situation is fully appreciated by the General Storekeeper, who is desirous of meeting our requirements, and the requisitions have been very much increased. Within a reasonable time, this should improve the situation as far as purchased material is concerned, but we must expect a longer time from the receipt

of raw material until the manufactured articles can be put through these shops which are designated to supply manufactured articles.

I only mention these matters in relation to the shop schedules to show that for some time to come we must expect shortage of material, and must do everything that we possibly can to anticipate our requirements; the storekeeper consulting frequently with the foreman, so that material transfer may be effected between shops, with the least delay, and without making undue requests to build up one place to the detriment of another, which may be just as urgently in need of material.

The distribution of material between shops is a most complicated and difficult problem at best, and we must try to give a true picture of the necessity for material, so that those in charge of the distribution may discriminate wisely when ordering transfers.

You have all been through the familiar procedure of asking by memorandum or wire for two cylinder heads, and could not get them anywhere, but if you call up the storekeeper at a neighboring shop, you will find that he has not any to spare, but when he realizes that you have a locomotive out of service, he can send you one. This goes right back to the question of giving a correct description of what is wanted, and why.

Probably one of the most expedients that we are frequently resorting to without being able to find out the cumulative cost is the manufacturing of a few parts on shop order of such articles as should normally be carried in stock. This operation is repeated, making up six or a dozen at a time, continually expecting the regular supply to come in from Altoona Works or the manufacturers, and the cost per item made on such small shop orders will run three or four times as much as when manufactured in quantities.

We must admit that sometimes these expedients are resorted to because of errors in carrying out our regular plan of supplying material. Material is not ordered when it should be according to formula; gang foremen and foremen

fail to notify the storekeeper of anticipated changes in consumption, and clerical errors are made in ordering too much or too little. In order to get out of these difficulties when we reach the point where the material is actually needed, all sorts of makeshift schemes are adopted, and particular parts are made up to suit the particular locomotive in question, many times at the expense of the pieceworker, as the prices are not set for making parts in such small quantities, including setting up machines and again changing back to other work.

All of these questions emphasize the necessity for close contact between the storekeeper and the foreman. Without calling formal meetings and taking the time of many men for matters that may only concern a few, it is nevertheless of sufficient importance that the storekeeper and foremen should discuss these material questions daily.

The Storekeeper is a very important man in our efforts to reduce the entire locomotives in shop. It is part of his regular duty to work very closely with the foremen, anticipating requirements for material, but more particularly so when the foreman becomes interested in the shop schedule, so that he will ascertain his requirements far in advance of what he would naturally do without a schedule. We are not criticising the foreman, who undoubtedly is very earnestly performing his duties at the present day, but when he has the schedule before him daily, he will undoubtedly plan and carry out his work much more intelligently and he will go to the storekeeper to tell him very clearly and forcibly that he will require this material on a certain day, and if the storekeeper does not produce the material, the delay will be on that account.

The changes in requirements for material are very often seasonal. During certain months we have a run of passenger locomotives in preparation for the summer season or holiday travel, and during other months a run of freight locomotives in preparation for the heavy fall and winter demands. Yard locomotives are with us at all times, and are just as important, because a shortage in that power invariably

means that other classes of power will be used to make up the shortage. Therefore we must keep the storekeeper informed of these seasonal changes.

To get the maximum efficiency in a shop organization, we must distribute the work proportional, as far as we can, to the capacity of the various departments. Next we must set an output schedule so that the work will move through the shop regularly, but at the same time proportionally to the size of the locomotives and class of repairs. Then we must set a time schedule for each locomotive.

Mr. Davis explained to you last year the details of the shop schedules.

It is important that meetings should be held to go over the progress of work and find out just what is lacking, and what substitutions can be made. Whenever meetings or conferences are suggested, they are liable to be drawn out into two or three hours discussion of matters that pertain to only two or three foremen, and for which the time of the entire meeting is taken up. When I say that meetings should be held, I mean that the head of the department, or the General Foreman of the shop should get the foremen together and very rapidly run through the subjects that are important, and which concern the greater number. Often this develops that if for lack of material, or for any other reason, one locomotive must be delayed, a shift can be made in the schedule so as to correspondingly speed up another locomotive, and not delay the total output of the shop.

In preparing a shop schedule for locomotive class repairs, I am not proposing that every detail operation must be scheduled. This has been attempted in some cases, and has been covered in voluminous articles on shop planning and the wonderful results that can be accomplished. We know very well that no two locomotives coming to shop require exactly the same repairs, but we must select the large operations performed by departments or gangs in the departments, and set dates when these operations must be completed. Each department will then work out the minor operations that go to make up their portion of the work.

In talking with a friend the other day, who is in charge of a manufacturing plant which covers quite a variety of work in the construction of steam turbines and pumps, he told me that several years ago they attempted to detail the operations on each machine, specifying just how much time was allowed, all of which was incorporated into a schedule for the construction of a steam turbine or pump. This schedule was used not only to insure a creditable output for the shop, but to set a task for each man, so that a reasonable day's work could be obtained from each one of them. This schedule was, of course, subject to many changes as designs of the manufactured article were changed, and as tools were improved, or men became more proficient in the operations on the tools, and of course every one of these changes required a revision of the time for the complete article, and one change in a tool necessitated a change in the schedule of each complete article that passed over that tool. The result was that today they do not attempt to schedule each individual operation on the tool, but cover the principal steps in the preparation of the material, and assembling of the complete article which is to be manufactured, and hold the Foreman in each department responsible for detailing the task work on each tool, and getting the required output from his men. In the same way I feel that we should organize our schedule for locomotive repairs.

The schedule in effect at Altoona Works is laid out along these lines, and was described to you in detail by Mr. A. C. Davis in his paper last year.

In setting the number of days or number of hours required for one of these operations, it is not the intention to give the minimum time in which the work can be done under most favorable conditions, but to establish a reasonable time which, with good management, should be met. We cannot expect to meet the schedule of each operation on every locomotive. We will fall behind on some, but we must beat the schedule on others. This should be very clearly explained when introducing any schedule, so that the men will not get the idea that as long as they are meeting the schedule, they

can slow up. On account of the varied character of our work on locomotive repairs, we must have a schedule prepared in this way. If we make a schedule which is so short that it can be completed only under ideal conditions, very few, if any, locomotives would be turned out in schedule time, and very soon no one would have any faith in the schedule. We therefore have a schedule which should be made under good average conditions, and in a review of the output of Altoona Works, for January, it was found, that of the 106 locomotives turned out, 48 met the schedule or better, and 58 failed, and this was accomplished under what would be considered rather unfavorable conditions, because of having a number of heavy locomotives of a new type.

The basic operations which comprise the Altoona schedule, for class 3 repairs, are

Date and time in shop

Stripped and distributed

Flues out and ferrules in

Date and time in shop from frame shop

Flues replaced in boiler

Frames, pedestal caps, cylinder work, and spring rigging erected

Rockers, lift shaft erected, wheels, boxes, shoes and wedges ready

Engine wheeled, pedestal caps up and trammed

Flue work finished except welding; boiler washed, closed up and tested

Links and valve motion, cross heads and pistons erected, lagging and jacket on

Valves set, ash pan up, grates in, side and main rods on, units in and tested

Pipe work and trimmings on, engine lifted out and finished.

Corresponding schedules are prepared covering the other classes of repairs, and variations are permitted for particularly heavy boiler and cylinder work, and cylinders renewed; changing from 3 to 2-piece cylinders; half side

sheets of firebox, barrel patches; crowd bolts, etc.; or new flue sheet.

A very important part of the success of the schedule system is the inspection of incoming locomotives. One railroad has developed this inspection so that a Chief Inspector is assigned, with one or more assistants, to go over the engine by a surface examination before stripping and during dismantling. These men select all of the parts to be removed and make out regular inspection forms giving sizes of all fits, clearances and tolerances for renewals and repairs of these parts.

The schedule clerk must make out a daily sheet, which is issued to the shop foreman and gang foreman, calling attention to material and operations delayed, the number of days delayed in the schedule and the cause. These delays are then posted in red ink on the schedule boards and an excessive number of red marks in any one vertical column on the schedule board indicates forcibly that this job or department represented by that particular vertical column is probably the cause for delaying the engine. When these delays are repeated periodically or persistently, the Master Mechanic or General Foreman must make a study of the situation to strengthen that department. Under the piecework plan, this system has resulted in men making more money on account of receiving material more promptly.

I have been told by those who have visited many shops that it is significant to note that almost invariably the dirty, congested shop has no schedule system.

Most all shops handling a large amount of miscellaneous work in addition to the locomotive repairs, such as work for other departments and miscellaneous machinery repairs, which should receive the attention of the schedule supervisor so that it may be handled in the order of its importance, thus interfering with the regular locomotive repair work as little as possible.

From an editorial comment in the *Railway Age*, a visitor at a shop, being impressed with the congestion of machinery, stock and unfinished machine parts, asked a Foreman how

he knew which shopping order covering miscellaneous work or direct locomotive repair work should be done first. The reply was, "We wait till somebody needs the order so much that he telegraphs for it." I think we all appreciate that while this language may not be used by our Foremen, this comment "hits home" to all of us. When the schedule system is not employed, each Foreman is naturally guided only in a general way by the final outgoing dates of locomotives and by the hurries that he receives from other Foremen.

To quote Mr. Spidy, *Railway Age*, "It is not the amount of work to be done that counts in the determination of output; it is the time required to perform the longest job."

That is to say, assuming that we wish to increase the output of a given shop, and that we have permission to put on the additional men needed, an analysis of the work will soon locate the particular operation that is holding up the largest number of locomotives. That operation may be the machine shop, and it in turn may be short of capacity due to the miscellaneous repairs that it is called upon to make in the supply of material to outside points; or, the longest job may be the boiler shop, not because of the length of time of the operations of this department on each particular locomotive, but because of the lack of capacity for handling each job promptly as it is turned over to the shop to be done. In our larger shops which renew fireboxes, you immediately think of that job as the longest one. In order that the renewal of the box in the boiler may interfere as little as possible with the flow of work through the erecting shop, we take the frames of those locomotives which are undergoing firebox renewal, outside the erecting shop and start on another locomotive. In other words, we have, for many years, recognized the scheduling of class 2 repairs, or firebox renewal, through the shop, and we must now go into the smaller operations and schedule the flue renewal, special stay-bolt examination, driving wheel work, and valve motion. Then, as we iron out some of these causes of delays, we will go into the still smaller operations.

When the idea is once firmly established in the minds of

the Foremen that they cannot make up for lost time and that the failure of one department will result in holding up the locomotive throughout the remainder of the time in the shop, he will begin to look around for means to shorten the time of parts in his custody. Very often much can be accomplished in this way by study of the work reports of locomotives in advance of shopping or as soon as they are shopped, but in advance of the material being distributed to the various departments so that material can be prepared in advance. We always do this as regards the large items such as renewal of firebox, broken cylinders, frames which have broken repeatedly, so that renewal is justified. The same practice should be followed for the smaller items, machining repair parts in advance and where the number of locomotives of any one class is sufficient, preparing extra parts in advance to be applied to locomotives and those taken out for repairs prepared for the next in order and so on.

This practice can be followed to advantage on such parts as engine trucks, trailer trucks, driving boxes. When the boiler of a locomotive is in the boiler shop for a new firebox, the driving wheels have often been moved ahead, thus saving time on the other locomotives in the shop for lighter class repairs.

Sometimes we are inclined to lay too much stress on the length of time the locomotive is inside the doors of the erecting shop, and as soon as the locomotive is drawn out of the erecting shop, the schedule ends. Our object, however, is to reduce the length of time such locomotives are actually out of service. Therefore it is just as much our concern to shorten the time on trial trip.

If two or three days work is left with the idea that it can be handled all at one time after the trial trip, it only delays the firing up for the trial trip and requires more men to be brought from the back shop to finish work which they did not properly do in the first place. Those shops which are making a point of shortening the time of trial trip as much as possible, will usually turn the locomotives out of the erect-

ing shop in more complete condition and the trial trip will be reduced to what it actually ought to be, that is, to determine only such minor details as could not be determined on the cold engine.

