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## LOCOMOTIVE BOILER CONSTRUCTION AT THE CANADIAN LOCOMOTIVE CO.'S WORKS.

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Probably every reader of this article if he stops but a moment to consider, will agree that of all the branches of the metal working industries, less change has taken place recently in the art as applied to boiler making than to any other branch. The tools, with but few exceptions, are almost exactly the same as those developed years ago in old country naval yards for ship-plate and marine boiler work. The one prominent exception to this lack of development is that of the advent of the pneumatic tool as a handy and indispensable adjunct of the boiler shop for rivetting and chipping purposes.

Various reasons may be assigned to this seeming lack of improvement, the most prominent of these being the fact that plate-working machinery reached a high stage of perfection years ago, leaving less room for improvements—different from the case of machine tools where the introduction of high-speed steels practically revolutionized the industry.

The outcome of the few changes in boiler shop equipment has been that boiler shops in general have had a marked tendency to deteriorate from every standpoint, with the possible exception that quality of production has probably remained at the same steady point. The high quality of work which many of these old-time shops were capable of producing, is worthy of particular note.

Within the past few years, some remarkable changes may have been noticed. Throughout Canada, nearly all the leading boiler-making plants have been entirely rebuilt on a larger scale. From a production equipment standpoint, the shops are much the same as ever, the big change occurring in the layout, and general facilities for the expeditious handling of the material in a more systematic manner, the routing of the boiler through the shop being more or less automatic, making possible much more rapid production.

Such is the case of the Canadian Locomotive Co. at Kingston, Ont. This company, which has always been noted for the high quality of its product, was, until within the last couple of years, handicapped in the rapid production of work by an old-fashioned shop, which, while well equipped, was not designed according to a Taylor or any other system where rapid and at the same time efficient, production is the principal feature.

The demand for locomotives having increased to such an extent as to make the old plant inadequate, it was finally decided to build a new shop of the latest and most modern design, equipped with the very best machinery and appliances of all kinds, it being necessary to maintain the high reputation for quality while at the same time decreasing the cost of the output.

### DESCRIPTION OF PLANT.

The Canadian Locomotive Co.'s plant

is located on the Kingston waterfront. Previous extensions to other departments of the business having absorbed most of the available property, a wide pier was built out into the water, the outer end of the new locomotive boiler shop being located on this made land.

A comprehensive view of the main part of the boiler shop is given in fig. 1, a view looking from the outer end of the shop toward the main portion of the works. The section shown in the illustration is 380 by 60 ft., with a height of 35 ft., and is of the typical all-steel, trussed-roof shop construction, excellent lighting being obtained from very large windows. The blank part of the wall is



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made up of wood sheathed outside with tin, presenting an imitation brick surface. To the right of the part shown, there is a flanging shop, 48 by 45 ft., built on as an addition. This shop forms a part of the boiler shop with no intervening wall, and is of the lean-to type of construction.

The boiler shop proper is supplied with two 35-ton Shaw electric cranes as indicated, these being more than sufficient for all needs. They are of sufficient capacity to lift the heaviest boiler and carry it bodily down the shop to the large hydraulic rivetter at this end of the shop, the photograph, fig. 1, being taken from the platform of this

rivetter. It is of the Chambersburg Eng. Co.'s manufacture, with a throat depth of 14 ft. and 4 ft. 6 in. gap, and having a controlled range of pressures up to 225 tons for the large size rivets. The working pressure is about 100 lbs. Alongside is located the pump and accumulator, both being sufficiently large to supply a hydraulic flanging press and small hydraulic riveter as well. The latter is located alongside the large one.

To the left, just out of the picture, there is a twin punch, each punch being supplied with a small jib, one of which shows in the photograph. Along the left wall, just visible in the picture, there is a large plate-trimming planer. The immediate foreground is the lay-out floor. Along the right wall, there are a couple of radial drills for tube-sheet work, and also a flange punch. Along the left wall there are a couple of cold cut-off saws. One of the finest pieces of the equipment is the large Hills & Jones roll in the middle foreground. This has rolls 22 ins. diameter, capable of bending plate up to 1½ in. and is driven by a 60 h.p. motor. It is of a modern design, capable of bending plate from the very edge. The construction consists of two rolls in vertical ways, between which the plate passes, with a third or bending roll set in ways at an angle to the perpendicular. The nearness of this third to the other rolls determines the curve. But few of this type of roll are to be seen in boiler shops. The background in the photograph is the erecting floor.

The flanging shop addition already mentioned, contains, as shown in fig. 2, a large flanging press, plate-heating furnace and flanging forge.

### CONSTRUCTION WORK.

The main feature of this article, i.e., the actual construction practice as followed by this company under the supervision of W. J. Robinson, Boiler Foreman, is next to be dealt with. As the initial step, the various plates entering into the boiler make up, are laid out in that section of the shop in the immediate foreground in fig. 1. On being laid out, they are all brought to the near end of the shop by the cranes to a convenient position for the jibs at the punches, which are located to the immediate left as before mentioned, to pick up. All plate work that has any flanging, is carried across to the right by the crane, and deposited in the flange shop. All other plate work is carried back down the shop to the edge-trimming planer.

Consider first the flanging operations: The piece operated on in fig. 2, is the front tube sheet. These sheets come from the mill in circular form, so that up to this stage they require no work in the boiler shop. The heating furnace and arrangement for transferring to the flanging press are well designed for quick work. The furnace doors, operat-