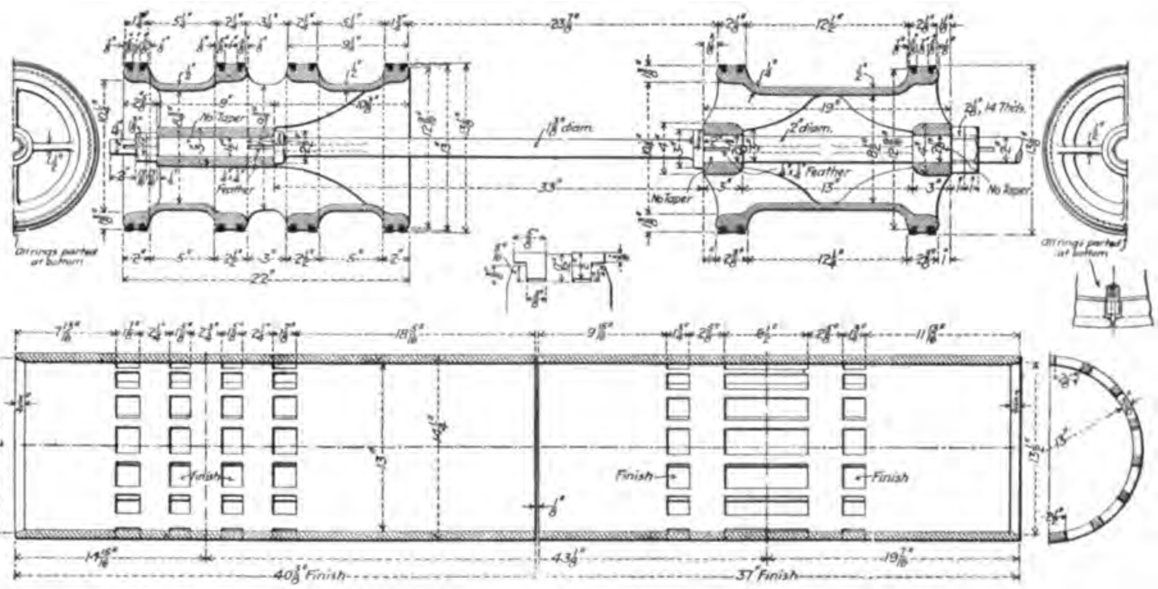

Decapod Tandem Compound Freight Locomotive—A. T. & S. F. Ry.

Valves and Valve Bushings

Wheels, Etc.

Driving, diameter outside	57 ins.
Driving wheels, centers	50 ins.
Truck wheels, centers	29¼ ins.
Driving journals, main	11 x 12 ins.
Driving journals, others	10 x 12 ins.
Truck, type	Swing motion
Truck, wheels	Steel tired
Truck journals	6½ x 10½ ins.
Crank pins, main	8¼ x 8½ ins.
Crank pins, others than main	5 x 4½ ins.

Boiler.

Type	Wagon top
Steam pressure	225 lbs.
Diameter	78¾ ins.
Thickness of sheets	⅞ and 15-16 in.
Type of staying	Radial
Number of fire doors	2
Firebox, length	108 ins.
Firebox, width	78 ins.
Firebox, depth	Front 80 ins., back 78 ins.
Staybolts	1 in. Ulster iron
Crown sheet, thickness	⅝ in.
Tube sheet, thickness	9-16 in.
Side sheets, thickness	⅝ in.
Back sheet, thickness	⅝ in.
Water space	Front 4½ ins., back and sides 4 ins.
Tubes, number	463
Tubes, diameter	2¼ ins.
Tubes, length	19 ft.
Heating surface, tubes	5,155.8 sq. ft.
Heating surface, firebox	210.8 sq. ft.
Heating surface, arch tubes	23.9 sq. ft.
Heating surface, total	5,390.0 sq. ft.
Grate area	58.5 sq. ft.
Smoke stack above rail	15 ft. 6 ins.
Center of boiler above rail	9 ft. 10 ins.

Tender.