The shop schedule should follow the engine until it is fired up ready for road.

I have said that this paper will be devoted to the work of giving class repairs to locomotives in the back shop. The points I have endeavored to bring out apply equally as well to the handling of classified repairs to passenger equipment and to shops specializing on heavy repairs to a particular kind of freight equipment.

While some scheme for scheduling locomotive class repairs is almost universal in the larger shops, the same progress has not been made in railroad shops to systematize car repairs. This is attributed by some to the fact that maintenance of equipment officials are, generally speaking, more familiar with the details of locomotive repairs, others say locomotives lend themselves better to scheduling systems than cars, and still others point out that an unserviceable locomotive day is more costly than an unserviceable car day and consequently the incentive has been greater to cut down the former. Whatever the reason is it should be disregarded in these days of high labor charges on the car side as well as on the locomotive side, not to mention such things as recognition of the value of traveling overhead cranes in car shops and the advent of the bake oven. The bake oven has taken a good deal of the lime-light away from the paint shop as the controlling department in shop scheduling.

Passenger cars, like locomotives, may be treated as units. It is now recognized that workable determinations may be made of the time required to perform the various operations. No schedule should be made up without the wholehearted approval of the various department heads. It should not be an easy schedule; it should require a maximum of effort with due allowance for those retarding factors peculiar to the shop under consideration and which, per-

haps, cannot be eliminated for lack of room or money. If these things are not taken into consideration, we will set impossible tasks, resulting in everyone losing interest and eventually the schedule goes under of its own weight.

Having determined the length of time required to perform the operations which must be carried through for various classes of passenger car repairs, wood and steel cars considered separately, with any further sub-divisions which may be found necessary, we are able to put our finger on the controlling operation. The first question to come up in our minds is, "How can this controlling time be cut down?" It may be the painting or it may be truck repairs or it may be something else. I will not discuss how these problems have been met in other shops; that is the problem for the individual shops. The point I wish to make is that the mere fact that this question comes to the front is a healthy sign pointing to increased production. That, of course, is the main reason for systematizing the work. We are seeking increased production with practically the same tools, men and machines we had before.

It will be manifest to each of you that a definite and just allotment of time for each department or group within a department, stimulates the desire to complete the task within that time. If the stimulant does not come naturally, the Master Mechanic or General Foreman can supply it, because he has the facts, based on past performances, and knows what he has a right to expect. He did not have it before he systematized the work; he merely knew that his output was not forthcoming but had no means of analyzing the delays and placing the responsibility where it belonged.

The possible shop output in cars per month for any shop may be determined each month as soon as the erecting shop foreman and the paint shop foreman have together inspected the cars awaiting shop and decided upon the repairs that each car must get and have placed the car in its proper niche in the routing scheme. To explain: So many cars standing space days will be required for car No. 1 and so many for car No. 2, etc., but the total must not exceed the number

of standing spaces in shop times the number of working days in the month. These two men determine the order of taking the cars in hand, subject, of course, to the General Foreman's approval, so as to keep the entire shop force in all departments continuously employed. This selection of cars in advance gives each foreman an opportunity to plan his work and post the storekeeper on his material requirements.

I would like to say a word here about the value of Foremen's meetings in any well organized shop, because I believe these meetings are essential to a smooth working system. Meetings should be held once a week, made as brief as possible, and confined strictly to the business of the shop as a whole. I mean by this, that the time of the meetings should not be taken up with matters that can just as well be handled between the General Foreman and the Department Head concerned. The time of supervisors is too valuable for that. The Storekeeper should make it a practice to hold a meeting of his people the day before so as to be thoroughly posted and possibly to set his house in order before someone called him to account the next day. A foreman told me these meetings prevented misunderstandings between departments which formerly made more or less bad feeling.

When the work for the ensuing months is laid out, the Planning Clerk arranges for his reports. I have only mentioned this man before. He must be keenly interested in his job, have initiative, be diplomatic, preferably have shop training, and be a "stickler" for getting correct information. He keeps the General Foreman posted. He takes the pulse of the shop, and on the strength of his reports the General Foreman applies the remedy. Somewhat like the piece work specialist under each Master Mechanic at present. He does not saddle paper work on the foreman if the planning system is a good one and he himself is efficient. But he arranges to keep the various foremen posted on the progress of work and what is expected of each department, he informs them of delays, and enables the General Foreman to

be on top of the situation by means of quickly understandable reports.

Planning systems applied to freight car repairs, work out successfully on large operations doing heavy work and handling the same class of car on this heavy work. As in locomotive or passenger car work it is not advisable to attempt to schedule running repairs. The foreman should have the measure of his force and facilities on running repairs and should know what his output ought to be within a very few cars either way, and if he does not get this output he should look for the cause, but further than this we are not prepared to go on light repairs at present.

The economy of designating certain shops for heavy repairs on certain kinds of cars has been demonstrated. That is one reason why contract shops make money. They plan on a big run of heavy repairs of pretty nearly the same kind day after day. The force gets accustomed to it. Blue prints need not be consulted for standards, every one knows what to do after the first few cars, a highly diversified material stock is avoided and hence the material may be concentrated where used.

One large operation of this system specializing on heavy repairs to our Gla type cars at the present time, knows exactly what the output will be each day. Their chief concern is material and you can appreciate how the foreman keeps posted on this. Piecework keeps the finished product rolling out of shop. The shop is a beehive for work and the earnings show it; they have shown it for several months. I would like some of the piecework opponents to know this. No one looked as though he was going to die on the spot either.

In this shop the foreman knew precisely how much time each operation required. He would get that mainly from the piecework prices. The exceptional man might throw his calculations out a little, but the gang foremen watch this and balance the force so that each gang keeps abreast of the other. There is no thought of restricting output. The Gangs are highly specialized and the work centralized.

The men do the same work at the same spot in the shop day after day. The car comes to them. It is more efficient to move the car than the man in an operation of this size.

In this same shop a very interesting experiment is being made to extend the planning schedules to manufacturing tools. Three charts are kept in the scheme, (1) A Machine Load Chart, (2) Machine Layout Chart, and (3) Machine Hour Record Chart. The first chart, for machine loading shows graphically the work ahead of the machine. The man running the charts gets his data for this chart from the Storekeeper, who holds the orders and records of past consumption. There may be more than one machine of the same kind and of course the chart man divides the orders. One sees at a glance when the machines should get around to the different orders and perhaps this survey will change the sequence or the orders.

We then have the second or "Machine Layout Chart." This shows what each machine is expected to do the same as the Machine Load Chart, but it is on a larger scale—does not show as long a period of time—and right below the expectation line, if you please, for each machine, is plotted a line to the same scale and showing what the machine actually does from day to day and the hour one order is completed and another is started. The chart man goes out into the shop and gets this information and plots it. This chart, in conjunction with the third or Machine Hour Record Chart, is the check on the operator.

The Machine Hour Record Chart shows graphically the working time and idle time for the machine. The working time is represented by a continuous line through the hours of the day. A break in this line represents the machine not in operation. In this break a symbol is inserted in explanation as: "S" for waiting on set-up, "H" for lack of help, "R" for repairs, etc. A long break or frequent shut-downs for the same symbol may indicate the need for corrective action by the foreman.

I cannot say how this scheme will work out; it is only in the experimental stage, and the need for all of its features

is not as apparent in a piecewrok shop as in a daywork shop but it is said to have accomplished greatly increased production in some munition plants during the war and it certainly has a strong appeal.

In closing I want to take you to another car operation which is running very smoothly, not as big as the one just described and therefore more nearly in line with what many of you gentlemen on this division are familiar with. This shop is also handling one kind of car for heavy repairs. But the appeal here is that the foreman has taken his old layout and facilities and made a great deal of them by systematic planning of the work. He recognized that without overhead cranes he could not advantageously take the car to the gang. But his general plan is to take the bad order car in at one end of the shop track and turn it out ready for service at the other.

The gangs at this shop are highly specialized. Each gang foreman has an entire track and supervises every man on the track except the painters at the far end. These men move from track to track and come under a separate gang foreman. The track gang foreman has certain men assigned to the cutting torches, other men to cutting down, others to fitting up, others to riveting, others to truck repairs. Of course, absentees mean a man will occasionally have to be shifted from fitting up to cutting down or vice versa accordingly as one operation lags behind the others, but the main object is to keep the men on the same line of work. The earnings of each gang are kept separate.

You are impressed with the tidiness of the operation. The foreman found he would have to confine his tearing down to a space close to the entering end of the tracks; his men would stumble over the scrap if he did not and their morale and his shop output were affected. The old wooden scaffold trestles were abolished. Cheaply made and easily portable scaffold braces were designed to hang from the top cord angles. Jigs were made to hold the motor while drilling along these top cord angles. Jigs were also in use for assembling hoppers and hopper doors off the cars and thus

save time. Gangs were specially assigned to this work, the same as the men on the tracks.

A well kept tool room with tools maintained in first-class condition and in sufficient quantity to supply the demand, and a neatly arranged storeroom for the small material and outside stores for the larger material located as close as possible to the points of consumption, are essential to output.

You may be interested to know in a general way, the attention that is being given to the subject of shop scheduling at other railroad shops where locomotive class repairs are handled.

In view of the publicity that has been given to the scheduling of work in the Jackson Shop of the Michigan Central Railroad, I took occasion to find out how it was being handled. The Jackson Erecting Shop is what we would consider very large for the number of locomotives to be given class repairs. They have standing room in their longitudinal erecting shop for 24 engines on the side tracks, to maintain approximately 600 locomotives assigned to their district. On account of the urgency for hurrying the work on certain locomotives, you will appreciate that others are allowed to stand in the shop for a very long time and this delay prior to taking up the work actively is not counted in the schedule.

For general shop efficiency, the locomotives should be left outside until they are ready to take hold of them and push them through, except that the present practice gives opportunity of obtaining material which is not on hand. Of the 25 locomotives put through the shop for class 3 in the month of November, the average time was 21 working days. This does not include three locomotives which were held back in order to give preference to more important power.

After the locomotive has been stripped and the work distributed, it is taken on the schedule board and the dates are then assigned when each operation must be completed; and, generally speaking they live up to these dates very well, but you will see that the total period in the shop is too long.

Meetings are held in the schedule room three times a

week, after regular working hours, to review the progress of work through the various departments and make any changes in schedule that are found necessary. The schedule room has a large blackboard taking up one side of the room, on which the locomotives are chalked up, giving the dates when the detail operations must be completed, so that everyone can take notes of any changes. In this way, it can be seen at a glance if any one department is called upon to complete its operation on too many locomotives at one time and correction made so that the work may be spread out. The Master Mechanic is convinced that the improved output of the shop during the last six months is very largely due to the schedule system and with the return of a large number of their old employees, who went out on strike, this shop is now practically back to a normal basis.

The shop formerly was on the piecework basis, but this has not yet been re-established. In the absence of piecework, a production check is being kept, not to show the earnings of each man if he were on piecework as we have been doing, but to compare his present output, in percentage, of the output of the man or machine tool prior to the strike. .

It was agreed on the Michigan Central Railroad to take back all of the desirable men who were out on strike, provided they reported within thirty days, with the understanding, however, that the new men who had been employed were not to be crowded out or interfered with in any way. As a result of the large number of the old men returning, the total force of the shop is now very much above normal. By means of the production check, all men who are showing a reasonably high percentage or who are showing improvement from week to week, are to be retained, and those men who are not giving a fair production will be dropped, whether they are new men or old.

At the West Albany Shops of the New York Central, the shop schedule was in effect in former years, but at the time of the shop strike it was discontinued. The shop is now making steady progress in re-introducing the piecework op-

eration, and the general run of the work has improved very materially by the active supervision on the part of the General Foreman and Assistant General Foreman, who go over the situation every morning, and advise the sub-departments of the progress of the work.

The New York Central Lines have been compelled to have a number of their locomotives repaired by outside shops, and they are now getting their own shops reorganized and built up to the full output required to maintain their entire equipment, the same as many of our own shops are doing, and I am inclined to believe that they will again restore the shop schedule.

