

The Best Design and Materials for Pistons, Valves, Rings and Bushings.

The American Railway Master Mechanics' Association Committee, Joseph Chidley, Assistant Superintendent of Motive Power, New York Central Rd., Lines West of Buffalo, chairman, reported as follows: Your committee was requested by the secretary to cover the subject of extension piston rods and also the matter of lubrication, in accordance with action taken by the Executive Committee. The committee has not attempted to cover the matter of lubrication, on account of this subject being covered quite thoroughly by the report issued by the Superheater Committee. The committee issued a cir-

cular depends not only on the material and design, but also on the efficiency of lubrication, the class of service and maintenance. A road traversing level country should obtain more mileage from the different parts than could be obtained by a mountain railway. This is equally true of roads traversing bad water districts, compared with those in good water districts. A road on which much drifting is done will obtain more mileage if its locomotives are equipped with automatic drifting and by-pass device. The service for which heavy, modern types of locomotives are used is generally more severe

Piston Valve Bushings.—Of the 34 roads reporting, 8 use cast iron for piston valve bushings on superheater locomotives and 26 use Hunt-Spiller gun iron. Cast iron is used on saturated locomotives by 17 roads, Hunt-Spiller gun iron is used by 10 roads and 7 roads have no saturated locomotives with piston valves. Short bushings are used by 26 roads, while 6 roads favor long bushings, extending across the exhaust passages to the steam-chest cover.

The number of roads using an even number of ports is about the same as those using an odd number. Apparently

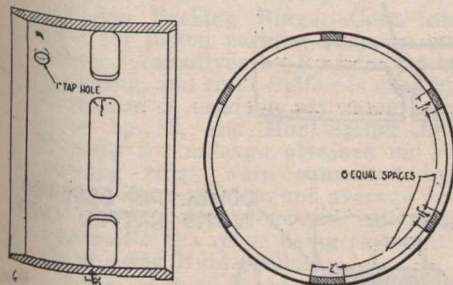


Fig. 1. Piston Valve Bushing.

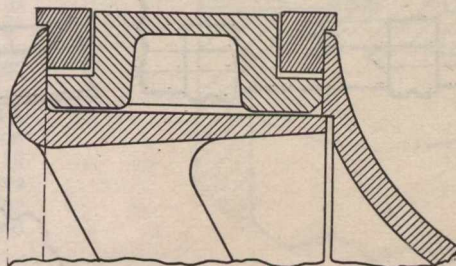


Fig. 2. Piston Valve L Ring.

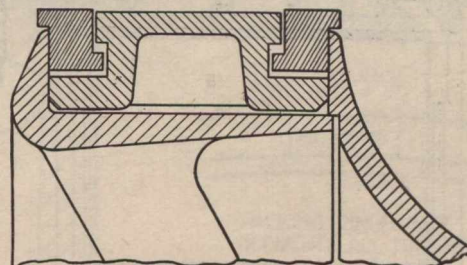


Fig. 3. Piston Valve Z Ring.

cular of inquiry to members with regard to the materials and designs used by the various railways for pistons, valves, rings and bushings, with a view of ascertaining the prevailing standards of material and design. This was also intended to bring out the changes, if any, which have been necessitated by the very general change from the use of saturated steam to superheated steam in the last few years. The committee has received replies from 34 railways, representing about 37,000 locomotives. In general, we may say that most roads make no distinction between saturated and superheater locomotives in the design of pistons, valves, rings and bushings, on locomotives equipped with piston valves. Many railways are using Hunt-Spiller gun iron for pistons, valves, rings and bushings for both superheater

than that of older and lighter types, which would be expected to give more mileage, other things being equal. The replies received by the committee indicate the difficulty of making a comparison between the service of the various parts on superheater and saturated locomotives. Most modern locomotives are equipped with superheaters, while the saturated type of locomotives is represented for the most part by a lighter class of locomotives, built, as a rule, a number of years ago, and not to be classed as types of modern locomotive construction. Several roads state that they find no difference in the mileage of the various parts under discussion on superheater and saturated engines, others obtain more mileage with the saturated locomotives, and a few report more mile-

not much attention has been paid to this feature of the design, although several roads are now changing from an odd to an even number of ports, which seems to be the preferable design. The object in having an even number is to have the bridges come near enough to being opposite each other so that the bushings can be readily calipered over the bridges to measure the amount of wear. The minimum width of bridges varies from 17-32 in. to 1 1/4 in. The committee favors a small number of bridges, with sufficient metal in them to give the necessary strength to the bushing. The usual form of steam ports is rectangular, although several roads report the use of diagonal bridges, forming diamond shaped ports. The committee has no evidence as to the advantages or disadvantages of this style