Type	8-wheel
Frame	10-in. steel channels
Trucks	Plunger cast steel, diamond frames
Capacity for water	7,000 gals.
Capacity for coal	1[illegible] tons
Wheels	34¼ ins., steel tired
Journals	5 x 9 ins.
Journal boxes	McCord

CONTRIBUTIONS TO PRACTICAL RAILROAD INFORMATION.

(Chemistry Applied to Railroads—Second Series.)

XXVIII.

(Disinfection of Passenger Cars.)

By C. B. Dudley, Chemist, and M. E. McDonnell, Bacteriologist, of the Pennsylvania Railroad Company.

It will hardly be denied that the subject of the disinfection of passenger cars, stations, waiting rooms and dwellings of employees is one of very great importance to railroads. As knowledge increases, we seem to be learning that there is very much more liability of disease being contracted from occupancy or contact with locations that have been contaminated by persons suffering with certain diseases than was formerly believed, and although the absolute limits of the danger as applied to passenger cars and waiting rooms have not been completely demonstrated by positive experiment as yet, it is still evident that in the case of some diseases, such as smallpox, no one feels satisfied to enter a place so contaminated until the same has been disinfected. And if, as seems probable, it shall be demonstrated by further experiment that there is danger of contracting diphtheria, scarlet fever, tuberculosis, pneumonia, etc., from the occupancy of places contaminated by persons suffering with any of those diseases, it is evident that some efficient means of disinfecting large places, such as passenger cars, waiting rooms, etc., is a very great desideratum. The ordinary fumigation with sulphur, and the treating of infected material with steam for disinfection, are surrounded with some difficulties. The effect of the sulphur gases on metals and on upholstery is very disastrous, and while steam is thoroughly efficient, in order to use it, it is necessary to have large closed spaces into which materials can be placed. Accordingly, when, a few years ago, it was announced that formaldehyde gas apparently successfully met all the requirements of a thoroughly efficient gaseous disinfectant, there was quite a feeling of relief among sanitarians and boards of health, and in many cases railroads began to supply themselves with the necessary apparatus with which to use this new disinfectant.

As time has progressed, however, some disappointment has been experienced in regard to the behavior of formaldehyde. Some boards of health, even at the present time, do not regard formaldehyde as of any value, while positive experiments, made by scientific experts in some cases, have resulted in disappointment. Furthermore, there does not seem to be general agreement as to the conditions under which formaldehyde is efficient as a disinfectant. Some authorities claim, and at first we think it was generally taught, that the gas, in order to be efficient, should be as dry as possible. Others claim that their apparatus gives the proper amount of moisture; while still others specify a certain amount of water to be vaporized per unit of space to be disinfected. Also, the question as to what effect the temperature has on the action of the gas seems to be in doubt. Some authorities think that the gas is absolutely inactive below 45 degrees Fahrenheit, and that it is much more active at higher temperatures than even as low as this point.

In view of this state of affairs, some two years ago experiments were begun in connection with the Chemical and Bacteriological Laboratory of the Pennsylvania Railroad Company, to see, if possible, under what conditions formaldehyde gas did produce disinfection. The questions which we asked ourselves were:

First—Is it essential that the gas should be as dry as possible in order to be efficient?

Second—If not, what influence does moisture have on disinfection?

Third—If moisture is found to be favorable to disinfection, how much moisture is essential?

Fourth—What influence does temperature have on the action of formaldehyde gas as a disinfectant?

Fifth—Are there any other conditions than moisture and temperature that have an influence on the action of formaldehyde gas as a disinfectant?

It is, perhaps, fair to say that it was hardly possible at the beginning of our studies to plan out the investigation as methodically as the questions above given seem to indicate, as the whole field was to us very largely unknown, and we had to feel our way. The above resumé is simply given for convenience in setting forth the results of our studies.