The erecting shops comprise 40 working pits in 2 cross shops. They are working, at the present time, 9-hour tricks; the second trick being quite generally established in various departments. During January, 64 locomotives were given class 2, 3, 4 and 5 repairs. As is the practice on all New York Central Lines, the locomotives are shopped on a mileage limit, which is counted between general, or class 3, repairs. Lighter repairs are made between these general shoppings, and estimated mileage is credited proportional to the work done.

A very creditable record of output was made in the latter part of 1922, when 171 locomotives were urgently needed for Winter operation, and particular efforts were made to put them through the shop in a short time, working 2 tricks of 9 hours each. These locomotives were given general repairs, 6 of them receiving new fireboxes, and all were equipped with boosters. The average time of the 17 locomotives in the erecting shop was 13.4 days.

The shops of the Lackawanna Railroad at Scranton, located as they are in the midst of the hard coal region, were very hard hit by the strike. The hard coal strike had been on for three months, and all of the shopmen went out on July 1st. The supervisory force remained loyal to a man. Experienced men could not be hired in any large numbers locally, and therefore men were imported from other points so that now they have 600 men that are being fed within the

shop enclosure and 400 of these are sleeping in camp. The normal force is a little over 1000 men and they have now practically 600 men, working 11 hours a day.

The back shop capacity for class repairs on the Lackawanna Railroad is ample for the number of locomotives on the road. During the year 1920, which is the last normal year, an average of 37 locomotives were given class repairs per month, and the total output of all shops was 60 per month. The total assignment is 750 locomotives, or an average of 13 months between shoppings. In the Scranton Shops 30 pits are assigned for class repairs, and the average number of days in shop for locomotives turned out in December was 16, (mostly class 5), not including 4 locomotives which were in the shop prior to the strike, the work coming to a stop for several months.

The shop schedule was used prior to the strike, although unfortunately no records were available to check up in detail as to how closely the schedule was being followed. At the present time a blackboard in the shop shows only the dates in and dates out. It is the intention to re-establish the schedule as soon as the shop forces are approximately back to normal, in numbers and quality.

The Philadelphia and Reading Railroad shop at Reading comprises 66 transverse pits, which are used for locomotive repair work on class and running repairs. The average output of class repairs in the year 1920 was 76 locomotives per month.

The Reading shop does not have a detailed shop schedule, but bulletins are issued weekly giving the dates on which the boiler work must be completed, and the dates on which the locomotives are to be turned out of shop. The largest operation is the boiler work, and this governs the length of time in shop. The average time in shop for locomotives turned out in December was 17 days. This is very good operation.

The shops at Ft. Wayne and Logansport on the Northwest Region have shown the best recovery of any of the Pennsylvania Railroad System shops. The shop schedule is

being used in these shops, I am told, with very good results. The output of class repairs in January, at Ft. Wayne, was 40 locomotives. The average time in the shop was 116 working days. At Logansport, the output in January was 24 locomotives for class repairs, with an average of 15 working days in shop. These are both very creditable operations.

We used the schedule at Trenton Shop prior to the strike and have just recently re-established it. Our average time for all class repairs in November (the last month on class repairs) from the time taken in erecting shop until engine left Trenton Shop under steam was 15 working days.

The general opinion expressed at all the shops that I visited is that the shop schedule is very important in order to balance the work between departments, and co-ordinate the operations for the largest possible output; but we all appreciate that when the strike came on us last summer, back shop operations, in a large measure, came to a standstill, and we turned our attention to the daily operations of the enginehouses in order to keep the railroad running. Schedules were dropped at all shops and have not been re-established, as very few shops are actually back to normal operation. There is absolutely no use in having a schedule if it cannot be lived up to.

Time will only permit of the mention of various causes of delay in shop repairs. After stripping we may find cracked frames, loose cylinders, extensive patching of fire-boxes, entire set of flues to be renewed, flue sheets to be renewed, wheel centers cracked, tender frames requiring extensive renewal, all of which are liable to upset the schedule.

Then we have the uneven demand for material. The enginehouses will call for a lot of side or main rods, or pistons and crossheads, probably more than the storehouse can supply. These deficiencies must be made up as far as practicable by taking material from the back shop, with the result that the class repair work is delayed. We must always expect some shortage of material due to varying consumption and the condition of the market.

These are real difficulties that the shop foremen have to

contend with. We all recognize them and no practical schedule will correct them. But the schedule must be liberal enough to allow for some delays, and the shop which is working to a schedule is in better condition to cope with these difficulties (which are everyday troubles) because everyone is watching the schedule board and is willing to help the fellow who is behind, if he knows the real conditions, for the general good of the shop.

Suppose the General Foreman should meet three department heads after quitting time on the way home. The General Foreman asks Eddy Erecting Shop if he is going to get out both 1522 and 1983 this week. Billy Boiler Shop is already late on the test of 1522, and waiting for superheater header bolts. The 1983 is held by Billy and Sam Smith shop. Eddy says it looks doubtful. The General says "Well, it looks as if Billy is holding things up. What are you going to do about it?" Billy says, "Well if we can get these bolts by express and if I can work a couple of hours overtime, I think I can catch up." "O. K," says the General, "I will get the bolts and ask the boss about overtime, and you set it up to get those two jobs done. Sam, you can take the material off one of these engines which just came in, and get your work done, and we will have both engines out this week," and the output of the following week was not delayed thereby.

The example that I have given is a common occurrence. Why not set up a regular meeting time to bring out these problems. Furthermore, if the work of that shop was scheduled, the General Foreman would have known that the Boiler Shop was a day late on the test, and meetings three times a week at the end of the day's work would automatically bring about the necessary co-operation which is not present in the same degree without the schedule, even in the best regulated shops. We want to avoid delays, rather than explain them.

The schedule is the pacemaker. We must have a personnel of high order, good facilities, material ready, and meetings to check up the progress of the work.

I have become convinced, although fully appreciating the

complex nature of our shop work, that the output of the shop can be improved by scheduling the operations, and I hope that you men, who are engaged in this class of work, have faith in the schedule, and will take hold of it with renewed vigor to see if you cannot beat your best record for output, and, at the same time, keep up the quality of the work.

### *Discussion*

#### CAR AND LOCOMOTIVE DEPARTMENTS

##### QUESTION No. 1

“Under a Master Mechanic the Locomotive Department has a quota of 25 locomotives per month. The Car Department has a quota of 145 class 1 cars per month. In the locomotive department there are no locomotives turned out the first ten days of the month and ten locomotives turned out the last two days of the month. In the Car Department 40 class 1 repairs are turned out for the first half and 105 class 1 cars for the second half. What is wrong and what corrective measures should be applied?”

*Group No. 1:* The conclusion of this group was reached by Mr. Campbell, who stated that arrangements should be made to turn out a set number of locomotives or cars each week, split the forces in order to carry along heavy and minor repairs at the same time, thereby maintaining the output schedule.

*Group No. 2:* Mr. Baker stated that this shop had allowed itself to get into a rut and had formed the habit of letting jobs lay until the last of the month and then had to double up to get out the required quota and this continued month after month due to no shop set up.

Mr. Knier stated that the shop was lax in their methods for if they had maintained a daily or weekly set up, the monthly set up would have taken care of itself and the quota would have been met without placing any restriction on the first half of the month following.

The consensus of opinion was that the shop set up was disturbed in the last part of the month in an attempt to meet the quota of output, which resulted in a restricted output the first part of the next month while the shop was regaining its normal aspect. This should be remedied by a daily or weekly schedule.

*Group No. 3:* Mr. Mitchell stated that each shop has a quota of class repairs to make each month and it is sometimes necessary to shift forces from one class of work to another so as to make the quota for the month, thus resulting in an unequal output during the different parts of the month. Mr. Derick argued that this condition was often caused by the fluctuations in the receipt of material but that the proper way to handle the matter would be to set up a weekly or daily schedule, and the monthly quota would then take care of itself.

*Group No. 4:* The consensus of opinion was that the Foreman of the department concerned should reduce his quota to the basis of output per day and then make every effort to maintain this output.

*Group No. 5:* The group after considerable discussion came to the conclusion that the shop set up is sacrificed at the end of the month to obtain output, and recommended making a daily or weekly schedule and holding each department to the fulfillment of their part in it.

*Group No. 6:* Messrs. Meadath and Schlayer discussed this question and stated that this condition may have been caused by improper scheduling, in other words the time set for certain locomotives might have been too short and felt that the proper way to overcome this is to set up a weekly or daily schedule and in order to equalize the work place certain gangs, who were falling behind, on overtime until the schedule is met.

*Group No. 7:* It was the consensus of opinion that if a daily or weekly schedule were set up, and brought about to be looked upon the same as the monthly output, with sufficient material and favorable weather conditions, there

should be no unequal output at the various times during the month.

*Group No. 8:* The conclusion of this group was that the Foreman should so arrange his work that there would be a steady output day after day and do away with a lot of lost motion during the first half of the month. Then the monthly quota would be taken care of and the shop would be placed on a much more efficient basis.

*Group No. 9:* The concensus of opinion was that after the monthly quota had been set up for the shop, the detail planning is up to the Foreman, and the proper thing to do is to set up a daily schedule. Material frequently holds up the output, but some system for a daily schedule will help maintain a more regular output.

*Group No. 10:* The opinion of this group was that a monthly quota should be reduced to the basis of output per day and every effort made to maintain this output, after which the monthly quota would take care of itself.

*Conclusion:* It is evident that the shop set up is sacrificed in the latter part of the month in an effort to meet the quota of output, which results in a restricted output in the first part of the month, while the shop set up is being restored to normal. It will be necessary for the Foreman to reduce his output quota to output per day and then set up his shop in such a way as to maintain this output. If this is done the monthly quota will take care of itself and the general shop efficiency will be greatly benefitted.

## LOCOMOTIVE DEPARTMENT

### QUESTION No. 2

“On a certain day a locomotive which received special staybolt examination is scheduled out and at the end of “A” trick all work was completed except back head sheet and building up front end arrangement, it being estimated that 12 hours will be required to complete work on locomotive. What action should be taken?”

*Group No. 1:* It was the concensus of opinion that ar-

rangements should be made to work enough men overtime to get the locomotive out on schedule.

*Group No. 2:* Mr. Reese stated that if the engine was needed badly he would hold the men over, but he would tell his men that the engine was badly needed, and try to determine how long to work these men so that their services would not be lost the next day.

Mr. Baker stated that the first thing to do in a case of this kind would be to determine the conditions that existed. If there was no great demand for power he would not hold the men over, but if conditions were such that the engine was actually required, he would hold them over and double up on the engine to meet the schedule. He would, however, try to avoid losing the services of these men the next day.

*Group No. 4:* Mr. Womer stated that by working the men overtime on one day they would probably not report for duty the next day, in which case the effort would be fruitless, but if there is an acute demand for power the men should be held and worked overtime until the locomotive is ready for service. With this the group agreed.

*Group No. 5:* It was the opinion of the group that sufficient men to finish the work should be held to get the engine in service according to schedule.

*Group No. 6:* Mr. Johnson expressed the opinion of the group in stating that if the locomotive was scheduled to go out that day, it would be well to work "A" trick gang until the job is finished, but if by doing this they failed to report for duty the next day, the efforts to maintain the schedule would be lost, especially if this condition should obtain day after day.

*Conclusion:* The action which should be taken will be determined somewhat by existing conditions. If there is an acute demand for power a gang should be held to work overtime until the locomotive is ready for service. The principal action necessary in a case of this kind is for the Foreman to hold a post mortem to ascertain why the work did not shape up as scheduled, taking necessary action to prevent a recurrence.

### QUESTION No. 3

"At a certain shop it is the practice when renewing locomotive crossheads to remove the piston and forward it to the Machine Shop for gauging and fitting, after which piston and crosshead are returned to engine together. The "A" trick removed a crosshead from a locomotive and sent it to the shop. They got the piston out just at closing time and therefore did not complete the delivery of the piston to the Machine Shop. "B" trick replaced the piston in the cylinder until the Machine Shop called for it when they again removed it but quitting time intervened before it was delivered to the Machine Shop. "C" trick again placed the piston in the cylinder and upon receiving another request from the Machine Shop removed it and delivered it. What was wrong and what should be done to overcome conditions of this kind?"

