IRON RAILWAY SLEEPERS.

WE give illustrations of a system of iron and steel permanent way, of which some experimental lengths have been laid on the London and Northwestern Railway, namely, half a mile on the down main line in Anglesey, half a mile on the up Chester line near Beeston, and a short length opposite the steel works at Crewe.

This system of permanent way, which has been designed and patented by Mr. F. W. Webb, the chief mechanical engineer of the London and Northwestern Railway, consists of trough-shaped sleepers, having riveted to them chairs of the form shown in Figs. 1 and 2. In the case of the permanent way so far laid down the sleepers are of iron, and were rolled by the Ebbw Vale Company, while the chairs, which are of steel, were made at Crewe from the crop ends of rails. To make the jaws of the chairs the crop ends are first rolled into ribbons, and then stamped up into shape, the

iron should be kept flowing from an elevation as high as possible. In burning the neck and wabblers upon a roll, the larger the roll the more successful will be the operation, on account of the larger surface for the melted iron to burn or cut into, thus uniting more perfectly.

As a preliminary operation, the roll should be made as hot as possible in the foundry oven, after which it should be lowered into a hole, previously dug in the foundry floor, keeping the broken end even with the level of the floor, as shown in the engraving upon this page, after which the hole should be quickly filled with sand, rammed up solid, particularly around the top of the roll. The surface of the fracture should be chipped all over, so as to break the skin of the metal and remove the rust.

The wabblers and neck must be moulded in dry sand, for if made in green sand the falling melted iron would cut the moulds all to pieces. These moulds should be made in section, as shown in the illustration, where 2 represents the

neck will be the first to break. In regard to the amount of iron necessary to complete the operation described, I may say, that it depends entirely upon the nature of the casting to be mended. For a roll weighing from 5,000 to 7,000 pounds, it will take about 1,800 pounds for burning on wabblers or neck, while on small rolls, about 1,200 pounds of metal will be required. The cost of the process is comparatively small, and saves the trouble and expense of turning up a new roll, besides effecting a great saving in time, which is a very essential point in rolling mills.—*American Machinist*.

APPARATUS FOR PREVENTING WASTE IN TWISTING AND DOUBLING YARNS AND THREADS.

By J. CLOUGH, Haincliffe, Yorks, Eng.

UPON each creel peg is a tube carrying a pegged braid to support and engage with the bobbin from which the yarn is being drawn, and a toothed wheel which can be held by a detent or detector wire. The yarns to be doubled are led through the feed rollers in the ordinary way, but in the place of the usual thread eye, a balanced lever is used, one

WEBB'S STEEL AND IRON RAILWAY.

operation being performed very rapidly. All holes are punched to template, each end of a sleeper being punched at one operation. The riveting is done by hydraulic power, and the chairs have shown no signs of working.

It will be noticed that each chair is made up of two jaws and a packing piece which forms the immediate bearing for the rail, so that any working of the latter will not injure the sleeper. Between the sleeper and packing and the packing and chair jaws there are interposed strips of pasteboard, paper, or canvas, dipped in tar or asphalt. To give rigidity to the jaws they are bulged in the middle of their width, as shown in Figs. 1 and 2, and this bulge forms a recess on the inner side of the jaws into which the compressed wood keys swell. So far there has not, we are informed, been one case of a key working out. On the London and Northwestern the keys are always put outside the rails so as to form a cushion to resist the blows of the wheel flanges. Mr. Webb's permanent way is a thoroughly good mechanical job, and the experience with it has so far been highly satisfactory.—*Engineering*.

BURNING OR MENDING HEAVY CASTINGS.

By THOMAS D. WEST.

THE principle employed in the process herein described for burning a new neck and wabblers upon the end of a broken cast iron roll, such as are used for rolling iron, steel, and other ductile metals, may, with a display of moderate skill and judgment, be practically applied for turning or mending a variety of heavy broken castings.

PROCESS OF MENDING HEAVY CASTINGS.

The object of this process is in mending heavy castings to avoid the expense of making new ones, and, if properly performed, it is very economical and will save much time, labor, and expense.

The most essential points to be observed in mending heavy castings by this process, are as follows: The melted iron must be very hot and of a medium soft quality, for the hard iron chills quickly, and therefore does not perfectly cement or unite with the broken surface of the casting.

An outlet must be provided to allow the melted iron to escape from the mould as soon as it is poured in, particularly at first, as the hot metal is liable to chill. The hot metal should fall directly upon the surface of the fracture, and, after beginning to pour, a uniform steady cutting stream of

mould for the neck, and 3 the mould for the wabblers, while 4 is for the riser or feeding head.

