SOCIETY NOTES.

Engineers' Club, Toronto.

At the regular meeting on April 16th, Mr. W. Almon Hare discussed a proposed Annealing Bed for Steel Rails. Mr. Hare said in part:—

It is a well-known fact that in almost every rail are present certain internal stresses of an indeterminate character. This is easily proved by cutting the rail in two by planing the web to separate the head from flange. As soon as separation occurs the two parts will assume a curved form due to these internal stresses, which have become unbalanced by cutting the rail apart. It is quite possible that a number of the breakages which have occurred have been partly due to the action of these indeterminate stresses, which in the instance of the broken rail exerted their influence in conjunction with the exterior applied forces, which of themselves would not have been sufficient to rupture the rail.

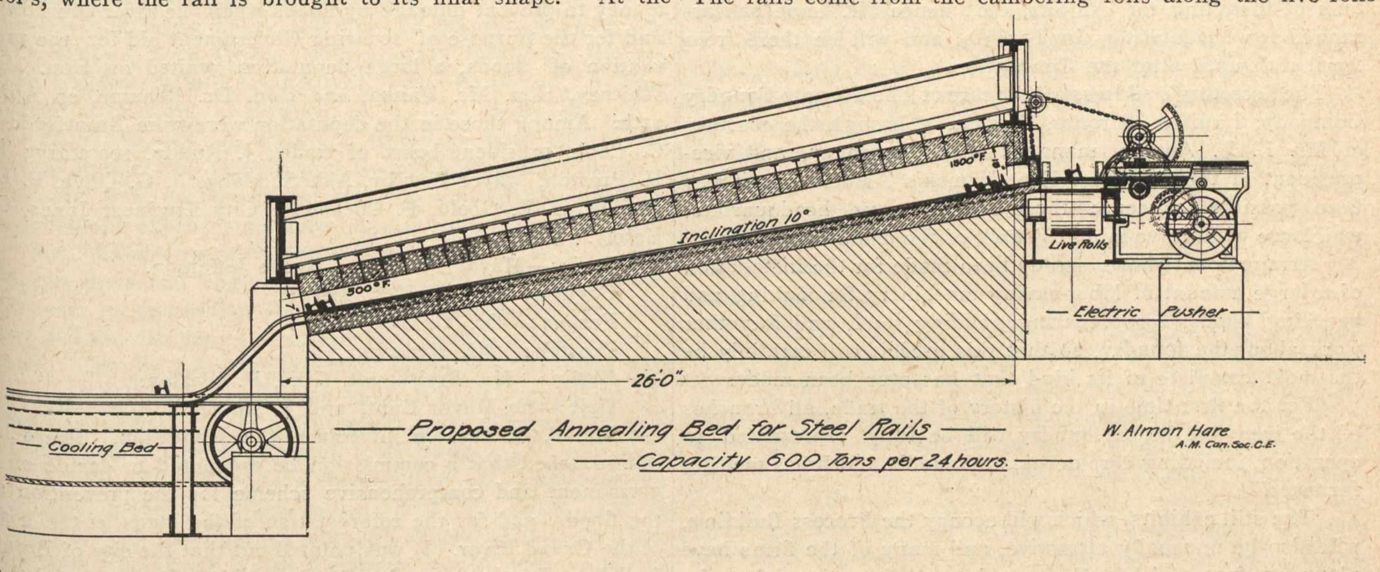
Assuming that such is the case, we are led to investigate as to the cause of these stresses, and to devise means to minimise as much as possible this unknown feature. A great deal of this difficulty is evidently due to the distortion of the steel during its passage through the finishing pass of the rolls, where the rail is brought to its final shape. At the temperature at which this is done, the distortion cannot show itself, but only after the rail has been partly cooled when these stresses cause the rail to buckle and curve, and when the rail has completely cooled it has a permanent set or curve which must be straightened out in the straightening press before shipment. The mill superintendent will endeavor to reduce this curvature, by adjusting the cambering rolls which give the hot rail a curve in the opposite direction to that which it would assume without cambering and so when the rail had cooled the distortion to be removed by straightening is, of course, minimised.

The manner of cooling the rails to-day is practically the same as was the practise in England when rails were first made. It consists simply of putting the hot rail on elevated skids, or cooling racks, which are in the open, and are left there until cool enough to handle. This method, is, of course, simplicity itself, and in countries having a moderate change of climate between winter and summer, nothing more could be wished for. Throughout the United States the above is the general practise, and for the Southern States is perhaps satisfactory. In the Northern States, however, and in this country, where the winters are so much colder, and the summers almost as hot, it is fair to ask the question if the rails rolled in the winter are subject to the same treatment as those made during the summer. In the summer months, the rails exposed to the weather cool at a much slower rate than those made in the winter, and if statistics were collected it is reasonable to expect more breakages in winter rails than in those made in the summer. It is certain that to expose the hot rail at say 1,400 or 1,500 degrees Fahrenheit to a temperature of 10° or 15° below zero is to cause a much more rapid rate of cooling than if the temperature were only 75° above zero.

Annealing is in other words, slow cooling, and in all forgings in which internal stresses have to be eliminated annealing is resorted to. Usually the method in such cases is to subject the forging for some hours to a moderate dull red temperature, thus allowing the molecules of the metal to adjust themselves to the new form into which they have been crushed, making the part homogenous in strength and quality.

It is not supposed that this can be done in the case of rails, as the resulting metal would be too soft, which would be detrimental, especially on the head where the unit stresses in the metal are greatest, due to the action of the wheels in transit. It is assumed, however, that some benefit will result if all rails were subjected to exactly the same treatment in cooling whether made in summer or winter, and that the product would be free from all stresses due to cooling at any rate. Whether it is possible to carry this further and anneal the rail to a greater extent than is here suggested is a matter that cannot be stated off-hand, and very likely this could only be done in conjunction with a change in the chemical properties tending to increase the hardness or tensile strength of the steel.

In the accompanying drawing is shown a suggested annealing bed for a rail mill of about 600 tons per 24 hours. The rails come from the cambering rolls along the live rolls shown on the right hand. When the rail reaches a point opposite the opening to the annealing bed, the electric pusher advances and moves the rail laterally into the chamber, the door of which has been automatically opened by the pusher by means of the mechanism shown. On withdrawing the pusher, the door closes, preventing the unnecessary escape of heat.



Proposed Annealing Bed for Steel Rails
Capacity 600 Tons per 24 hours.

The rails entering this chamber are at a temperature of about 1,400 to 1,500 degrees Fahrenheit, and in some mills somewhat higher, and will in a short time raise the temperature of the chamber corespondingly. In starting up on Monday morning, it will be necessary to fire the chamber with a few gas jets until the roof has been heated, after which the incoming rails will maintain the temperature required.

The roof of this chamber is firebrick of a usual form suspended by the steelwork shown. These blocks are 9 inches thick, and about the same in length. The roof thus made is perfectly flat, and can be repaired at a very low cost. The bed is also firebrick, built up to within 1 inch of the top of the steel rails forming the skids. The roof has been shown higher at the entering end than at the exit, to assist in confining the heat at the upper end. At the lower end it is only high enough to allow the rail to pass out freely. After the rails have passed through this chamber, which will take about one hour for any one rail, they are dropped down to the cooling bed and skidded to the live rolls for transit to the straightening presses. The floor of this chamber has been shown on an incline of 10°, so as to facilitate the movement of all the rails on the bed without causing too great a stress on the nearest rail to the pusher, which being the hottest would be the most susceptible to injury. The coefficient of friction on this inclination is not more than .027, so that the pusher will