*Group No. 1:* The question was discussed by Messrs. Mumma, Weaver, Lehmer and Wissler, who reached the conclusion that there was a lack of system and co-ordination in the shop. The Foreman should make a survey of his condition relative to passing uncompleted work from one trick to another, and should also make a study of material delivered to the machine shop for repair, in order to keep the number of trips to the least possible number.

*Group No. 4:* It was the opinion that it will be necessary for the Foreman to make a study of the method of passing uncompleted work items from one trick to the other. He should also study the method or system of delivering material to the shop and arrange for all material for one job to be delivered to the shop at the same time.

*Group No. 5:* It was the consensus of opinion that the Gang Foreman should consult each other, or leave a memorandum of uncompleted work for the following trick, and also mark all work to be sent to the Shop in order to avoid conditions such as mentioned.

*Group No. 6:* Mr. Meckley stated that in his opinion both the "A" and "B" trick Foremen were not on the job, as it

is evident that in each case they failed to notify the succeeding Gang Foreman that the piston was to go to the machine shop to check piston fit, and if this condition was not corrected it would become a chronic source of delay.

*Conclusion:* The conditions described indicate lack of system and co-ordination in the engine house. It will be necessary for the Foreman to make a study of his method of passing uncompleted work items from one trick to another. He should also make a study of his system of delivering material to the shop and arrange for all the material involved in one job to be delivered at the same time or on two successive trips by the same truck, if it is not possible to haul the material in one load.

## CAR DEPARTMENT

### QUESTION No. 2

“When a car loaded with export freight is due to be loaded on ship sailing on 16th day of month is disabled at Enola Car Shop with broken center sills on the 15th, no special information had been given to the shop as to character of shipment but at closing time the Foreman discovers from manifest that car is export freight. What action should be taken?”

*Group No. 3:* Messrs. Kinter and Koons agreed that under the conditions set forth in this question all that could be done was to make transfer promptly, and ask the Superintendent office for instructions on a special movement of the car.

Mr. Hassler advanced the idea that the car might be taken to destination on the rear of an express train, with the good end of the car coupled to the train, but this idea was not approved by the group from the standpoint of safety, and they agreed with Messrs. Kinter and Koons.

*Group No. 7:* Mr. Kinter felt that the Shifting foreman should have noticed this information on the manifest, as the sailing date is generally shown, and should have called the attention of the foreman to same, who should have ar-

ranged to give instructions as to the proper handling of the repairs. It was the opinion that any delay before coming to the shop was not up to the shop, but on arrival at the shop arrangements for transfer or repairs should have been handled promptly, working men overtime if necessary, advising yard people the time repairs would be completed and after repairs were completed move promptly to yard. A full report of the case should then be made to the superior officer.

*Group No. 8:* Mr. Rich stated that in such cases the Foreman should carefully read his manifest as soon as he receives it and in this particular case the freight should have been transferred to another car and shipped out at once.

Mr. King stated that the clerk who handles the manifest should have found this information and notified the proper person, who could have had the lading transferred and car sent out on the first connection.

*Group No. 9:* It was the opinion of Messrs. Quaid and Hoover that temporary repairs should be made to the car and permit it to be rushed to destination, or if this were not possible the lading should be transferred to another car as promptly as possible. This case should be thoroughly investigated, after the car was gotten on its way, to see where the trouble lay and possibly prevent a recurrence of the condition.

*Group No. 10:* It was felt by Mr. Wenrick that the repairs should be rushed and everybody concerned in the movement notified so that special attention would be given to the car. The Foreman should ask for instructions from the person in charge of the train movement in this territory, inform him how long it will take to make the repairs, in order to arrange for this special movement of the car.

*Conclusion:* This is a case for the Foreman to ask for instructions from the authority in charge of the train movement in his territory, advising how many hours it will take to complete the car. It is useless to hold a gang for considerable overtime if the car cannot be dispatched until some time the next day, but on the other hand if it can be

dispatched promptly by working overtime to complete it, this course should undoubtedly be followed. After the car is disposed of the Foreman should make a written report of the circumstances to his superior as there was evidently a fall down on the part of some person in not covering the shipment with special information to all concerned.

### QUESTION No. 3

“A contract outfit consisting of a train of cars in which is a pile driver enroute from the east to the Middle west which has been visited by a flood. The trucks under pile driver fail on the Philadelphia Division and is brought to shop for repairs. The train is accompanied by the General Superintendent and 300 men and the General Superintendent insists on repairs being made and train sent forward not later than 3.00 P. M. same date. Investigation develops that pile driver is equipped with 50 ton trucks when 100 ton trucks should have been used; there are no 100 ton trucks on hand that can be used and the wrecked trucks from pile driver are not delivered to shop until 3.00 P. M. What action should be taken?”

*Group No. 3:* It was the concensus of opinion that the only thing to do under the circumstances, since there was no material on hand to build 100 ton trucks, was to build 50 ton trucks of new material and allow the pile driver to go forward, restricting the speed of train, if necessary, and make arrangements with some point enroute to replace the same with 100 ton trucks on its arrival at that point.

*Group No. 7:* The group arrived at the conclusion that rolling equipment for special purposes should always be in condition to be moved in case of emergency. A little more time spent in planning and preparing before starting movement of special shipment will often prevent delays enroute, and safe, prompt movement to destination should not be sacrificed through careless starting. Wreck crew handling the wreckage should have seen that the wreckage accompanied shipment to shop. If necessary lower capacity trucks

should be applied, speed of train restricted and if necessary next terminal advised to have higher capacity trucks ready to apply on arrival. .

*Group No. 8:* Mr. Rich presented the conclusion of the group in stating that the wrecked truck should have arrived at the shop before the time designated for it to leave. On the other hand the foreman in charge should have investigated the wrecked truck at once and calculated the time needed for repairs. If the repairs in his opinion would take too much time to comply with orders, another 50 ton truck should have been put under it and orders sent out with it to have a 100 ton truck applied at the nearest shop along the route west.

*Group No. 9:* Brief discussion of this question resulted in the conclusion that circumstances required immediate dispatch of the train from this point. A lighter capacity truck should be temporarily applied, and if necessary to take this precaution on account of safety, speed should be restricted and the pile driver handled on the rear of the train. Arrangements could then be made with Altoona or some other point along the line to provide suitable trucks.

*Group No. 10:* The consensus of opinion was that the best method to pursue in a case like this would be to apply good, well made trucks as near the size of truck required for this shipment, cut down the speed limit of the train to the point of safety, then notify the next terminal what action had been taken and ask them to procure proper trucks to apply to this equipment on its arrival at that point.

*Conclusion:* These circumstances require that the pile driver be moved west at the earliest opportunity and any available trucks which will carry the load should be used, restricting the speed, if necessary, for safety. Arrangements should then be made with Altoona or some other point on the route to provide proper trucks for this equipment on its arrival.

### **CHARLES WOODWARD**

**Member of Cleveland Chamber of Commerce; founded and for three years was President of the Industrial Association of Cleveland composed of employers and employees; Assistant to President, Hydraulic Steel Company; active participant in various campaigns during World War; prominent speaker on business and industrial questions; President of Woodward & Company.**

## THE FOREMAN'S JOB

MR. CHARLES WOODWARD  
Cleveland, Ohio

March 6, 1923

Before I begin I wish to say that this makes me feel good, and I believe by the smiles on your faces that you feel good. This is the way all good men should feel. Good. I often wonder what prompts me to come back to a place a second time. I guess it is the attraction which draws a man back to the scene of his crime. I wonder that the people do not rise up in their wrath and strike me. I feel pretty much this way each time I go to Milwaukee. I have been there five times, and each time I approach Milwaukee I do so with a great deal of concern. I don't know how they figure it out. I have told them this story frontwards, backwards, and every other way. This shows you that people are patient. I know that all men are primarily fair. Just as true as I am talking to you I know that within the heart of every man there is an inherent fairness which is fundamental.

When I get bumped, and I do often, it always gives me courage to go on. When we make a mistake, and I guess we have all made mistakes, we need a helping hand. As we go along in life we all need a helping hand. Every so often it seems that the whole world rises up in its wrath, seems to pick us out, and strikes us amidship. These are the moments when we all need a helping hand.

You men are fortunate in having been picked as leaders by this wonderful railroad, the biggest in the world. It is a mark of distinction to be picked out by this railroad system as a leader. I insist that every man who rises above his fellow men in this race, I don't care how little or how much, is worthy of mention. This is a period that is moving rapidly. It is moving so fast that the man who says he does not believe a thing can be done is interrupted by the man who is passing him on the way doing it. It is that way in

all institutions throughout the country. The fact that you have been interested in Foreman Training shows that you believe this, and that the Company for which you work is interested and believes it. I have been in this game for some years, and have known a lot of men who did not believe in training men. Some concerns are indifferent, and I have seen some of the most peculiar phases and conditions in bringing along other men's minds that you could imagine.

Many men contend after listening in on a lecture that they have not gotten a thing out of it. I cannot agree with this viewpoint unless one is static—at least you will get objections or disagreements if nothing else. We cannot tell where we have acquired our habits of thinking—our particular thoughts. One fundamental fact can be stated—“WE HAVE ABSORBED OUR THOUGHTS FROM OTHERS.” There are no original thinkers. We learn to think by listening—by thinking. We progress because we know “more” about things.

But you do not know what particular thought caused this progression, nor where it came from. You have gathered some ideas somewhere, some place, organized them, and as a result you were selected to head some men, and you don't know where you got them yourself. Will you admit, or won't you admit to me, that you never had an original thought in your life. I will admit it—I mean this. I am convinced, fellows, from sharp observation that there is nothing new under the sun. There are a lot of smart fellows dressing up old thoughts and putting them over. There is no mystery why a man is a better Foreman than another man. An object, a goal, visualized in a man's consciousness and then a determination to make it, plus a persistent desire to keep going and backed up by honest intention to do more work than other men, and you have a pretty good idea why “men get there.” Fancy thinkers and slick thinkers do not amount to a hill of beans and big business is beginning to realize that this is true. We need good old-fashioned thinkers who open up their consciousness and who want to know more about things, intent on gaining

more knowledge—and faithful,—there you have the picture. There is no reason to wonder or speculate about success.

If you are wondering why it does not come to you, just take yourself by the arm, lead yourself out into the woods; by all means get away from your friends, sit down with yourself and begin to talk to yourself and reason with yourself about why this or that is, or is not, as the case may be,—and watch and see how many times you will find the remiss is within. “I tell you, I am the only enemy I ever had.” I will bet you, the more you think of it men, the more you will come to the conclusion “that you are the only enemy you ever had.” Let’s see what one of the primary requisites of a Foreman on the job is:—a great big wide open consciousness—a willingness to see beyond, plus some imagination. Here is a funny little story. Thinking is a simple thing. A fellow came to me, he was a Sales Manager, and said to me—“Do you think a man ought to have imagination?” I replied, “I would say he does.” He said “I cannot imagine a thing, what am I going to do?” I said “Begin imagining.” He asked, “How?” I said “Let’s imagine a five mile man, could a railroad train run on his hand, what would he do to the Mississippi River if he stepped into it, how big a hat would he wear, how long would his whiskers be?” He said “I’ve got you.” Men, if you want to imagine you must train your imagination. But of course, use Common Sense—picture your objective, then what you will have to do to reach it, then go to work and get there. That is the way life goes on. As a Foreman you must have some imagination. Business is pretty much a matter of men, methods and material. I cannot go into all the factors of it, they are so beautiful and wonderful they should be gone into, but we lack time. That is why you men are gaining knowledge, you are going into all the phases of it. Men—Methods—and Material. Organization. We have to organize these things to get a coherent mass.

