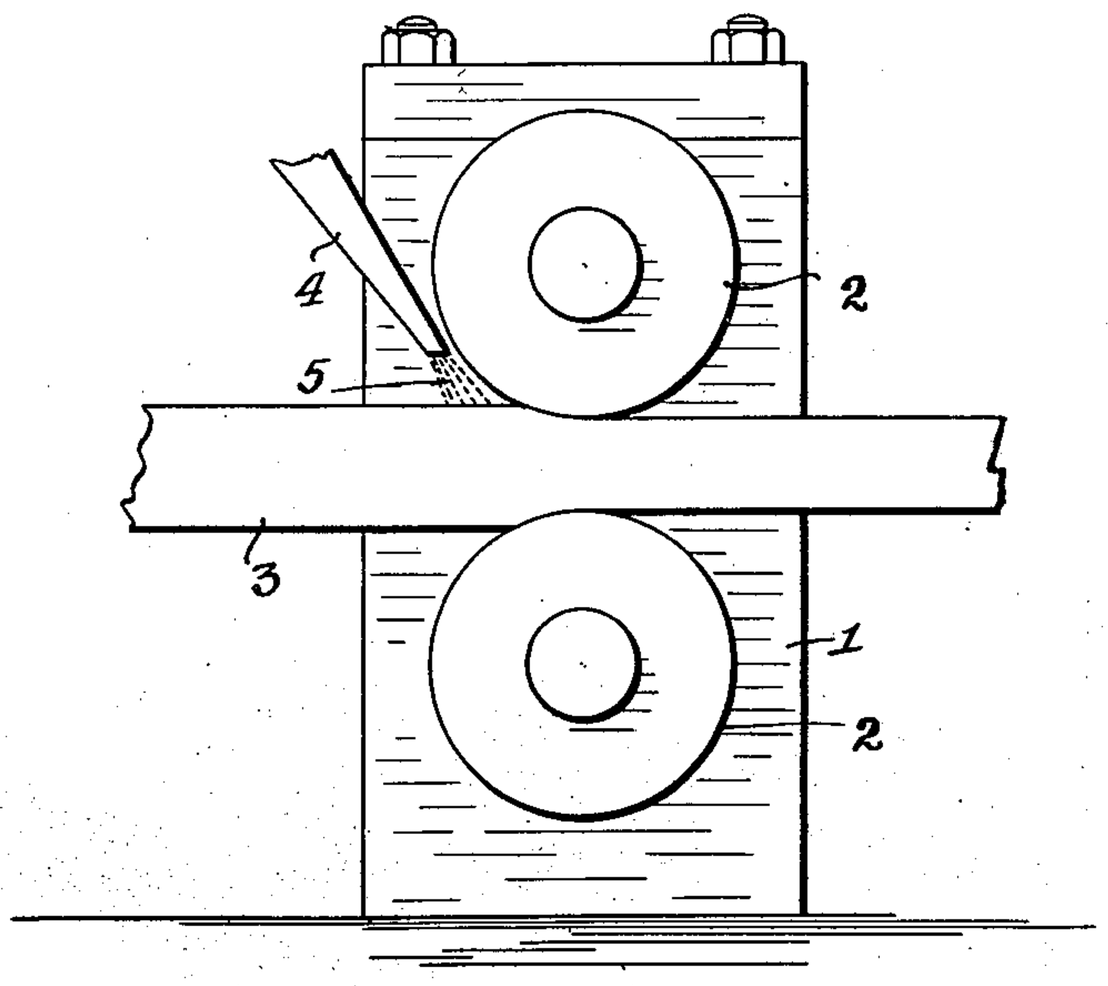
No. 886,349. PATENTED MAY 5, 1908.

W. H. CONNELL.

MANUFACTURE OF RAILWAY RAILS.

APPLICATION FILED JULY 18, 1905.



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MANUFACTURE OF RAILWAY-RAILS.

