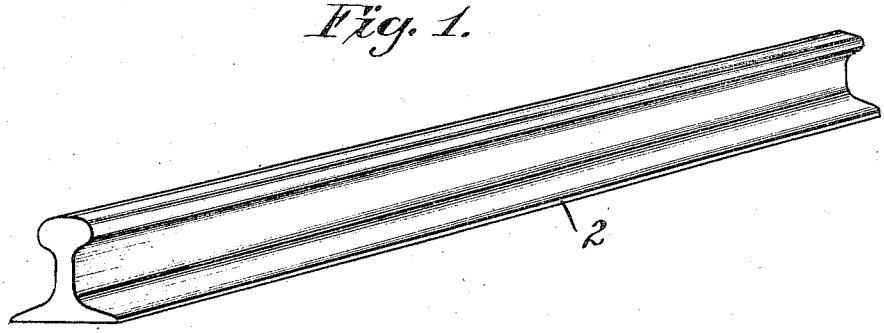
No. 812,810. PATENTED FEB. 20, 1906.

W. BRINTON.

CAST MANGANESE STEEL RAIL.

APPLICATION FILED MAY 4, 1904.

Fig. 1.



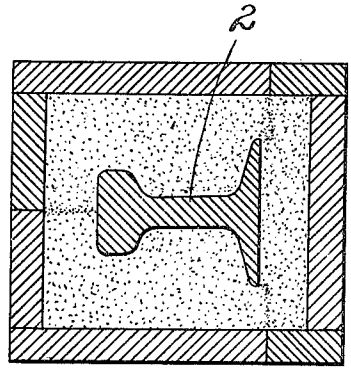


Fig. 2.

Witnesses:
O. W. Pillman
Robert Catt

Inventor:
Walter Brinton,
By his Attorney
F. H. Richards.

UNITED STATES PATENT OFFICE.

WALTER BRINTON, OF HIGH BRIDGE, NEW JERSEY, ASSIGNOR TO TAYLOR IRON AND STEEL COMPANY, A CORPORATION OF NEW JERSEY.

CAST MANGANESE-STEEL RAIL.

No. 812,810. Specification of Letters Patent. Patented Feb. 20, 1906.

Application filed May 4, 1904. Serial No. 206,300.

To all whom it may concern:

Be it known that I, WALTER BRINTON, a citizen of the United States, residing in High Bridge, in the county of Hunterdon and State of New Jersey, have invented certain new and useful Improvements in Cast Manganese-Steel Rails, of which the following is a specification.

The present improvement relates to railroad or street-car rails, the object of the invention being to produce a cast manganese-steel rail.

A further object of the invention is the provision of a steel rail adapted for railroad or street-car use of superior quality and greater longevity than ordinary steel rails, it being particularly well adapted for use at those points in the railroad or street-car system where there is greater attrition or wear—as, for instance, at curves—than at other points in such system.

In the accompanying drawings, Figure 1 is a perspective view of this rail, and Fig. 2 illustrates one method of casting the same.

Steel rails, as ordinarily made, especially when located at curves, quickly become worn out, so that the life of the rail is comparatively very short. It has, however, been found by practical test that rails produced from manganese steel—that is, that steel composed of iron and a certain percentage of manganese—when properly made have much longer life than ordinary steel rails.