I will give you three funny little formulas. They are not new. You know everything I know anyway. Organization is a great word. You are part of an organization. What

should you know to be a satisfied part of an organization, now I don't mean "too doggone self-satisfied." What are the inherent things you should know? Here they are. If you don't pass this story down the line to the men under you, you are to blame. If you cannot answer these three questions you are lost. To whom am I responsible? For what am I responsible? The organization's line of responsibility? To the degree that you know the contents of these three questions you are part of an organization. Let me repeat. To whom responsible? For what responsible? The line of responsibility? Organization—where does it start? Some day the most humble, lowest, meanest, I really don't mean the meanest, because few men are really mean, but the most humble man in the ranks is going to know this. They do this in the army. Group discussion is a form of organization, and in a certain group I was in, the question was raised as to who was responsible for absenteeism. One fellow said the foreman and job foreman. Listen to that, passing the buck again. Old stuff, older than Methuselah. They soon straightened this fellow out. They said no, no Mister Foreman. You are responsible up to the point where you tell the Job Foreman, then if he doesn't want it he passes it right back to you. If you are so cranky and cross, that you don't want to know this—take your boy, if you have one, and teach these organization principles to him, and when an employer gets hold of your boy and finds out he knows, watch him go up the ladder to just the degree that he knows these three principles. One reason organization fails is because it is not organized. That poor old Foreman who said it was two men's responsibility was wrong. When you get home tonight just hunt up an old broken down pencil and pad, and write down the things for which you are responsible. Check yourself up.

Now—Planning. Here is a fine thing. What about planning? Can anybody plan? Sure fellows. Here is a formula for planning,—it is simple, all things are simple. Here it is—"Look ahead, look behind, look out." "The old, the present, and the new." When you want to do some plan-

ning, approach it on that basis—what did we do—what will we do, and see how quickly thoughts will respond. Here are three more questions. I am ashamed to ask them, but they are fundamental. What are you doing? What can you do? When will you do it? Did you ever apply that to your duties down at the plant? Let us repeat. What are you doing? What can you do? When will you do it? Most men do not know what they can do. They are afraid they cannot do anything anybody else did. There is a man by the name of Huxley. He is a profound thinker. What do you suppose he said about men. He states that “Mankind has never engaged in but one battle. Just one,—that man had honestly and consistently, daily, hourly, monthly persisted in standing on his own foot.” Standing on his own foot. The only enemy that man has had is man. “It cannot be done.” Oh, I wish someone would write a foolish song about what “Cannot be done,” then maybe some men would get tired of it. I am sorry for the man who says things cannot be done. I do not believe that there is a man in the world who has really seen the universe. He has just seen what *he can see* of the universe, more or less. I tell you as truly as you are born you cannot see the real universe, no one ever has, it unfolds constantly.

I told you the last time I talked to you about Lincoln. Millions of men had said slavery was unfair and unjust, but Lincoln decided and slavery ceased. Can you make good decisions? Are you used to making decisions? There was never a man lived, who amounted to anything, who did not make them. Do you reach the big things and hope someone else will take them from you? If you do you're lost. No matter if you strike out, take the bat, step up to the plate and whale away. Don't let anybody push you out of the way. If you do you'll only get a few big things to do in your lifetime. When thoughts, that things cannot be done come up, by all means throttle them. This is part of your duties and responsibilities and the living and breathing part of the Foreman's job—the ability to make decisions. I do not mean that you have got to run the Pennsylvania

Railroad but you must run your department. If you don't someone else will run it for you, and if they do, it is your own fault. You must not kick about it. Now then, be fair about this thing, don't complain, hustle. Too many men miss their chance this way. There is too much complaining, not enough THINKING. Don't let any of your men tell you how to run your department, but be reasonably fair *always*, and talk things over with them. Look yourself square in the face and see if you believe in yourself. No one is going to pat you on the back and tell you that you are running things alright if you're not on the job; if you think they are, get wise to yourself, take a walk out in the air, take a deep breath and you will know better.

I heard a story about a little Jew who was in business, and had a fellow working for him who did not amount to much, and at the end of one year he asked the Jew for a raise and the Jew said he could not afford it. The man said he would quit, and so the Jew gave him the raise. The next year the fellow asked for another raise and the Jew told him he broke even and could not give it to him. The fellow replied "Well you can't get along without me if I quit," and the Jew said "What would I do if you were to die?" and the man replied "Oh that's different." "No it isn't different," replied the Jew, "just consider yourself dead."

So men, you see it doesn't pay to stand too much on your own foot.

Here is another thing. If you ever find that you or anyone in your department is jealous of the efforts of any other man in your department, for heaven's sake, Get Busy. If there is one thing in industry that has caused industry its greatest loss, in terms of money and in terms of men, it has been this monster, "Jealousy." I am going to tell you how you can cure a fellow of being jealous, or how to cure yourself of being jealous. "You are only jealous because you think the other fellow has it on you, you are never jealous of a man you believe equal to you, or below you. You admit the other fellow's superiority when you are jealous of him. As the foreman of your particular department, it is your

duty to carry messages to your men as fast as they are capable of dissecting them. If you don't relay your thought and messages to your men, who will do it? Now I want to tell you something. Do you know, the workmen like you? In spite of the fact that they talk about Mr. Lee, or Mr. Atterbury, "do you know they like them?" I tell you they do. Though they say all sorts of things about them, yet down in their hearts they like them. They represent Success, which is what all men want. While workmen complain, cuss, and rave over their different troubles, don't pay too much attention to this. Don't get excited when they get this way. All men will complain some. "No man can be completely pleased." Don't try to please—be square—what they want is a square deal. You must be a disciplinarian and exact discipline. They won't like you unless you get discipline out of them. Never as long as you live, will a man respect you if you do not exact discipline from him. Here is a funny thing—what is that little baby doing over there in the corner, if you have one in your home. He is trying to tell you what "he thinks about things." This old world is crazy about doing just that sort of thing. Everyone wants to express himself; give workmen a chance to express themselves.

Remember this, that it is up to the Foreman to handle his men properly. I have seen any number of men ruined and lost to a company by poor handling, and any number of men made, by good handling. The last way is the best, and then you will not see the men growling and complaining. If the Pennsylvania Railroad can find fellows to do things like this they have solved the labor problem. You will find in industry that a man who needs information most gets the least, and the man who needs it least gets the most. You are the fellows that can remedy this situation.

I remember once during a strike in our city, some strikers were picketing our plant, and one morning I went over to the plant and one of the pickets was there. I asked if he had breakfast and he said no, and I said come on in and have breakfast with me. He started to cross the street with

me, and then said "why I can't eat breakfast with you," and I said why can't you, and he replied "that he was to watch our plant even though it was not on a strike." I left the man, but a morning or two afterward I approached him again and invited him to take breakfast with me and he did. Now what do you think of that? He told me he liked our fellows and did not see why they were picketing our plant. This was really a funny thing to me. I took the man and treated him nice, and he told me everything I wanted to know. **They like this.**

I was talking to another fellow one day, one of these "red" fellows, one who spits blue vitriol, and he spoke of a revolution. I asked him what kind of a revolution he wanted. He looked at me kind of funny, you know the fun is all gone for a revolutionist if you don't get mad, and I said to him do you want a revolution that will revolute you and revolute the other fellow, or do you want one that will revolute the other fellow? He said nothing. I said "suppose this revolution would come off, and everybody gets just as mad as you are, and the revolutionists start to get a neighbor next to you, but they are mad, and by mistake they get into your house and revolute your wife and child—is this the kind of a revolution you want?" Being honest, he said "no." Later on this fellow became one of our best workmen.

An incident which explains a great deal of the misunderstanding that exists in the minds of most of us relative to how to deal with one another, particularly how to deal with working men, was brought to my attention during the war. I believe this story has a great moral and in it is contained a lot of food for thought:—

One of the activities of the Cleveland Chamber of Commerce is a Production Club. In that club are gathered together many of the men who have to do with the great productive efforts of the biggest industries in Cleveland. One of their functions was to hold meetings at which outsiders appeared with thoughts relative to productive matters in industry, and after the matter had been talked over they resolved themselves into a Discussion Group as you are do-

ing here. On this occasion, a lady, who has charge of the Industrial Relations Department of one of the biggest concerns in Cleveland, was talking on the subject of women in industry. Her subject finally resolved itself into a discussion as to how they had overcome absenteeism in their institution; and among other things she concluded her talk by stating that the question of absenteeism had been put up to the employees in a mass meeting by the President of the Company, together with a bonus that was to be given for perfect attendance. The plan had some ramifications but after thorough discussion the question was put to the working men and women and they voted 100% to accept the proposition. She then went on to explain that it had almost completely eliminated absenteeism.

After she completed her address the production group took up the question and after thoroughly discussing it, it was apparent there were a great many differences of opinion among them as to the proper plan to pursue: one man, for instance, said that his concern had paid bonuses each day for attendance but they found this failed, for it had no incentive for the succeeding day: another man stated that their concern had tried weekly bonus, but that it had failed because very often the workman would miss out the first day of the week and then he had no further incentive. Monthly plans, pro rata plans, and every conceivable method was discussed and it was apparent that they were not coming to any definite conclusion, when the chairman arose and said that the predicament they were in reminded him a great deal of the story the English Corporal, Guy Empey, told about the lance corporal in the English Army. He then told the following story to illustrate the predicament they were in, and in this story is a great truth that it seems to me had been missed all the way through by all that had attended:

“That, Empey being a Lance Corporal, on one occasion had brought from the commissary his provisions for his men, and counting over his baked potatoes he found he had fourteen baked potatoes, and seventeen hungry men. This

predicament seems so closely related to the position we so often get in with our working men and women, 14 potatoes, and 17 men. However this Lance Corporal was different in many respects than we are. What do you think he said? He sang out to his men "Who among you don't want potatoes?" Those who did not stated they did not, and those who did stated they did, and everybody was happy. Had he tried to distribute the 14 potatoes among 17 men, it would have been impossible."

Now the great truth that runs through this story, if I am a judge of human beings, and the great truth that is overlooked in our problems in dealing with the variable kind of men, is that so often we fail to put our problems up to the workmen. It is apparent to you if you will stop and think a moment that the bonus proposition was not the basis of the success of the efforts in the factory described by the woman. What they did or did not pay the workmen was not the fundamental thing that made their proposition successful; but the thing they did which brought success was to put the question up to their workmen, and as you will recall the workmen voted and accepted the proposition. Wherever you have a collective problem and can put it up to your workmen collectively, do so, you will be surprised how often you can solve the most perplexing problems between the management and men by following this simple procedure. Empey, the Lance Corporal, simply followed this, for he stated, "Who among you don't want potatoes?"

Let us not forget this very important doctrine. This does not in any sense mean we are surrendering our executive or managerial powers, but it does mean that we are getting many problems across that otherwise failed to go through because of the disinterested lack of knowing "WHY" that exists in the minds of working people.

Are you a student and close observer of the time element in industry? Do you appreciate the importance of the time factor in your departments? Do you watch the present moments to see that each 60 seconds of both your men and yourself are spent productively? Are you careful of the

minutes? Do you know where they are going? Do you teach your men that minutes are valuable to the company and to them? Have you told your workmen what a minute is?

Most supervisors, in the hurry and bustle, incident to their positions, fail to take into realization the importance of the time factor. How many minutes have you each day to give? What are you doing with them? How many minutes has each man to give? What is he doing with them? How many collective minutes are there in your department, and what is being done with them?—should be a daily problem with you. Watch The Minutes.

Take this gospel into your departments, teach it, preach it, show by your conduct that you place importance on every minute that you spend in your daily endeavors and demand from others that they do the same:

Here is a simple lesson in mathematical thinking that may bring some thoughts to you for the future. It has to do with the “swapping” of ideas, and the swapping of ideas is a most neglected factor in industry today. There are more men that have good ideas and fewer men know how to get them than any other relationship on earth, and to illustrate the importance of this I want to give you a simple problem that I know you will never forget.

“If you have a dollar and I have a dollar, and we “swap” dollars, you have a dollar and I have a dollar. But, if you have an idea, and I have an idea, and we “swap” ideas, you have two ideas and I have two ideas. Think for just a moment what will happen if they “spark.” Suppose my idea, plus your idea is a germ of a real idea.

Keep your consciousness open, search and mine for thoughts, keep your ear to the ground. May there be many ideas in these few moments which we have spent together that will in your daily efforts and my daily efforts help each of us.