No. 886,349. Specification of Letters Patent. Patented May 5, 1908.

Application filed July 18, 1905. Serial No. 270,294.

To all whom it may concern:

Be it known that I, WILLIAM H. CONNELL, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain Improvements in the Manufacture of Railway-Rails, of which the following is a specification.

My invention relates to the manufacture of rails by an improved method that will produce a head having the portions exposed to wear of the degree of hardness and toughness required for effectively resisting such wear and gradually decreasing in these qualities to a softer body of the toughness requisite for resisting fracture so that there shall be no line of cleavage between the hard and tough wearing portions and the softer body.

The method of treatment contemplates working a hardening and toughening material or materials, as carbon, manganese, nickel or tungsten, into the portion only of the metal entering into the wearing parts of the head, the hardening and toughening agent or agents being applied to the portion of the surface of the ingot that is worked into the head of the rail and in like manner to the intermediate forms produced in rolling such ingot into a rail.

In practice, the ingot is preferably scored or otherwise rendered rough on the face or portion of the surface that will enter into the head of the rail and the irregular surface thus produced is treated with the hardening and toughening agent or agents, such as pulverized manganese, nickel, carbon, tungsten, or a combination of them, immediately prior to passing it through the rolls, the hardening and toughening material being rolled thereby into the metal entering into the head. In the succeeding rolling passes or part of them, further hardening and toughening material is applied to the new surface of the same portion of the metal either immediately before or immediately after receiving a rolling pass, or it may be applied both before and after, to such extent as may be required to effect the degree of hardness and toughness desired.

The hardening and toughening material may be applied to the metal in any suitable manner, as by blowing powdered graphite, manganese, nickel, tungsten, or a mixture of any two or more of them against the surface of the hot metal, or as a hardening agent and as a means of carrying pulverized hardening matter, a stream of carbon gas or gas containing carbon may be blown against the appropriate surface of the hot metal as it passes through the rolls.

The accompanying drawing illustrates mechanism by which the invention may be practiced.

In the drawing is shown in side elevation, the housing 1 having journaled therein the rolls 2 between which is passed the ingot 3, a nozzle 4 delivering the hardening material 5 upon the surface of the ingot that is to enter into the head of the rail. The resulting product is a rail having a head the wearing portion of which is alloyed or chemically combined with the hardening and toughening material, so that the portions exposed to greatest wear may have such hardness and toughness as is best suited to provide the resistance desired, gradually decreasing inwardly until the original composition of the metal is reached. The rail thus treated may be chilled, when required or desirable by the composition of the metal and the use to which it is to be put, from the proper temperature for hardening.

Having described my invention, I claim:

1. The manufacture of rails which consists in applying pulverized nickel to the surface of the hot metal that is to enter into the head of the rail and mechanically working said nickel into the metal.

2. The manufacture of railway rails which consists in rolling hot metal and simultaneously applying a hardening material comprising a metal element to a surface of said metal and working it into said metal by the rolling operation.

3. The manufacture of rails which consists in subjecting hot metal to rolling operations, and applying a solid and a gaseous form of hardening and toughening material or materials to a portion only of the hot metal during the operation of rolling, substantially as specified.

4. The manufacture of rails which consists in producing a metal body with a scored surface, applying a hardening and toughening agent or agents to said scored surface, and directly rolling said agent or agents into said body by rolling said scored surface, substantially as specified.

5. The manufacture of rails which consists

n applying a non-carbonaceous material to
ı surface of hot metal and rolling said ma-
erial into the portion of the metal entering
nto the head of the rail so as to produce a
stratum of metal providing greater resistance
o wear than the metal of the body.

In testimony whereof I have hereunto set my hand this 14th day of July, 1905, in the presence of the subscribing witnesses.

WILLIAM H. CONNELL.

In presence of—
PIERCE C. WILLIAMS,
FREDERICK E. WILEY.