The first point which we tried to settle by experiment was the effect of the presence or absence of moisture on the efficiency of disinfection by means of formaldehyde. Before giving in detail the method of experimentation and the results on this point, it may, perhaps, be wise to spend a few moments with the question of moisture in the air. It is well known that moisture is always present in the air to a greater or less extent, and that the amount of moisture that the air can contain is largely a function of the temperature. Barometric pressure has an influence, but this need not be considered, so far as our experiments are concerned. A few rather elementary figures may not be amiss. When the air is saturated with moisture at a temperature of 40 deg. F. each cubic foot of it contains about 2.80 grains of water; at 50 deg. the amount of water is 4 grains; at 60 deg., 5.70 grains; at 70 deg., 8 grains; at 80 deg., 11 grains, and so on. But it rarely happens that the air is saturated with moisture. The usual condition of the air is a good deal below saturation. The amount of moisture in the air varies with different parts of the country and at different seasons of the year. The usual method of stating the condition of the air as regards its moisture content, or as is commonly said, its "humidity," is by means of a percentage figure. For example, if we say the humidity of the air is 70 per cent., we mean that the air contains 70 per cent. of the moisture that it can contain at the temperature; or, in other words, if the air contains 2.80 grains of water per cubic foot, and the temperature happens to be 50 deg. F., it is evident, since the air can contain 4 grains of water per cubic foot at 50 deg., that the moisture in the air is 70 per cent., that is, 2.80 grains are 70 per cent. of 4 grains, and so on for any other temperature.

One point further should be made clear, namely, there is no necessary relation between the humidity expressed in percentages and the number of grains of water per cubic foot in the air. For example, when the humidity is 70 per cent. and the temperature as above stated is 50 deg., there are 2.80 grains of water per cubic foot in the air. When the humidity is 70 per cent. and the temperature is 70 deg., there are 5.60 grains of moisture per cubic foot in the air; or again, when the humidity is 70 per cent. and the temperature is 80 deg., there are 7.70 grains of water per cubic foot in the air. It will be noted, a little later, that if our experiments are to be trusted, the absolute amount of moisture, that is, grains per cubic foot, has no relation to the efficiency of disinfection by means of formaldehyde. On the other hand, the humidity or percentage of moisture that the air can contain at the temperature has a very important influence on the efficiency of disinfection by means of formaldehyde gas.

Returning now to our experiments. A year ago last winter all the time that could be devoted to this subject was taken up in our bacteriological laboratory with experimental work on this subject. A tight alcohol barrel had the glue soaked out of it, the head taken out and the barrel thoroughly dried. The inside was then coated with paraffine wax, in order to render it impervious to moisture, and the head replaced. The barrel was placed horizontally and an opening made in one of the heads, which was closed by a tight door, and an auger hole (closed with a rubber cork when desired) bored in the head, to enable us to introduce the gas. Along one side of the barrel holes were bored, sufficiently large so that they could be stopped with rubber corks, each cork carrying a half inch or more diameter glass tube, which was closed at the outer end and open at the inner one toward the barrel. This glass tube was divided into two compartments by a little shelf. There were a number of these holes. The object of this glass tube was to carry the test objects which were to be exposed to the action of the gas. The barrel was also fitted with two holes, which were stopped with rubber corks carrying dry and wet bulb thermometers, the wet bulb thermometer being normally removed and a tight cork put in its place, the object of the arrangement being to enable us to determine the amount of moisture in the air. These thermometers read to tenths of a degree, were carefully compared and believed to be fairly accurate. The test objects consisted of the *bacillus coli communis* and *staphylococcus pyogenes aureus*. These test objects were prepared in the proper culture media, and were exposed both on platinum foil and plush, each cork, with its glass tube and shelf arrangement, giving us sufficient space to have both kinds of test objects, both on platinum foil and plush, exposed at one time. In order to dry the air inside the barrel, air which had been passed through chloride of calcium and concentrated oil of vitriol, was sucked through the barrel through proper apertures. We succeeded in getting the moisture out of the air in this way down to a humidity of 18 per cent., the temperature of the room and of course the air in the barrel being from 70 to 90 deg. F. This dry condition of the air being obtained, test objects were introduced into the proper apertures, as above described, and allowed to remain for an hour, until they should come to the condition of dryness which corresponded to the condition of the air in the barrel. Then the proper amount of formaldehyde was introduced by boiling it off from formalin solution, or by the use of para-form decomposed with a little borax water, as will be described later. The amount of formaldehyde gas was varied. In some experiments the amount used was the amount contained in 150 cubic centimeters of 40 per cent. formaldehyde solution per thousand cubic feet of space, but this amount was increased two, three and fourfold in various experiments. The moisture was then measured by means of the dry and wet bulb thermometers, and the gas allowed to act. The test objects were removed at the end of 15 minutes, 30 minutes, 2 hours, 4 hours, 6 hours and 23 hours, and tested for growth. It should be mentioned that the introduction of the formaldehyde always increased the moisture. Also the introduction of the wet bulb thermometer for the time necessary to make the measurements increased the moisture. Both these operations increased the humidity from 15 to 20 per cent., depending on temperatures. It should also be stated that "controls," as they are called, namely, some of the test material which had not been exposed to the gas, was always tested in exactly the same way as that which had been exposed to the gas, to be sure that we were experimenting with live material. It would hardly be possible in a paper of this kind to give the details of all the experiments, as they would occupy too much space. It is perhaps sufficient to say that, although the experiments as above described with dry air were repeated several times, the amount of moisture being always below 45 per cent., we never succeeded in any case in sterilizing test objects as long as the moisture remained at or below that low figure. Even the 23-hour exposure, with the moisture below 45 per cent., in no case ever gave us sterilization.