The flask, 2, has three places cut out at the bottom edge, A, B, C, which are for openings to allow the melted iron to freely escape while the neck is being burnt on. As soon as the roll has been securely placed, the flask, 2, should be put in position, care being observed to keep the opening for the neck exactly in the center of the roll to allow for turning up the journal in a lathe. Pigs of iron or other suitable heavy weights should be placed upon the handles, X X, to hold down the flask. If an air furnace is used in the foundry three basins should be formed, one opposite each of the openings, A, B, C, to catch the waste iron, but if there is no air furnace at hand, then a pig bed should be made, throwing the spare sand around the joint between the roll and flask so that there can be no run-out. The sand should be cleaned away from the outlets, and runners made leading to the places formed for catching the waste iron. If the iron should be likely to run upon the face of the roll at the outlets, it should be smeared with oil at those points to prevent the melted metal from adhering to it. In commencing to pour the iron the ladle should be held very low, and then gradually raising the ladle until the metal will have a fall of about four feet. The ladle is supposed to be handled by a requisite number of men not shown. The man in charge of the process can easily ascertain if there are any places upon the surface of the fracture where the melted metal is not cutting, by means of the bent rod, D, and the molten stream directed upon those places. Some small pieces of tin or zinc should be kept at hand, and by constantly throwing them into the mould, the iron in the holes that are burnt is thereby made hotter than it would be otherwise.

The iron should be poured until only about five hundred pounds remains in the ladle; the openings, A, B, C, should

end of which forms the thread eye, and the other the detent. As long as the yarn is being wound by the flier, the "drag" depresses the lever, and keeps the detent clear of the toothed wheel, but when the yarn breaks the lever rises, and the detent engages with the wheel, and stops the rotation of the creel bobbins, thereby preventing the formation of a "roller lap;" 1, 1 are the creel bobbins, 8, 8 the toothed wheels, 9, 9 the balanced lever, 12 the doubled yarn.

HOW TO MAKE A TRAWL.

MR. THOS. E. PARKINS writes as follows to the *Sea World*: In regard to the turbot, I have often caught the young fish in the Harbor of Beaufort, which I take as evidence of the larger fish being on our coast, also the brill, sole, and plaice. I have no doubt that a little further north these fish abound in great numbers, and with a good fishing smack, or a steamer, I think, would be better than a sailing vessel, for a trial, as they could move on different ground, or from place to place, and would be more likely to find the fish quicker with a steamer, and, as the writer says, a large fishing business could be established. I think the idea a good one of sending to England for a set of trawl heads and beam, with ground rope already fitted and the net. Then any one used to making nets could make one after the pattern. But I think the trawl could be made all complete in this country, also that there could be many good trawlers found in the United States who could take charge of that department.

It is not a very hard job to make a trawl. Any blacksmith can make the trawl heads. The beam is of oak or ash. Any good netter with a little instruction could make the net.

I send you a rough outline of the different parts of a trawl as used by the Barking fishermen, which are marked

HOW TO MAKE A TRAWL.

then bestopped with a stopping stick and clay, then fill the neck nearly full of metal.

The protecting ring (which is a thin plate of metal, having a hole in the center, the same size as the neck and is placed on top of the flask to prevent the falling stream of molten iron from cutting away the edge of the mould) should be lifted off at once by means of handles attached to it; then skim off all the dirt and slag from the surface of the metal, after which the wabblers mould, 3, should then be quickly placed upon the flask, 2, and the feeding head, 4, upon the top of the flask, 3. These flasks should be securely held by placing heavy weights upon the top, after which the mould should be quickly filled and fed with metal, until it solidifies. If the neck has been burned successfully, the old or original

as follows: A, trawl heads, 5 feet long on the tread and from 3 to 4½ feet high; B, the beam; C, the ground rope—it is leaded and then covered by winding another rope tight around it; D, the ground or belly of the net; E, the upper or back of the net; F, the two wings or sides of the net; G, the cod end—it is of double twine, and put on after the back, belly, and wings are laced together. It is made in two straight pieces, and laced at the sides so as to form a sort of sack, with a draw string at the extreme end. The fishing smacks from Barking carry four men and from three to four boys.

[A private letter from Professor W. K. Brooks, of Johns Hopkins University at Baltimore, says that Mr. Parkins is an experienced trawler, and is thoroughly well posted.]