

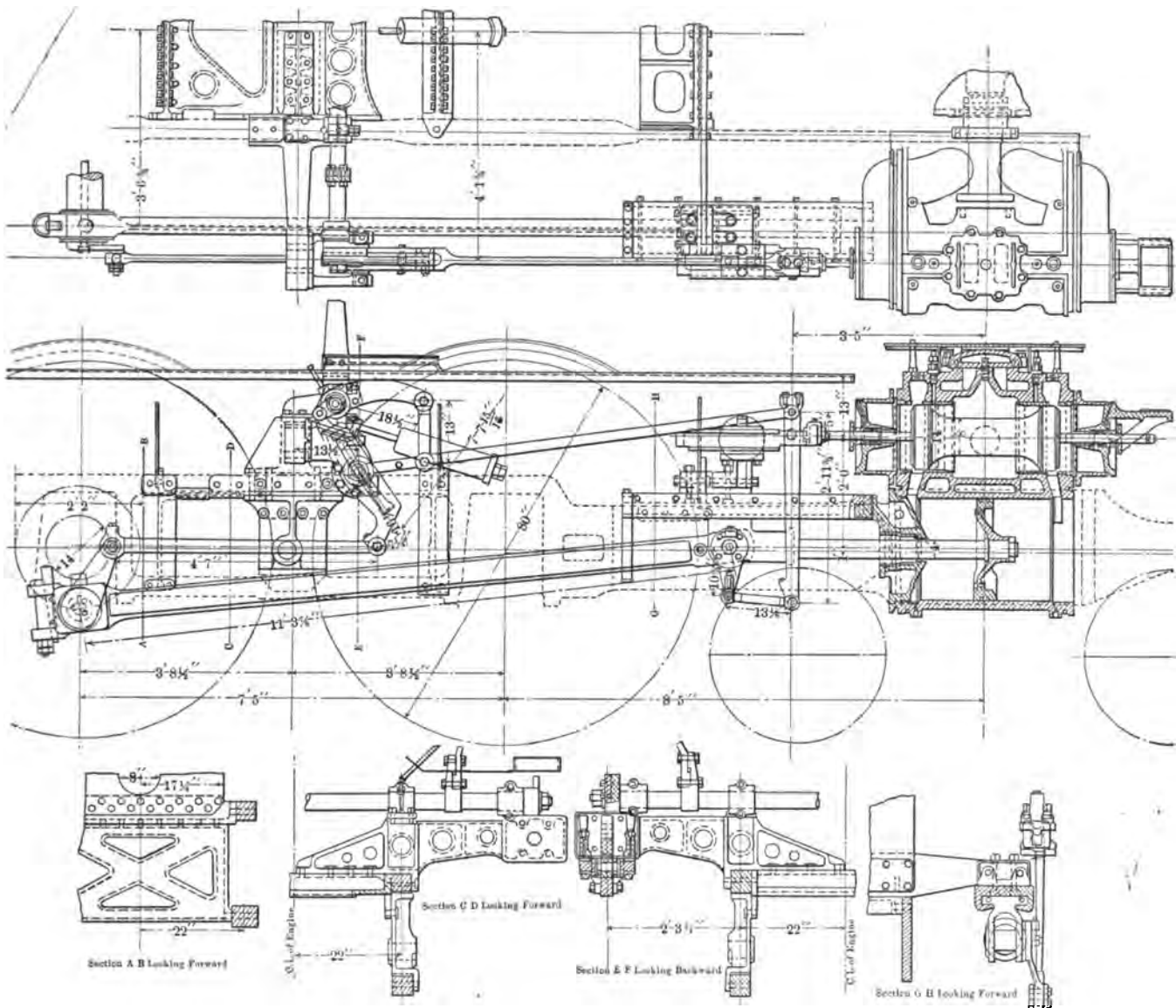
WALSCHAERT VALVE GEAR.*

PENNSYLVANIA RAILROAD.

The design of valve gear which has been developed on the Pennsylvania Railroad for use on high speed Atlantic type locomotives presents many features of refinement of detail and attention to the underlying principles of a gear of the Walschaert type which are not always found in the gears being applied. It consists of as few parts as can be used to advantage and still obtain a satisfactory motion. All moving parts are made as light as stiffness would allow and particular attention has been given to providing case hardened bushings and pins at all wearing points. Full advantage has also been taken of the opportunity

drawing will show that the great importance of an absolutely rigid support for the link has been fully appreciated. Since this section of the gear must be located back of the front driver and with the center of its trunnions some distance ahead of the point midway between the drivers, it is necessary to support it from a cantilever extending out a distance of over 2 ft. from the main frames. As the link is hung $13\frac{1}{2}$ in. ahead of this extending arm, a twisting action is introduced which must be opposed by a liberal length of bearing on the frame.

The construction at this point consists of a steel casting which



PLAN AND ELEVATIONS OF ASSEMBLED VALVE GEAR OF THE WALSCHAERT TYPE—PENNSYLVANIA RAILROAD.

presented by the use of this type of gear in obtaining an exceptionally good system of frame bracing.