This point being pretty thoroughly established in our minds, we began to increase the amount of moisture. Depending on the amount that we desired to have present, the moisture was obtained by bubbling air through water, and sucking this air through the barrel, until the desired condition was obtained, or in some cases, in the form of steam from a flask boiled for the purpose, both before the gas was introduced, along with the gas, and after the gas was introduced. The latter procedure, namely, the steam, was employed when we desired to get pretty near to saturation. In this way experiments were made with 50, 55, 60, 70, and so on, per cent. humidity. In brief, our experiments in the alcohol barrel may be summed up as follows: With the moisture in the air below 45 per cent. of the amount that it can contain at the temperature, we never got sterilization, as already stated. With the moisture in the air up to 65 and 70 per cent. and above, we never failed to get sterilization. Between these two points the results were more or less erratic. Sometimes an occasional object would be sterilized, and sometimes none. It should be mentioned that as the amount of moisture increased the time of exposure necessary to produce sterilization seemed to diminish. Indeed, when the moisture in the air approached saturation the test objects withdrawn 15 minutes after the gas was all in, were completely sterile, and this experiment was repeated a number of times.

It will be noted that our experiments do not seem to confirm the idea that dry formaldehyde gas is efficient, but that, on the contrary, certain fairly definite percentages of moisture in the air are essential in order that the gas may do its work. This conclusion, reached over a year ago, was so contrary to what we had been taught that we were quite skeptical of our results, and did not at the time make any use of them, other than to talk the matter over with bacteriologists, whenever we could get a chance. We felt that the matter was of so much importance that hasty conclusions should certainly be avoided, and that it would be desirable to make experiments on a car, or other larger enclosed space, than our alcohol barrel. Accordingly, the matter was held in abeyance until the advent of cold weather again, since in the summer and fall of the year the amount of moisture in the air is quite large, and it is difficult to make a car tight enough to maintain dry or moist air in it, and we were therefore quite dependent on the outside conditions for our condition of moisture. Before, however, leaving the alcohol barrel, we should mention that a piece of plush, corresponding in size to the amount in a passenger car, was introduced into the alcohol barrel, to see what effect this would have on the moisture in the air. It was found to have a very marked effect. Plush being hygroscopic in its nature, with plush present it was necessary to add a good deal more moisture in order to have the proper percentage show on the dry and wet bulb thermometers than was the case with no such hygroscopic substance present. This point will be referred to later.

In our experiments on a passenger car, which have occupied most of the time during the past winter, we had in mind:

First—To demonstrate whether our conclusions in regard to moisture as obtained from the alcohol barrel were correct as applied to a car.

Second—What is the effect of temperature on formaldehyde disinfection?

Third—Whether any other conditions would manifest themselves in the course of our experiments that would have a bearing on the problem.