For those who feel that progress is tardy, or that you are not making the “grade,” figuratively speaking, I want to leave you with a little thought in poem—

Then what is the use of striving at all, brother, Oh brother?  
 Because each effort, or great or small  
 Is a step in the long, long road which leads  
 To the kingdom of Growth on the river of Deeds;  
 And that is the kingdom no man can gain,  
 Till he uses his hands, his mind, his brain.  
 And when he has used them and learned control,  
 He has found his soul, brother, Oh brother.

### *Discussion*

## **THE FOREMAN'S JOB**

### **QUESTION No. 1**

"A certain Gang Foreman had in his gang two mechanics who rated high in mechanical and productive ability. One of the men was very set in his way and inclined to be contrary so that it was very difficult to sell him a new idea or get him to adopt new practices. The other man was lacking in system and did not seem to care what method he used. He was willing to try anything and was constantly approaching his work in a different way, frequently to the detriment of his efficiency. How should the Gang Foreman handle these two men?"

*Group No. 1:* Mr. Mullen presented the opinion of the group in stating that he felt that an effort should be made to sell both men the new idea by a confidential talk, after some occurrence which had brought out the particular weakness of each man.

*Group No. 2:* Messrs. Reese, Dean, Manahan and Winand discussed this question and arrived at the following conclusion: That both men were good mechanics but the one man was too set in his way and the other was a little too lax. Both men should be developed in regard to their various weak points, and the best time to do this is when an occurrence presents itself which reflects on their efficiency.

*Group No. 3:* Messrs. Gerheart, Koons, Allen and Eichholtz argued to the point that the best material for the making of a good mechanic, up-to-date and efficient in his work, was to be found in the man who was willing to try a thing once. His seeming manner in which he always approached

his work was evidently for no other reason than to obtain a better, easier, quicker and more productive way, even though some of the methods used worked against his efficiency. The man who is set in his old ways and never tries to advance from the old system lacks co-operation, therefore he fails to press forward with the advancement of the work. He will finally be of no service to himself or anyone else and will block the road to success.

*Group No. 4:* Mr. Lotz felt that the man lacking in system needed some one to have a talk with him and give him a chance to see the other way. Both men had ideas. Take both ideas and use the one which will give the best results.

Mr. Womer said that when the contrary man made a mistake the matter should be brought to the attention of the shop Foreman; the two to talk the matter over and the Foreman should show the man that through his own stubborn or set ways the error had been made. The Foreman, however, should use discretion when selecting the time and place to talk to the man.

*Group No. 5:* Mr. Hall felt that it is a hard job to change a man who has been taught one way to perform certain work. Mr. Weaver stated that if the superior officer had sufficient ability to put the idea across, he will be able to change the man and show him the best way to work. Mr. Yost stated that if the man has good ways of performing his work let him alone and do not try to induce him to try new things; if not, try to show him the right way. The second man in this case needed to be shown.

*Group No. 6:* Mr. Runk was of the opinion that the man inclined to be contrary should be handled so as to let him know his work was considered favorable. The second man, who was different, should be led and told how to improve. In both these cases the Gang Foreman should use tact in handling the men to obtain the best results, using every endeavor to bend the will of the men to something better. The Foreman and Gang Foreman should seize the psychological moment, however, to bend these men to their ideas.

Mr. Mountz agreed with Mr. Runk but added that these

men should be approached at the time when it can be shown clearly that old ideas are a hindrance to the smooth operation of the department, pointing out wherein old methods are lacking.

*Group No. 7:* The consensus of opinion was that as these two men were both considered mechanics it is assumed they were fit to handle the work. They probably had some notions as to the Gang Foreman's ability however. He should be able to bring about the necessary result without letting either man know that he was actually playing teacher. There would occur a time in the work of either man when the opportunity would present itself to put this over.

*Group No. 8:* Messrs. Rich and Zimmerman stated, in reference to the man to whom it was difficult to sell a new idea, as well as the man who was lacking in system, that the Foreman should explain new ideas and methods in a thorough manner, showing the advantage of working by system. If the men then fail to see the efficient and economical results, both to themselves and the Company, they should be placed with workmen who have grasped the new idea and are working to better advantage.

The conclusion reached by the group was that these men were standing on their own feet and did not co-operate the way they should. The proper thing to remedy this would be for the Foreman to give both of them a good clean cut talking to which should cover the weakness of the men concerned.

*Group No. 9:* Mr. Roberts brought out the conclusion of the class when he stated that the question was one of dealing with two men of entirely different dispositions, their ability apparently being equal. Best thing to do is to find out their dispositions. As both men are good mechanics it is up to the Gang Foreman to make an effort to harmonize the conditions. The first man requires a lot of thought if you want to sell him a new idea. It will be necessary to work on his confidence that he will believe that the ideas you are passing to him are for his benefit. To win leadership over a man of this type will help the morale of the en-

tire gang. The other man was willing to try; all that was lacking in him was system, and the Foreman should show him that system was a benefit to him.

*Group No. 10:* Mr. Rhoads felt that this question resolved itself into the ability of the Gang Foreman to know how to handle men, reason with them and get them to think, and exchange ideas in regard to work.

Mr. Wenrick suggested that the solution to this problem was a good sound, common sense, heart to heart talk with the men interested, reason with them, exchange ideas with them and let them use their own idea, and if their ideas prove wrong occasionally this would be the best way to teach some men.

*Conclusion:* It is evident that both of these men have sufficient trade skill to handle their work and in this respect they probably feel that they know as much as the Gang Foreman, so that they are likely to resent petty interference or any attempt at school teaching methods. It is evidently a case for frank talk with both men. The best time for the talk is following some occurrence which reflects the particular weakness of each man.

## QUESTION No. 2

“In a certain shop it is customary for one department ordering material, made in another department, to indicate the blueprint number and piece number on their order. As the matter is now handled the mechanic in the first department goes to the blueprint room to consult the print before making out his order. The mechanic in the second department then goes to the blueprint room and gets the print to be used in manufacturing the material. What system should be set up to improve this method and conserve the time of the mechanics?”

*Group No. 1:* The conclusion of the group was presented by Mr. Lehmer who suggested that messenger service be established to bring prints to the different departments and thus save the time of mechanics now consumed in going for same.

*Group No. 2:* Mr. Knier stated that it would be well to have each department supplied with a set of prints that they use the most and the prints which they do not require often could be obtained from the main blueprint room, by messenger service in the large departments and in the smaller departments the mechanics would not lose much time if the prints were not required often.

*Group No. 3:* Messrs. Koons and Eichholtz argued that the correct manner of ordering any kind of material was to see that prints from the proper tracing accompanied the order, Mr. Stonesifer agreeing that this would help the Stores Department and also save the mechanic's time.

*Group No. 4:* It was generally agreed that each department should have prints on file in the shop for material of a standard nature which it was customary to manufacture in that department, or have a messenger system to eliminate the necessity of the mechanic losing so much valuable time leaving the work to go after the print.

*Group No. 6:* Mr. Sassaman was of the opinion that a material man should procure the necessary prints, the prints to follow the job from department to department, with the order, same to be returned to the blueprint file room by the department working on the order last, after the order had been completed.

*Group No. 7:* The consensus of opinion is that as output in quantity is desired and this depends on the time of the mechanic, everything possible should be done to assist in conserving his time. If the work involves the procuring of blueprints some messenger service should be set up whereby the mechanic would be relieved of the necessity of leaving his work to procure blueprints.

*Group No. 8:* It was felt by the members of this group that the prints should be sent for at the time needed by a messenger and in case the job is held up or finished the print should be returned to the blueprint room until needed again in the same manner.

*Group No. 9:* The conclusion reached was that in such cases a clerk or runner could be assigned to get the prints

for the mechanics. If there are many mechanics in the department and they work by print it would be economical to set up a system whereby the men would be kept at their post and some one assigned to procure the prints for them.

*Group No. 10:* Mr. Reed felt that a blueprint should accompany all orders for material.

Mr. Mager stated that a copy of all blueprints pertaining to the department in question should be maintained in that department and issued on a check system.

The conclusion reached was that if the job requires the consulting of blueprints very often a messenger system should be established to carry blueprints to the mechanic in each department.

*Conclusion:* The first thing to be determined is the amount of work which involves consulting the blueprint. If there is any considerable amount of it, it is a case for a messenger system to bring the print to the mechanic in each department.

### QUESTION No. 3

"In a certain shop department, the Foreman having visited another shop and observed practices which were an improvement over the methods he used asked permission to send one of his Gang Foremen to make observation for himself. When the authority was granted and the subject was taken up with the Gang Foreman he objected to going away because the day's absence would get the work in his gang mixed up and would take him a long time to get it straightened out. What was wrong and what advantage is it to the Gang Foreman to visit another shop to observe their methods?"

*Group No. 1:* The conclusion of the group was reached by Mr. Beck when he stated that the Gang Foreman has not properly organized his gang and did not have a man broken in to take his place during his absence. A visit to the other shop will be of benefit to him as well as to his gang which should profit by the ideas obtained at the other shop.

*Group No. 3:* It was brought out very plainly in a heated debate that a Gang Foreman could and should profit by visits to other shops to learn something of the ways of the other shops. Uniformity and system can only be had by exchanging thoughts and ideas.

Messrs. Koons, Eichholtz, Gerheart and Allen conceded the thought that a substitute to fill the vacancy of a man so relieved from duty should be one that would not mess things up but be able to carry the business on in a proper manner so that on the return of the man who was absent he would find things progressing OK, which would be the case if the man had properly organized his gang.

*Group No. 4:* It was concluded that this Gang Foreman had not made a thorough study of his job and introduced organization and system. A Gang Foreman can always profit by making periodical visits to other shops where the same character of work is performed, to get ideas of their methods, but should go only with the thought of obtaining information and not because he thinks he is compelled to go.

*Group No. 5:* Mr. Devenney explained that the Gang Foreman who is afraid to leave his gang in the hands of an understudy has not organized his gang along efficient lines if it will not function for a day or two without his presence. The fact that he seemed reluctant to go only proves the fact that he should visit another shop to obtain views on the handling of a gang of men.

*Group No. 6:* Mr. Sassaman felt that a Gang Foreman having such an idea belonged to an antiquated shop scheme. Every department and gang should have an understudy, which would enable the department head to enjoy freedom in visiting other shops and study improved methods which could be adopted if they were found to be advantageous to his department. This expressed the opinion of the group.

*Group No. 7:* The opinion of the group was that this Gang Foreman had not studied his job, had neither organization or system. In fact had he the proper qualifications of a Gang Foreman he would be training other men so the job would run smoothly in his absence. There is no question

of the benefit to a Gang Foreman who visits other shops for the sole purpose of bringing home all ideas or improved methods which will improve his own line of work.

*Group No. 9:* Mr. Myers stated that he felt sorry for a Gang Foreman who was afraid to visit another shop for the purpose of obtaining new ideas for fear that some one else would mix things up. If he had a well trained gang, or had system about the work he should not be afraid to let some one else have a look-in. His visit to another shop would apply to one part of Mr. Woodward's talk when he said "When you swap ideas you have two ideas." A competent Gang Foreman should certainly have some one trained to take hold of the reins during his absence.

*Group No. 10:* Mr. Bell felt that it was an excellent idea for Foreman and Gang Foreman to visit other shops to receive and exchange ideas.

Mr. Wenrick stated that the Gang Foreman in question did not have his gang well organized or was afraid some one else in the gang knew more about it than he did, in which case he should have welcomed the chance to obtain other ideas on the handling of his gang.

' General discussion resulted in the conclusion that a visit to another shop with the idea of learning and putting into effect good points received would assist a Gang Foreman in handling his own gang and result in better working conditions for his men.

*Conclusion:* It would appear that the Gang Foreman has not made a study of his job and introduced proper organization and system. It is a poorly organized gang which cannot go ahead with its work for a day or two under an Acting Gang Foreman without getting things mixed up. The Gang Foreman who has the work in his gang well organized will always profit by visiting another shop which performs the same character of work and studying their methods, provided that he goes seeking information and not in a spirit of criticism.