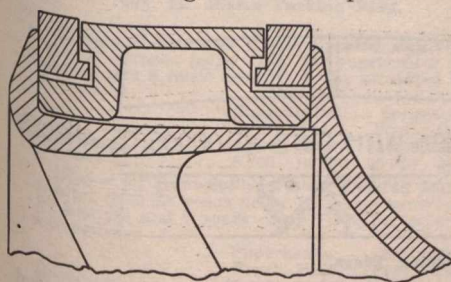


Fig. 4. Piston Valve Anchor Ring.

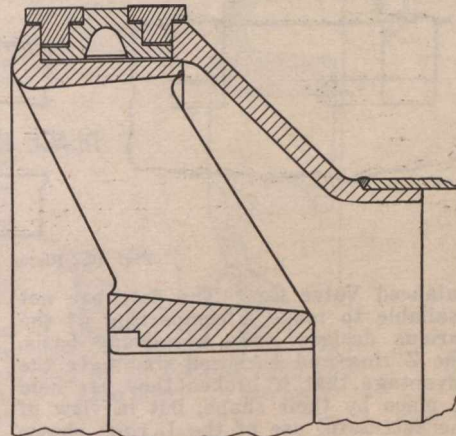


Fig. 5. Piston Valve T Ring.

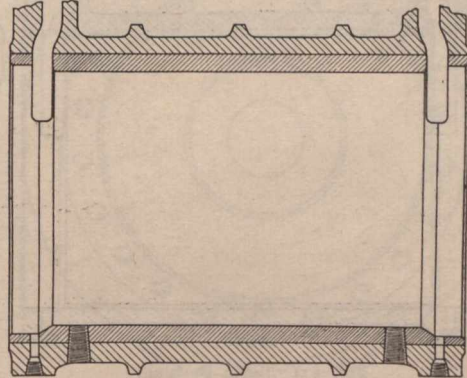


Fig. 6. Cylinder Bushing.

and saturated locomotives, while a smaller number use ordinary cast iron for the purpose; a number of roads use Hunt-Spiller iron for superheater locomotives and ordinary cast iron for saturated locomotives. Throughout this report the words "Hunt-Spiller," or the letters "H.-S.," denote Hunt-Spiller gun iron, and the words "Cast Iron," or the letters "C. I.," denote other varieties of cast iron.

The committee asked for data regarding the mileage obtained for different designs and materials in passenger and freight service on superheater and saturated locomotives. Mileage figures were submitted by something less than half of the roads reporting. The variation in mileage is so great, according to the replies received, that the committee hesitated to draw any conclusions from considerations of mileage. The mileage ob-

age with superheater locomotives. By the term "mileage," as used in this report, we refer in all cases to the mileage obtained between renewals for the parts under discussion. It is worthy of notice that of the 34 railways replying to the circular, some use Hunt-Spiller gun iron, some merely state that they use cast iron, others use a special grade of cast iron, some roads giving their own specifications for cast iron, and none state that they follow the specifications of the A.R.M.M.A., which were adopted in 1906 and revised in 1915.

of port. Sixteen roads use a fillet in all corners of ports in piston valve bushings, and 15 provide no fillet in the corners of the ports, or provide fillets only on the exhaust edge of the steam ports.

The committee asked the members to report on the mileage between renewals of piston valve bushings, but it is evident from a consideration of the replies that in some cases mileage is given between borings. The largest mileage reported between renewals on superheater locomotives is 300,000 miles, obtained in both freight and passenger service on one of the standard trunk roads with the use of short Hunt-Spiller gun-iron bushings. The maximum mileage reported between