An ordinary passenger coach was accordingly chosen, the ventilators closed on the outside with hoods of canvas, the doors, windows and deck sash likewise closed, and dry and wet bulb thermometers on a proper stand were set inside one of the doors, where they could be easily read. In the experiments on the passenger car for convenience only the *bacillus coli communis* was used, and test objects, both on plush, on foil and on filter paper, were employed, as before. The test objects were distributed throughout the car, some in the basket racks, some on the window sills, some on the seats, some on the floor and some in the closets. Twenty-four test objects in all were used with each experiment, and the ordinary controls were made as before. The test objects were always put in place and allowed to stand an hour, before the gas was introduced, and then an hour after the gas was introduced, in order to allow it to act. The gas was boiled off from formalin, always adding a little borax to the formalin, as suggested by Novy, it being found under these conditions that high temperature and pressure are not essential in order to decompose para-formaldehyde. Usually on the car the amount used was about 0.40 of a quart for each thousand cubic feet of space in the car. The gas was introduced through the keyhole, in the opposite end of the car from where the dry and wet bulb thermometers were placed.

It will be readily understood that by warming the air in the car it was easy to get low humidity. The temperature outside varied from 20 to 40 deg. F., and as the amount of moisture possible in the air at these temperatures is less than 3 grains per cubic foot, after heating the inside of the car to 80 degrees, which was often done, the percentage of moisture in the air was readily obtained as low as 22, 25 and 28 per cent., and if the temperature was made a little higher even lower figures could be obtained. A number of experiments were made on a car in this way with the air in the car containing moisture below 40 to 45 per cent. In no case did we succeed under these conditions in getting sterilization; in other words, we absolutely confirmed on the car our experiments with the alcohol barrel. In all perhaps six or eight tests were made with low moisture in the air in a car.

On attempting to increase the amount of moisture in the air we ran across very serious difficulties, owing to the diffusion. It will be understood that a car not being perfectly tight, there being crevices around the windows and underneath the doors, and also around the ventilators more or less, the attempt to maintain a high condition of moisture in such a space was found to be more than we could accomplish, especially in view of the hygroscopic nature of the plush and window curtains. Accordingly at this point we took up the question of the influence of temperature. It will be readily understood that if the temperature is ignored it would be easy to maintain almost any percentage of moisture desired in a car. For example, if the temperature outside was 40 deg. F. and the humidity was 70 per cent., it would require only a few grains of water per cubic foot inside the car to bring the moisture up to saturation if desired. Without going into all the details of all the experiments it may perhaps be sufficient to say that the experiments on the car, ignoring temperature and at high moisture, demonstrated two things, if our experiments are to be trusted: First, we never failed to get disinfection with the moisture above 70 per cent. Second, temperature within the limits of our experiments has no perceptible influence on the action of formaldehyde gas. In other words, even at as low as 25 deg. F. we get complete sterilization of the test objects, provided the amount of moisture was sufficiently high.

It may not be amiss to repeat that our experiments on the car seemed to indicate, first, that with low humidity, up to as high as 45 per cent., we did not get disinfection, irrespective of the amount of gas used. With high humidity, 70 per cent. or above, we never failed to get disinfection. Between these two points the results were more or less erratic and variable. Also temperature at least as low as 32 deg. F., and perhaps safely as low as 25 deg. F., does not retard or prevent disinfection by means of formaldehyde gas, provided a sufficient amount of moisture is present in the air.