## THE FOREMAN AND HIS RELATION TO OPERATION

MR. C. S. KRICK,  
General Manager

March 13, 1923

I am very glad to have this opportunity of meeting and talking with so many of the foremen at this very important point on our railroad.

The occasion brings back to my mind many of the most pleasant recollections of my earlier years in the service as well as some of the most valuable and practically useful lessons in railroading which I have ever learned.

Next July I shall have finished thirty-six years of continuous work for the Pennsylvania Railroad. That is a long time in the service of one employer, and I have had but one since I started. For my first two years or three I was a rodman on the Schuylkill Division and at Altoona. After that, for nearly twelve years, I was Assistant Supervisor and Supervisor on various divisions of what is now the Eastern Region of our railroad system. During that time I naturally got to know a good many foremen and also gained a pretty broad acquaintance with the character of their work, because my own work was done in the closest and most constant association with theirs. It is a source of very real happiness and satisfaction that personal friendships which were formed in that period have been kept up to the present day.

In my latter work on the railroad I have made it a point to meet and know as many foremen as possible. As part of my present duties I endeavor, as far as practicable, to go over the lines and shops of the Eastern Region once every three months. In connection with that work there is no feature upon which I would place a higher real value than the opportunities which are afforded for personal talks and meetings with many foremen individually.

During my earlier days on the railroad, first hand experi-

ence showed me many times, and in forceful ways, how great is the importance and influence of the foreman's position in this great job, which we are all helping to perform, of keeping the railroad running. I came to realize how true it is that the foreman is actually the key man in the organization of management, and my subsequent experiences in railroad work have confirmed and strengthened this view. Of course, as assistant supervisor and supervisor, my acquaintance among foremen was chiefly in maintenance of way work, while you who are here tonight belong largely to the maintenance of equipment forces. But the principles upon which the successful carrying on of the foremen's work rest, are the same in all departments.

What I would like to do tonight is to try and give you some idea of the general conception I have formed of the foreman's place, opportunity and responsibilities in railroad operation. That conception, as I have just tried to make clear, is the result partly of my own personal experiences during the long period when I worked with foremen every day, and partly of later thoughts and reflections from perhaps a somewhat wider viewpoint. To make my own views clear, there are a few general facts to which I would first like to direct your attention.

We all know that any great business, as carried on today, is a very complicated thing. We also know that there is, and must be, a very great subdivision of duties and responsibilities, and that nearly all forms of individual work are highly specialized. The result is that in any great enterprise—such for instance, as a big railroad like ours, which employs nearly a quarter of a million of men—the man whose hands actually perform any particular piece of work is usually carrying out some detail of a general plan or program which was devised and put in motion by some other man or men, far up in the management, whom the worker may have never seen or, perhaps even heard of.

That condition is true of nearly every form of big business today, whether the running of a railroad, a manufacturing industry or a mining enterprise. It is a fact which

every one of us should realize and bear constantly in mind in connection with our own work and our relations with our fellow workers, because it affects us perhaps more profoundly than any other single influence.

This present day method of organizing and carrying on big business is the only one with which any of us here tonight has ever had any personal experience, because it came into general use before our time. Nevertheless, it has not always existed. Indeed it is a comparatively new thing as time is counted in human history. If we go back to about the period of our grandfathers, or their fathers, which is really not so long ago, we would find that all forms of business were carried on in a very different and much simpler way. There were few enterprises at that time which would be considered even fairly good sized today, and none that would even remotely compare with the present scope of our great railroad and industrial companies.

Three or four generations ago an employer was usually a workman who had saved a little money to buy a few tools and hire a few assistants and helpers. Very often, he worked side by side with them. Following the general introduction of steam driven machinery and the starting of the first railroads, however, this condition began to undergo important changes. All forms of production and service tended to become larger and larger in scale, because it soon came to be realized by everyone that the use of machinery, in turning out either goods or services, had to be upon a big scale to be efficient.

A result which could not be avoided was that, as the size of the business and its forces increased, the manager or employer could not be as close to his men as before. For a considerable time, however, the change was not radical and managers and employers were still able to keep up a fair degree of direct personal contact with everyone under their direction.

It is very important to note that as long as that direct personal touch remained, practically nothing developed resembling what we call our labor problems of today.

Since the first beginnings of the changes I have just mentioned, there has taken place, step by step, in our own and all other civilized countries, a series of developments which are now termed by students the "industrial revolution." By that expression is meant the vast upheavals in business methods, in our living standards and conditions, and in our day to day relations with each other, which have followed the universal adoption of machinery and the marvellous improvements in all its forms.\* Two of its notable results, to which I have just referred, have been the upgrowth of the immense business enterprises of today and the necessity for great specialization in practically all forms of work.

In the way of material benefits, the "industrial revolution" has done more for the human race than anything else in history. To it we owe the advantages, comforts, luxuries and conveniences of modern life, which I do not need to name, as you experience them every day. It is no exaggeration, but merely a plain statement of truth, to say that an unskilled laborer in America today uses and enjoys, as a matter of every day course, comforts and conveniences which a hundred years ago a king could not have bought, because they were totally unknown.

These have been very great advantages, but with them have come some disadvantages which should be frankly faced. One of them in particular I wish to call to your attention tonight. It lies in the fact that, with the bigger scale on which everything is done today, the old time closeness of touch and personal contact between employer and employee, between management and men, has been largely lost. That is without doubt one of the principal causes for what we call our labor troubles. And these troubles, by tending to divide our people into classes, and to set one class against another, are among the most serious which face us.

As long as the employer worked side by side with his men, or even as long as he was able to know them and deal with them all personally, differences over the conditions of work were chiefly differences between individuals, and were set-

tled as such. Even in the earlier days of the railroads, the responsible directing heads were able to know practically all of the employees, and while that lasted, there was a sense of unity of purpose and identity of interest which prevented anything like a lining up of one group against the other. Unfortunately that sense of unity has been weakened with the great increase in size of the roads, the immense growth in the numbers of their workers, and the high degree of specialization in duties and authority, which has been unavoidable.

I do not intend going into the question of labor troubles at any length, but merely wish to call your attention to the fact that the restoration of that old feeling of brotherhood and fellowship between men and management is as important and vital a problem as exists in connection with our railroads today.

Here, I think, is where one of the greatest opportunities of the foremen comes in. By always bearing in mind that you are part of the management, by always remembering that you belong to the official forces of the railroad, it is in your hands to restore, as nearly as it is possible to do so, that directness of personal contact which existed when the railroad and other enterprises were of so much smaller scope.

One of our officials, not long ago, in addressing a convention of Ticket Agents, told them that they were the front line troops of the railroads in all dealings with the public. He reminded them that the man standing behind the ticket windows, for the time being, represents the entire management of his railroad to the man standing in front of the window. In the same way the foreman is the front line of management. He should always remember that in giving an order, praise, or criticism, he represents, and in fact, is, the management of the railroad to the man or gang of men with whom he is dealing.

You are all familiar with the employee representation plan which has been put into effect on the Pennsylvania Railroad. You know that its object is to bring the men and

management together again so that there shall be the same feeling of unity of interest and purpose as prevailed in the days when the superintendent or master mechanic knew all his men and dealt with each one personally. I think the foremen can probably do more than any other group of workers on the railroad to help make this plan a permanent and complete success, because you are the men in the railroad who have the best opportunity every day, by your example, bearing and conduct, to instill into the minds of the working forces confidence and respect for the management.

An American writer who went to England to find out what the war experiences there taught about managing men says: "This is the lesson that struck home the hardest: That the chain of management is never any stronger than its weakest foreman's link—for the man who comes directly in contact with the men stands in their eyes for management as a whole, and rules their shop life and duties."

That should inspire you with a sense of your responsibility, and the value and importance of your work. But it should also remind you that you are part of a great business organization in which everybody's work is important, from the top to the bottom. The job of the President of the railroad is important. The jobs of the Vice-Presidents are important. The job of a trackman who drives a spike to hold a loose rail is important,—very important indeed, for the lives of many people may depend upon how he does his work. The job of the man who inspects the running gear of trains at stations is important, because the safety of passengers and crews often rests upon his care and thoroughness.

We cannot, therefore, say that on the railroad one man's work is more important than another's, because they all form part of the same chain. All are important and essential, but in different ways and for different purposes. What I am endeavoring to do is to try to make you feel something of the particular way in which the work of the foreman is important as distinguished from that of other men.

His importance very largely lies in the fact that he is the one who can best interpret to the rank and file the purposes

and policies of the management as a whole. He is the man who must inspire the rank and file with morale, and with belief in the honesty and integrity of the management, and the soundness of the business principles being followed. He has it in his power more than any other to upbuild discipline and inspire loyalty.

A railroad can get along without a good many things, but some things that it cannot dispense with are morale, discipline and loyalty in the working forces. The working forces must go with and not against the management, or the whole machinery breaks down.

Let us consider a little more fully just what this involves. Maintaining discipline does not mean being harsh or brutal or arbitrary or unreasonable. It does not mean that a man is to set himself upon a pedestal and call attention to his superiority over those around him. It means chiefly seeing that the work to be done is planned, mapped out and performed in an orderly and systematic way so that effort shall not be wasted. It means seeing that the company actually receives the time and work paid for. It means making sure that the rules and regulations laid down to safeguard fellow workers and patrons, and to promote efficiency, are honestly and faithfully followed.

The work of management—and a foreman's work is purely that of management—is largely the giving of orders in such a way and such a form that they can and will be faithfully, accurately and fully carried out. Whoever undertakes the work of seeing to it that others obey, must therefore first learn what obedience means himself. In other words, the successful maintaining of discipline is a thing that for the most part must be brought about freely, as a result of example and inspiration on the part of the men whose duty it is to keep discipline. Discipline cannot be successfully sustained by force or fear, on any large scale or for any great length of time; still less can morale and loyalty. I am told that the discipline in the United States Army is the highest of any military force in the world. You can see from that that a high degree of discipline does not

mean a spiritless and machine-like force of men, for the average of intelligence and initiative among the rank and file of the United States Army is also of the highest grade in the world. Discipline in our army is maintained by the moral power of the character and example of the officers entrusted with it. At the West Point Military Academy, where young men are trained to be officers, they are first taught unquestioned and implicit obedience themselves. Indeed the greatest lesson which they learn in their course at West Point is to render obedience willingly and intelligently to their superiors in rank, and to expect and obtain it, also willingly and intelligently, from their subordinates in rank.

It has been said, and I believe with perfect truth, that any man who directs and handles other men receives the discipline that he deserves, and that the man in authority who relies for discipline on powers of punishment will obtain only a low degree of efficiency. The law of industrial achievement is not conflict, but co-operation. Remember that the spirit of co-operation is not one sided. It cannot all come from the men.

There is another thought that every foreman, and every other man in authority, should constantly keep in his mind. That is that you can lead more people than you can drive, and that almost any man who is handled with judgment can be led farther and faster than he can possibly be driven.

Every man in a position of management should remember that it is no reflection upon the personal standing or character of another, or upon the nature or dignity or value of another's work, to be in a subordinate position, as these differences are merely due to the necessities of carrying on a great business. Nor should the one exercising authority ever so far forget himself as to glory merely in the fact of being a boss. When a man is taken from the ranks and raised to a foremanship, he should never think of himself as being less of a worker than before, but as being more of a worker. What he should always bear in mind is that his work becomes of a quite different character from what it

was before, and this it is very important for him to remember at all times.

Most of you, before becoming foremen, were engaged in some kind of mechanical work. You guided the operation of a machine. Now what you are doing is to guide the operations of men, each of whom in turn may be controlling a machine. But for yourselves the vital fact is that you are now controlling human beings and not mechanical apparatus. That is one of the most essential thoughts for any man to keep before himself who wishes to be successful as a manager, for management is simply the work of controlling, directing and guiding the activities of other men into channels of useful service or production.

Bear in mind, also, as you go up in the organization, that your individual responsibility increases. In a great business like that of the Pennsylvania Railroad, there must be many grades and divisions and subdivisions of authority. The rule everywhere is, the greater the authority the greater the responsibility.