The general assembled drawing of the gear shows the supports for the different parts very clearly, and a study of that

* This is the fourth article of a series describing in detail typical arrangements of the Walschaert valve gear. The standard arrangement used on consolidation locomotives on the Canadian Pacific Railway was described on page 16 of the January, 1908, issue. A typical application made by the American Locomotive Company to some Pacific type locomotives for the Florida East Coast Railway was described on page 89 of the March, 1908, issue. Details of the Walschaert gear used on a recent order of Pacific type locomotives furnished to the A. T. & S. F. Ry. by the Baldwin Locomotive Works were described on page 114 of the March, 1908, issue.

is cored at all available points to make it as light as possible and still retain the requisite stiffness. This casting extends inward to the center line of the engine, being securely bolted to a large horizontal frame stiffening casting located at this point. It has a bearing nearly 2 ft. long on the frame with a deep lip extending down on the outside and is secured to the frame by four vertical and four horizontal bolts. At the outer end is carried a steel casting which includes the bearing for the link trunnions. A bearing for the end of the reverse shaft is also provided in this casting, the construction and arrangement of which is clearly



VIEW OF WALSCHAERT VALVE GEAR AS APPLIED TO CLASS E3D LOCOMOTIVE—PENNSYLVANIA RAILROAD.

weight, are worthy of attention. Another horizontal frame stiffening casting will also be noticed just back of the guide yoke, where the frame narrows down to a $2\frac{1}{2}$ in. plate.

The support of the forward part of the gear is provided by the valve stem cross head which has very liberal bearing area and is carried in guides supported from the top of the main guide just ahead of the yoke. It will be noticed that an extension valve stem with a stuffing box and bearing in the front valve chamber head is used, which will assist in keeping this section of the gear in line and relieve the cross head to some extent.

The illustrations of the details of the gear show its refinement and extreme lightness combined with sufficient rigidity to prevent it from springing or otherwise getting out of adjustment at very high speeds. The whole gear, from the center of the pin on the return crank to the center of the valve stem, is all in one vertical plane, so that no horizontal lever arms are introduced at any point. Provision has been made throughout for the convenient and easy removal of any part which may need attention, without dismantling other sections. The return crank is held to the main pin by a bolt extending through the center of the pin and is held to its setting by three stud bolts. The method of carrying the link is also very simple and effective. Complete provision has been made for lubrication by means of oil cups incorporated in different members.

The connection between the valve stem and the cross head is capable of adjustment for setting the valve central after the gear has been erected. This is a provision which is not usually found in the Walschaert valve gear in this country and was adapted from the design applied to the De Glehn compound owned by the Pennsylvania. The arrangement consists of extending the valve stem through an opening in the cross head and securing it by a large nut on either side. These nuts are provided with a flange having 30 teeth cut in its circumference. A locking device is provided which securely fastens both nuts. This arrangement has not proven to be entirely satisfactory and the latest gears have the stem keyed to the cross head and an adjustment provided at the valve itself.

One of the illustrations shows the type of piston valve used on these locomotives, with an enlarged section through the packing ring. These valves were furnished by the American Balanced Valve Co.

A LABOR LEADER'S INDORSEMENT OF A RATIONAL RAILROAD APPRENTICESHIP SYSTEM.—Summing up the whole question of industrial education, as it is supposed to apply to the young men, I am firmly convinced that every precaution should be taken concerning such schools (trade schools), to the end that young men will not be induced or led to believe that after serving a

few months, or a year if you will, in an industrial or trades school, by securing certificates they are permitted or even warranted in going into the industrial field seeking employment as mechanics, against the best interests of those who have served a reasonable or legal apprenticeship. To avoid this danger, and with a view to securing the highest skill and to perpetuate the supremacy of the American mechanic, I believe that the proper and best methods to be adopted are for employers to establish schools in connection with their factories and workshops, for the purpose of giving young men employed by them an opportunity for a few hours' schooling each day, in addition to the practical experience they are securing while serving their time as apprentices. To my mind this idea is best carried out by the New York Central Lines, as represented by Mr. Deems.—*From an Address by James O'Connell, President of the International Association of Machinists, before the Civic Federation of New England.*

IMPROVING THE EFFICIENCY OF THE CAR WHEEL.—Finally, to summarize the points that I have endeavored to make and laying aside, for the present, the matter of improving the quality of the wheel, which is a work that must necessarily go on, I would suggest first, avoid the concentration of load by the use of a more satisfactory relation between the contour of the wheel and that of the rail; second, avoid the concentration of heat at or near the flange of the wheel by a modification of the brake practice; third, relieve the oftentimes existing high pressures against the flange by introducing the feature of lateral motion in truck construction, so that a considerable yielding resistance will be offered instead of an abrupt one; fourth, for the purpose of avoiding the excessive wear of wheel flanges of all kinds, modify the contour and provide means whereby the resistance to the pivoting of the truck and of the wheels to track may be very materially reduced.—*S. P. Bush before the Western Railway Club.*

THE FASTEST LONG DISTANCE RUN.—The Pennsylvania has achieved the distinction of carrying a theatrical company from Pittsburg to Chicago in 7 hours and 42 minutes. The special train used was made up of two 60-foot baggage cars and two sleepers. The distance covered was 468 miles, so that the average speed was a fraction under 61 miles an hour, including stops. It is claimed that never before has such a high average speed been maintained for so great a distance by a passenger train. The special was stopped four times and slowed down once by the block signals to prevent overrunning the Pennsylvania's 18-hour train. One of the forced stops was five minutes and the others were nearly as long.