See Purchasing Agents' Guide on third page of cover.

See Alphabetical Index to Advertisements on page 402.

THE

Railway and Shipping World

With which is incorporated The Western World. Established 1890.

Devoted to Steam & Electric Railway, Shipping, Express, Telegraph & Telephone Interests.

OLD SERIES, NO. 140.
NEW SERIES, NO. 58.

TORONTO, CANADA, DECEMBER, 1902.

10 CENTS A COPY.
$1 A YEAR.

RAILWAY BLACKSMITHING.

By D. B. Swinton, Master Blacksmith, C.P.R.

Since the earliest ages amongst all the industrial arts, the work of the blacksmith has always been considered one of the most important, and while its importance is quite as prominent in later years in the construction of railway cars, on account of the immense amount of material to be handled and the tremendous cost of that material, it has to some extent changed in character. It has partially lost its constructive character, that is, articles or pieces of work, which were formerly built by welding together bars or other prepared pieces, are in later years replaced in many instances by steel castings, or are re-designed to permit of their being built up, or composed of castings and bars of wrought iron readily made by bending and working from such bars of mercantile sizes in stock by the aid of special machinery and tools devised for the purpose, thus enabling them to be produced in large quantities at very low cost. Thus by far the greater part of the weight of wrought iron, used in car work, has little or no work upon it, except such as bending, upsetting, or other operations that can be done by machinery, and the blacksmith is rapidly developing into an iron former rather than an iron welder.

It must not for an instant be supposed that a lesser degree of intelligence is required for the production of such work as compared with the old system. Such an idea would be very misleading. The only difference is that the machine and the man working it simply replace the striker and helper, who largely supplied the force while the smith furnished the skill. The skill is now employed in the design and formation of dies suitable for the purpose of manufacturing each piece successfully, and in the knowledge, experience, and mechanical instinct which can tell at a glance what can and what cannot be done by properly designed dies. Any lack in these requirements generally furnishes work for another department, to repair or rebuild the machine, besides failing to produce the desired result at satisfactory cost and time.

Material being one of the important points in forgings, great care should be exercised in seeing that the quality of material used is up to the standard, and it would be to the advantage of railway companies to have a well regulated system of testing all iron and steel as soon as received from the manufacturer, and also to have pieces stamped with makers' name or brand. This would perhaps entail a small additional cost which would more than pay for itself in the quality of the material we would receive if this system were adopted. It is also important to examine the bar iron supplied, to see that it is correct as to size within certain limits, which formerly was not necessary and therefore calls for more accurate work in the rolling mills. If the bars are variable as to diameter, those which are too large, when gripped by the holding dies, form a fin between the faces of the dies bringing undue strain upon the machine, frequently causing a breakdown. In addition, the bulk of iron in a given length, automatically measured off by the machine, is greater than that furnished by the bar of correct size and the excess overflows the forming dies and stops or breaks the machine. If the bar is too small, the gripping dies fail to hold it, and the forming dies push it out. Thus a limit in diameter of about 1-64" above and below correct size is as much as can be allowed.

P. S. ARCHIBALD, M. CAN. SOC. C.E.

The next step that should be considered is the handling of material. This being one of the chief items of expense in connection with forgings, especially car forgings, it is necessary to have the material piled in a convenient place, where it can be easily carried to the machines, as all extra handling adds very much to the cost of cars, and in shop arrangement too great deliberation cannot be given to this point, for by it the employment of many laborers can be obviated.

A noticeable fact about blacksmithing is, that although the construction of rolling stock for these last 10 years or so has been tending towards more metal each year in the construction of cars, and while the malleable iron foundries have taken advantage of the condition of affairs to increase the size of their buildings from 50 to 100%, the smith shop has remained about the same as regards floor space. Certainly the introduction of modern machinery in the shop has supplied this want to a large extent, and has been the means of increasing the output of forgings and reducing the cost of same to such an extent as almost to revolutionize blacksmithing, and when the mild steel industries of the country have been fully developed, the opportunities of the smith shop will still be greater.

As an illustration of machine work, we will take an ordinary M.C.B. coupler pocket 1"x4", and follow it through the different necessary operations to completion. The material, which comes from the rolling mills cut to length, is carried to the furnace, which is located as near as possible to the machine, the furnace being of such size as to take the entire bar and heat it thoroughly from end to end, 15 or 20 bars being usually heated at one operation, the number depending largely upon the size of the furnace. When properly heated (a matter which can only be determined by experience and thorough acquaintance with the different grades of iron) the bars are moved and quickly placed upon the bulldozer machine, the machine having been fitted up with the necessary forming dies while the iron was being heated. By an ingenious arrangement of dies, the iron, by one stroke of the machine, is bent in the form of a U, then, being placed in another position, another stroke gibs the ends and shears them to the proper length, and a third movement of the bulldozer punches the holes by which the coupler pocket is to be riveted to the coupler; all these operations being completed at one heat. After cooling, the pocket is taken to another part of the shop, where the pneumatic riveters are located, and is quickly attached to the coupler by two 1⅛" rivets and is ready to be applied to the car. A variation in the manufacture of these pockets, and one that is practised by many railways is made by upsetting the ends of the iron before being bent, drilling or punching holes and then bending it as before described,