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“An Apparatus for Obtaining Sections of Rails.”

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ENGINEERS have generally experienced some difficulty in obtaining accurate records of the wear of rails, so that possibly the following description of an apparatus for obtaining the outline or section of a rail, by means of a wax cast, may be of interest; the same method can be followed to obtain the wear of fish-plates, wheel-tires, etc., etc.

Records can thus be kept of the wear of rails, and accurate calculations can be made of their lifetime, in relation to the tonnage of trains passed over them.

Sections of new rails can also be taken at the maker's works, or when delivered to the railway, to ascertain whether they are in accordance with the standard section: only a few minutes are needed to obtain such a section and record it on a card.

The apparatus consists chiefly of a double frame (of brass), made in two halves, in order that it can be attached to the rail and withdrawn therefrom after taking the wax cast, as explained in detail in *Figs. 1*. Thin strips of brass are inserted at the top and bottom of the wax cast to separate the wax so that it will come off the rail in two halves.

If it is desired to take sections of worn rails periodically at certain parts of the track, it will be found convenient to mark the place by driving an iron stake (numbered), and in leaving it in the ground for future reference, the position being registered in a book. It is also advisable to paint the side of the rail at each stake, so that sections can be obtained at exactly the same spot on each occasion. The rails of which sections are needed should be prepared beforehand, and well cleaned of rust and dirt, say for a width of 6 inches, and just before taking the wax casts the rail should be washed with water and left in this wet state, so as to

prevent the melted wax from adhering to the rail; certain parts of the apparatus proper should also be wetted for the same purpose.

The apparatus having been secured to the rail, the space between the apparatus and the rail must be closed on the outside with a fillet of clay to prevent the melted wax from escaping; the wax is then poured carefully into the apparatus until it just overflows.

As soon as the wax is sufficiently cool, which takes about three

Figs. 1.

minutes—depending on the air-temperature—the apparatus, with the wax-cast in two halves, can be withdrawn from the rail, and any projections or burrs of wax may be pared off with a knife.

The back part of the apparatus must be perfectly joined together again with the wax-cast still attached, and then laid on the recording card so that the outline, which will correspond exactly with the section of the rail, can be carefully traced on it.

The wax composition is made up of two parts of resin to one part of beeswax: this has proved quite satisfactory, and it is also economical, because the casts can be re-melted and used several times. Lead, zinc, and metallic compositions have been tried, but they were found to contract very much on cooling, resulting in imperfect sections of the rails: in addition, they heated the rail and the apparatus inconveniently, whereas the wax composition melts and also cools rapidly, and the shrinkage is imperceptible, so that accurate sections are obtained.

A petrol or kerosene blow-lamp for melting the wax should be provided, and also a ladle and spoon.

It is advisable to have proper cards printed for registering the sections of rails, and on these should be noted information, such as the date when the rail was laid in the track, its position, whether on a straight or curve, name of manufacturer, tonnage passed over it, etc.

To prevent confusion it is well to prescribe at the outset that the apparatus must always be placed on the rail with the plates A and B facing a specified end of the railway, so that if further sections of the same rail are needed for comparison, they will all have been taken under the same conditions.

The above particulars are the results of experiments carried out by the Author, as Chief Engineer of the San Paulo Railway, aided by members of his staff.

The Paper is accompanied by one drawing from which the Figure in the text has been prepared.