The object of the present invention, therefore, is to provide a superior manganese-steel rail. In accomplishing this object the rail 2 is cast into the form in which it is to be used. The present practice of making steel rails is to after the billet or ingot has been cast subject it to a rolling process for the purpose of shaping it into the form in which it is to be used. By casting the rail into the shape into which it is to be used it is unnecessary to roll or to further treat it other than for the purpose of toughening it or to grind the tread-surface thereof, so that the particles or molecules of metal are not interfered with and the resisting qualities thereof not decreased, as is believed to be the case where the rail is rolled into shape, as heretofore, since by rolling the steel is thereby refined, as such rolling tends to change the crystalline condition of the rail into a different or fibrous condition, in which condition it is believed it does not resist wear so well as when left in the condition in which it is when cast. In the present instance the final form of the rail, or that form which, as stated, is the form in which it is to be used is obtained by the casting of such rail into its final shape without any rolling or other shaping of such rail, it being subjected to no further treatment thereof other than a toughening treatment and the finishing of the tread-surface of such rail. After the rail is cast in the form in which it is to be used, and in which form it would be extremely brittle unless toughened, it is subjected to heat treatment for the purpose of toughening such rail. For this purpose I have found that it is desirable in order to prevent the setting up of dangerous internal and contracting strains, which cause cracks in the casting, and when the rail after it has been cast has solidified to that extent which will permit the same to be properly handled, or, in other words, when it has reached that point where its strength is sufficient to retain its own weight without warping and it is freed from any parts of the mold which would have a tendency to retard the contraction or shrinkage which commences very soon after casting, to subject it to treatment to prevent a too-rapid cooling, and consequently a too-rapid shrinkage or contraction thereof, and to maintain therein a portion of its original heat determined by the size and character of the rail. In other words, the cooling of the casting is checked, so that such casting will retain therein a portion of its heat varying according to the size and character of the casting which I have found in practice to range between a point about 100°—that is to say, above normal atmospheric temperature—and 1,000° Fahrenheit, according to the size and shape of the casting. This checking or the maintaining therein of a portion of its original heat is accomplished in one way by covering the casting with sand or preferably placing the same in a pit prepared for that purpose, from which drafts of air are entirely excluded, so that all parts of the casting are kept at a uniform temperature throughout until they have cooled down to the right degree of heat for the final toughening. By means of this preparatory step by which the rail is prevented from becoming cold, or substantially so, the metal is never permitted to reach a period of rest from absence of heat, which is be-

lieved to be the cause of intense and dangerous contracting strains before final toughening, and the too-rapid cooling of such rail is prevented, so that a gradual and uniform cooling thereof down to the right degree of heat for the final toughening is maintained. The casting is then subjected to heat treatment by in the present instance placing the same in a furnace the temperature of which corresponds or substantially corresponds to the temperature of the cast rail at the time it is placed in such furnace, it then being preferably rapidly heated up to a predetermined point—say, for instance, substantially an orange-heat—whereupon it is removed and cooled, usually by being immersed quickly in water, such as brine-water, although this step may be effected by other suitable processes. By this means I am able to provide a perfectly solid homogeneous cast manganese-steel rail cast into the shape in which it is to be used without the necessity of rolling or other shaping treatment. The tread is then smoothed or finished by grinding, which is the only practicable way of accomplishing this step, since manganese steel cannot be cut or drilled in any practicable manner.

By actual demonstration rails made in accordance with this process and placed on the elevated roads of Boston, Massachusetts, at curves where the wear is very great outlast sixty of the ordinary steel rails heretofore used, and it has not yet been necessary to replace the rails, so that the test has not been completed.

I claim as my invention—

1. As a new article of manufacture, a manganese-steel rail of regulation size and form produced by casting it in the form in which it is to be used as a completed rail, and then toughening such rail.

2. As a new article of manufacture, a manganese-steel rail produced by casting it in the form in which it is to be used as a completed rail and thereupon toughening the rail by heating it and then cooling it.

3. As a new article of manufacture, a manganese-steel rail produced by casting it in substantially the form in which it is to be used; thereupon arresting the cooling of the rail after solidification; then toughening the rail by heating it rapidly up to a predetermined temperature, and then cooling it rapidly.

4. As a new article of manufacture, a manganese-steel rail produced by casting it in substantially the form in which it is to be used; thereupon arresting the cooling of the rail after solidification; thereupon placing the rail in a furnace having a temperature substantially corresponding to the then temperature of the rail and rapidly heating the rail in such furnace up to a predetermined temperature and thereupon immersing the rail in a cooling-bath.

5. As a new article of manufacture, a manganese-steel rail produced by casting it in substantially the form in which it is to be used; thereupon arresting the cooling of the rail after solidification; and then toughening the rail by heating it and then cooling it.

6. As a new article of manufacture, a manganese-steel rail produced by casting it in substantially the form in which it is to be used as a completed rail, then checking the cooling of the rail after solidification and before such rail reaches a period of rest from absence of heat, and then heating such rail beginning with the furnace in a heated state and applying the heat until the rail has reached a predetermined temperature, and then plunging the rail in cold water.

7. As a new article of manufacture, a manganese-steel rail produced by casting it in substantially the form in which it is to be used as a completed rail, then checking the cooling of the rail after solidification at a predetermined point above normal atmospheric temperature, then heating such rail beginning with the furnace in a heated state substantially corresponding to the temperature of the rail when the cooling thereof is checked, and then finally cooling the rail.

WALTER BRINTON.

Witnesses:

JACOB STRUBLE,

PERCIVAL CHRYSTIE.