One or two interesting points developed in the course of our experiments on the car: First, on a windy day the test objects on the side of the car toward the wind sometimes failed to disinfect, even though the amount of moisture and other conditions were what they should be. This is apparently due to the fact that, as has been stated once or twice, a car not being tight there is more or less air movement in the car, and the gas was probably carried away from that side of the car. Second, when experimenting in a doubtful region of humidity, namely, from 40 to 65 per cent. of moisture in the air, on one or two occasions we got sterilization on the floor and seat of the closet, while we did not get it in other parts of the car. This apparently is explained by the fact that the asphalt floor of the closet was considerably colder than the point at which the moisture was measured in the car, which would have the influence of increasing the percentage of moisture in the air, as already explained. Third, some experiments were made on the car to determine how well the formaldehyde gas penetrates such material, as may occur, as for example, dry sputum. These experiments were not quite as satisfactory as we would like, and we do not feel that this point is completely covered. We could not experiment with the sputum of tuberculosis, as the resources of our laboratory do not involve cultures in living animals. Accordingly the cultures we had already experimented with were mixed with healthy sputum, dried down, and then exposed in the regular way. We always got sterilization of these test objects, provided the amount of moisture was sufficient, but the controls were not satisfactory, indicating perhaps that the *bacillus coli communis* does not flourish in a culture medium containing considerable healthy sputum, or that the drying was detrimental. The point, therefore, of the penetration of the gas into dried sputum is not quite satisfactorily settled by our experiments.

This is the place perhaps to mention that thus far we have made no experiments on a Pullman car, with its wealth of upholstery. So far as our experiments, however, have gone we are clearly of the opinion that it will take a very much larger amount of moisture, introduced in some way, in order to get sterilization in a Pullman car than with an ordinary passenger coach, provided, of course, the air does not happen to have the proper amount of moisture in it when the experiment is made.

A few words on how to get the moisture in the air may not be amiss. We tried two different methods; one was by boiling in a large amount of moisture along with the gas or preceding the gas. This method is not to be recommended, we think, as the heat which goes in with the steam raises the temperature of the car and makes the maintenance of the percentage of moisture more difficult, the tendency of the air inside and outside the car to intermingle through the crevices being increased by difference in temperature. The other method consisted in sprinkling the floor. This has the two fold advantage of supplying the moisture required and at the same time lowering the temperature in the car and making it easier to maintain the humidity nearer saturation. It seems fairly probable that possibly spraying through the keyhole for those places into which it is not desirable to enter may be a thoroughly efficient means of getting the moisture, and indeed there are some indications that spraying may be the best means of all of obtaining the moisture in the space to be disinfected.

Another point which should be mentioned is that there may be some difficulties connected with getting rid of the gas after the space has been sterilized. Our usual procedure has been to open the doors and windows and allow the car to ventilate itself, but we have always found that when a car is heated after such a procedure sufficient material remains in the car to cause some difficulty. This difficulty diminishes if the car is heated up to 70 or 80 deg. F. and then ventilated, and then heated up a second time and thoroughly ventilated. A third heating shows very little odor. This procedure we commonly employed between experiments, so as not to have anything carried over from one test to another, but it is obvious that if cars are disinfected in the summer, and do not completely lose the effects of the disinfection before winter, there may be some trouble. The use of ammonia gas to overcome this difficulty did not prove entirely satisfactory. The point remains for further study, with the expectation on our part that two or three times heating up to a pretty high temperature and ventilating between will probably make cars quite satisfactory to use.

It might perhaps be fairly stated that it is the intention to prepare definite instructions in printed form, embodying the results or our studies on the subject, to be used by the employees of the railroad company who do this work of disinfection. This has not yet been done, but will receive attention as soon as possible.

In view of the work that has been done on this subject, which has been summarized above, we are inclined to think we are warranted in trusting the following conclusions:

First—That in order to get efficient disinfection it is essential to have the air of the space to be disinfected contain at least 70 per cent. of the moisture that it can contain at the temperature.

Second—That we are fairly safe in ignoring temperature in the matter of disinfection with formaldehyde down to as low, at least, as 32 deg. F.

Third—That it would be desirable not to attempt to sterilize artificially heated rooms or spaces on account of the difficulty of maintaining the proper amount of moisture in the air.

Fourth—That a hygrodeik or some means of determining the amount of moisture in the air is an essential to every sterilizing outfit.

Fifth—That the necessary moisture can probably, in almost all cases, be satisfactorily obtained by sprinkling the floors. In cases where it is not desirable to enter the space on account of fear of infection the moisture can be sprayed in through the keyhole in the door.

Sixth—Since formalin, the usual commercial form of obtaining the material, is cheap, it is probably better to use an excess than to try to diminish the amount to the smallest figure which will give success, and that it would be desirable to charge the apparatus with not less than 0.40 of a quart of formalin for each thousand cubic feet of space to be disinfected.