A British writer has defined management to be "handling human nature in conjunction with machinery or materials with a view to its perfect co-operation in an industrial enterprise." He was speaking chiefly of manufacturing plants, but the idea applies just as fully to a railroad, because railroading is merely the manufacturing of transportation services. The important part of that definition, and the reason why I quoted it, lies in the statement that the management is the "handling of human nature."

Probably most of you have heard of Sherman Rogers. Perhaps you have heard him talk. He is one of the foremost advocates in the country of employee representation in large businesses. In one of his talks he tells of a foreman who got wonderful results in a lumber camp in the far west, putting life and ambition into men who had been sullen, indifferent and leaden. When his superintendent asked him how he did it, he made this answer: "Every living man has got an electric battery in him, if somebody will only turn on the switch." I think that states another great opportunity

of our foremen, to turn on the switch that is in every man in the rank and file.

I won't say the foreman is the only man in the management of our railroad who has this opportunity, but certainly none has it presented to him more directly and constantly. I am glad indeed to be able to feel and know that so many of you are taking advantage of it.

There are such things as "good manners" in managing or handling men. In discussing the "manners of management," another writer recently said: "In the long run the workmen of today will only do their best if they are treated not as slaves, nor as serfs, not as horses, not even as ignorant savages, but as intelligent human beings, having equal rights of life, liberty and the pursuit of happiness, and freely and willingly co-operating of their own accord in what they feel to be a common enterprise."

I feel that those words very well express the ideals of the Pennsylvania Railroad management. What we are endeavoring to do is to apply those principles all the way down the line so that they may reach and influence, and be appreciated by, the rank and file. The foremen, who are the members of the supervisory forces coming most often and most directly into contact with the rank and file, have it in their power to do more than any others to make those ideals a living reality.

There is just one more thought I would like to leave with you. In thinking of yourselves as belonging to the management, make it your business to get as much general information as you can about the railroad system for which you work. Study the map, see where our lines run, and think of the immense number of people who live in that territory, and of the many things they constantly make, need and use. This will help to fix in your minds the importance and responsibility involved in helping to run such an enterprise. Get an Annual Report and look at the figures of receipts and expenses. This will help you to form an idea not only of the great size of the business you are engaged in, but also of the enormous expenditures necessary to carry it on.

Such knowledge will help you to make your own work more interesting, and cannot fail to increase its value to the company which employs you.

It is very encouraging to note the widespread and increasing interest which is being taken in these Foremen's Courses. As you probably know, the movement was started in Harrisburg about a year ago. It has now been extended to Wilmington, Altoona, Trenton and Renovo. A report which I have just received shows that we are starting off the present year splendidly, with a total membership at the various points, of over 1,600. It gives me great pleasure to congratulate the foremen of the Eastern Region upon the spirit of progress and ambition which that reflects.

I thank you very much for inviting me here tonight, and wish to close by expressing to you my sincere belief that the foremen of the Pennsylvania Railroad constitute the most loyal, efficient and best equipped body of men of the kind that can be found on any railroad or great business enterprise in our Country, or for that matter, in the World. You are fairly entitled to be called "our railroad's backbone."

### *Discussion*

#### QUESTION No. 1

"At a certain large shop a rule has been in effect for some time that air brake material, such as pump governors, feed valves, distributing valves, etc., and also such other material as injectors, lubricators, starting valves, etc., will not be issued from the store house to the shop department unless the second hand article removed from the locomotive is turned in when the order for the new one is presented. This rule was found to have excellent results in reducing the amount of stock required and also in reducing the total consumption. One day when a passenger engine was about ready to leave a defect developed with one of the injectors and the Gang Foreman assigned one man to the engine to remove the injector and another man to the store house to get a new injector. The store house people refused to issue an

injector until the second hand injector was turned in and the Gang Foreman's plan to make a quick move was thereby defeated. How should a case of this kind be handled?"

*Group No. 1:* Mr. Mullen presented the conclusion of the group in stating that the Gang Foreman erred in not recognizing the rule and making some arrangements with the Stores Department whereby he would stand responsible for the return of the old material after the engine had been gotten out and the emergency was past.

*Group No. 2:* Mr. Mellinger stated that the Gang Foreman should have gone to the store house and explained the condition, and the store house in turn should have co-operated to get the engine in service on time, and the injector could have been returned into the store house afterwards.

*Group No. 3:* Messrs. Hassler, Derick and Rice agreed that the reason the Gang Foreman was defeated in his plan to hurry this engine out was that he did not have a proper understanding with his stores department people, whereby he would be responsible for the return of the old injector after the emergency had passed, and the locomotive was on its way.

*Group No. 4:* Messrs. Buck, Givler and Reish discussed the question and it was unanimously agreed that the Foreman should have given the workman a note to the store keeper stating that the emergency existed and the store keeper should then have instructed the attendant to deliver the injector in order to get the engine out without delay to the train. This practice should not occur too often or the men would take advantage of the precedent to obtain material without the necessity of returning old material, but in this emergency the rule should be waived and injector furnished and the Gang Foreman held responsible for the return of the old injector.

*Group No. 5:* The consensus of opinion was that the Gang Foreman was lax, in that as this was an emergency he should have interested himself personally in making a special set up with the stores department people whereby he

would be responsible for the return of the old injector after the engine had departed.

*Group No. 6:* Mr. Runk stated that the rule at the store house was entirely correct as it is essential to safeguard material and to avoid carelessness in handling same. In my opinion the case should be handled first by the Gang Foreman accompanying the man to the store house for the material and make proper arrangements for the order later, or second, by issuing a special order to the man going to the storehouse, explaining the necessity and the fact that the old injector would be returned later, with proper order covering the one drawn.

Mr. Schlayer felt that this matter could be handled by the man depositing his tool check with the storehouse counterman and adjusting the matter later by returning the old material with proper order covering the same and receive his tool check.

*Group No. 7:* It was the consensus of opinion that the Gang Foreman in this case defeated his own plans for the prompt movement of this engine due to the fact that he failed to set up an arrangement whereby the repairman could have drawn the material without return of the defective one, in that he knew the rules concerning the drawing of such material without the return of the old piece.

*Group No. 10:* Messrs. Rhoads, Wenrick, Fasick and Reed felt that the Gang Foreman was at fault in this case for not either going to the store house himself and making a special set up, or sending a note with the M. P. 151 explaining all details covering the case and that he would stand back of the store keeper for breaking the existing rule under the circumstances, in which case the stores department should have willingly co-operated with him in order to meet the emergency.

*Conclusion:* The Gang Foreman in the engine house erred when he failed to recognize the existing ruling. He should have gone to the Store House himself or sent a note signed by the Foreman indicating that an emergency existed. Under such conditions the Store House should co-operate and

deliver an injector at once, making necessary arrangements to cover the return of the old injector and if necessary follow up the engine house Foreman until it was returned. If there is proper co-operation and the engine house does not take advantage of exceptoins to the rule an arrangement of this kind will not work a hardship on any department. If any department takes advantage of the opportunity afforded by emergency exceptions the rule, of course, will eventually break down.

#### QUESTION No. 2

"A Car Shop Gang Foreman had two loaded cars on the same track, one of them a pool car with work which piece workers regarded as a good paying job and the other one a foreign car with perishables, with work which the piece workers regarded as a poor paying job. The usual practice in assigning work is to assign the cars in turn to the different gangs. After the Gang Foreman checked the cars he found that it would require the best efforts of his best gang to complete the foreign car without overtime and he accordingly changed the assignment and gave this car to Gang "B" whereas Gang "A" who would have gotten the car if they had taken their turn were assigned the pool car. Gang "B" was consistently the speediest gang on the track and justified the Gang Foreman's selection by completing the car just at quitting time. In doing so their earnings per hour, however, were less than Gang "A" who worked the pool car and they complained about being assigned out of their turn. Was the Gang Foreman justified in his assignment and what conditions cause the best gang to receive the lowest earnings?"

*Group No. 1:* It was the concensus of opinion of the Group that the Gang Foreman was justified in assigning Gang "B" to this particular job and he should arrange to even up the earnings by assigning good paying jobs later to Gang "B," at the same time taking up with his superiors the question of inequalities in rates which would cause the speediest gang on the track to earn the lowest rate.

*Group No. 2:* Mr. Knier stated that the existing conditions at the time would have to be considered. If Gang "B" would do the work and make poor money on it, what would the poor gang do on the same job, and if this condition existed for two or three days, and in the end Gang "B" was still behind Gang "A" the Gang Foreman would be justified in making some arrangements to compensate the men for their loss.

Mr. Rice was of the opinion that as Gang "B" was considered capable of doing the work, and in-as-much as the practice was to give the cars out in turn, and Gang "B" was given the car that Gang "A" should have had, and Gang "A" made more money than Gang "B," the Foreman would be justified in setting a precedent by some arrangement whereby these men would be compensated, which would keep their confidence for future emergencies.

*Group No. 3:* Messrs. Gerheart and Eichholtz brought out the fact that there are always some men just a little faster than others with their work, and therefore the Gang Foreman was justified in assigning the work as he did, without any obligations to either gang. This was the consensus of the group.

*Group No. 4:* Messrs. Buck and Givler felt that the Foreman was justified in switching gangs but the Gang Foreman should not make this an every day occurrence. He should study the question from all angles and be fair with all concerned. It should be the ambition of every Gang Foreman to develop his men so that each gang would be as fast and efficient as the other. Encourage the men and be fair at all times and there will be no dissatisfaction. Existing conditions justified the move of the Gang Foreman in this particular case but he could not afford to make a practice of switching gangs. If the gang lost money on this job they should be taken care of in the future by assigning them jobs which would square matters.

*Group No. 5:* Mr. Yost stated that the Gang Foreman was right in the way in which he handled the situation and should see that the Gang which helped out in this emergency

is taken care of later by handling them so as to receive good paying jobs sufficient to make up for the poor job.

Mr. Green felt that this evidently was an exceptional case and the Gang Foreman was justified in switching the gangs and using the best men, but if cases of this kind were to happen every day the men should take their turns.

*Group No. 6:* Mr. Kissinger felt that the Gang Foreman was justified in handling the case as he did and in the event the men protested against low earnings he should request the Foreman to make an adjustment. This could be handled, however, by making arrangements, in a tactful manner, to throw certain good paying jobs to the gang which had helped out in the emergency.

Mr. Meadath was of the opinion that when such emergencies arise it opens an opportunity to show the workmen's loyalty to the service, in other words, workmen should be satisfied to make this switch occasionally for the good of the service, with a view to later adjustment.

*Group No. 7:* It was the consensus of opinion that if the assigning of work is established in such a way as to give out the work in turns, the breaking of this practice should only be resorted to in extreme emergencies. If the men are fair minded they will not be inclined to think their wages will be the lowest, as work of this kind eventually equalizes itself.

*Group No. 10:* Mr. Bell stated that the Gang Foreman must be fair with both gangs at all times and should not disturb the rotation of the gangs on work of this kind except in extreme emergencies and under these conditions should endeavor, without too much publicity, to equalize the matter in such a way as to permit Gang "B" to increase their earnings on some other car.

*Conclusion:* The urgency of the case determines whether the Gang Foreman was justified in his action. Fairness requires strict observance of established practices and established practices, generally speaking, should not be disturbed except in cases of emergency. The condition which causes low earnings on a foreign car is one which requires careful

study from the Foreman. He must make sure that his men are not putting in unnecessary time hunting material, getting special material manufactured, etc., which takes up their time, and which is not covered by the piece work prices. On the other hand if the excess work is assigned to another party great care must be exercised to see that the piece worker is not relieved of work which forms a part of his contract, thereby creating an equally bad condition in the other direction. Another condition which should receive study is the piece work prices themselves and suitable recommendations made to cover inequalities where they exist.

### QUESTION No. 3

“What benefit have you derived from this year’s course and what suggestions have you to offer for next year’s?”

It was the opinion of all the groups comprising the Harrisburg Training Course that the benefits derived by the members was inestimable, and the recommendation was unanimous that the same be continued next year along this or advanced lines.

**PRESS OF  
J. R. KERR & BRO.  
CHAMBERSBURG, PA.**