Seventh—That if a small amount of borax is added to the formalin solution it is not essential to use high temperatures and pressure in the generator.

Eighth—It is probable that it would be unwise to attempt to disinfect a coach or a room on the windy side of a building when high winds are blowing.

Ninth—That it is probably good practice after the moisture is introduced to allow twenty minutes or half an hour to elapse before the gas is introduced, in order to have the moisture disseminate itself, and that after the gas is introduced, provided sufficient moisture is present, an hour is abundant for the action of the gas. Of course all the windows and doors should then be opened, to give thorough ventilation.

It is simple justice to say that in the planning and carrying out the large number of experiments epitomized above the chances for consultation with and the suggestions of Mr. F. N. Pease, principal assistant chemist of the Pennsylvania Railroad Company, have been of very great value.

THE SUPERINTENDENT OF MOTIVE POWER AND THE STOREKEEPER.

By G. F. Slaughter,

General Storekeeper, Chicago & Northwestern Railway.

It is usually conceded that the store and motive power departments in railway work are closely related. In times of financial prosperity, as at present, this is especially true. Business activity brings added responsibility to both. For instance, at such times locomotives are usually overworked, and material with which to repair them is difficult to procure, though planned for far in advance of actual requirement. Hence there must be hearty co-operation; first, between the superintendent of motive power and the general storekeeper; second, between the master mechanic at the division shop and the local storekeeper.

To achieve the best results, the two departments should be interdependent, though in no sense under one head; for one branch of the service requires mechanical instinct, the other that of the merchant. The mechanical department creates, while the store department supplies the demand.

To be of proper assistance, the storekeeper must possess a fair knowledge of the locomotives on the division where he is employed. Usually there are many classes, and he must know of what these consist. This is not sufficient, and he must seek further information from the detail drawings secured from the mechanical office. Some parts of locomotives last much longer than others, and it is his business to know just what these parts are, to prevent a shortage of that for which there is a demand, or an overstock of useless material; otherwise his motive-power friend will soon discover that he has everything in stock except the particular part desired.

To secure appropriations for shop improvements, such as machinery, etc., the mechanical department is usually required by the management to assume the obligation of cutting down the cost of output. Before attempting to cut it down, however, the cost must be known. For this purpose simple intelligent cost-accounting is required. When, as on some railways, the storekeeper is entrusted with this, he is of far greater value to the mechanical department. He must furnish the cost of all output, impartially, upon its completion, exhibiting the rate of compensation, the time consumed, kind and quantity of material and labor used. Then only can the mechanical department distinguish between labor wisely and unwisely expended, and compare the ability of their men, whether foremen or mechanics. The following examples show how such information may be presented:

Example "A"

Cost of manufacturing ten freight whistles on lot No. 3583, dated March 3, 1902, in M. P. & M. Department. Completed April 21, 1902. Shops, April 22, 1902. No. 1914, M. P. & M. file No. 983.

	$			
5 feet tubing, 33¾ lbs. at c.				
10 castings No. 910, 35 lbs. "				
8 feet 1 in. soft steel, 20 lbs. "				
10 castings No. 764, 9 lbs. "				
10 rivets, ⅜ x 1¾, ⅛ in. "				
10 cotters, ⅛ x 1 "				
10 whistle castings, 239 lbs. "				
Exp.				
Labor				
Machine Shop.				
Hours. Rate. Total.				
Check 1367 at				
" 1381 "				
" 1376 "				
" 1374 "				
" 1386 "				
" 1366 "				
Superintendence				
Total				
Credit				
10 lbs. brass scrap at				
Total cost				

Remarks.

April cost $....per each.
March cost $.... " "
February cost $.... " "
January cost $.... " "

Approved:

.... Supt. M. P. & M.

.... General Storekeeper.

Example "A" is for the manufacturing of ten locomotive whistles. Aside from the material, with its cost, is shown the labor performed in each shop; also, the men who performed it, identifying them by check numbers. In Example "B," aside from the opening details, you will observe the quantity