Oct. 2, 1923. 1,469,721

V. E. EDWARDS

METHOD OF HANDLING HOT METAL STRIP AND APPARATUS THEREFOR

Filed Sept. 19, 1919

Fig. 1.

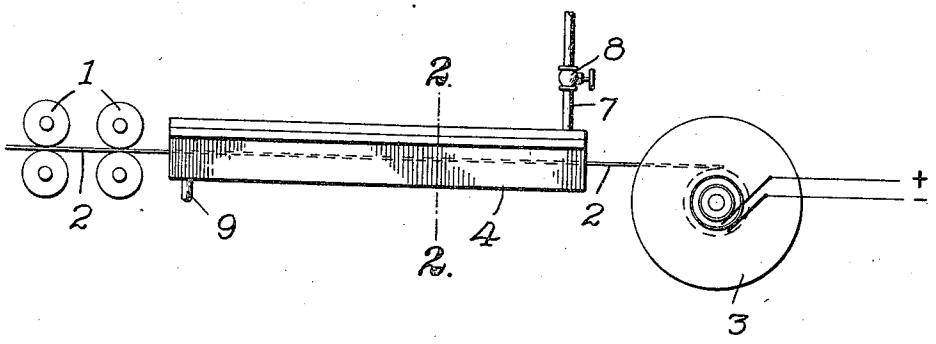
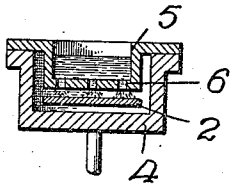


Fig. 2.



Inventor
Victor E. Edwards
By Attorney
Geo. B. Kennedy Jr.

Patented Oct. 2, 1923. 1,469,721

UNITED STATES PATENT OFFICE.

VICTOR E. EDWARDS, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO MORGAN CONSTRUCTION COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

METHOD OF HANDLING HOT METAL STRIP AND APPARATUS THEREFOR.

Application filed September 19, 1919. Serial No. 324,772.

To all whom it may concern:

Be it known that I, VICTOR E. EDWARDS, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in a Method of Handling Hot Metal Strip and Apparatus Therefor, of which the following, together with the accompanying drawings, is a specification.

My invention relates to a method of handling hot metal strip as it is delivered by a strip mill.

The object of my invention is to provide a method and apparatus by means of which relatively long and thin metal strip may, after hot rolling, be automatically and almost instantaneously formed into a ribbon coil.

Difficulties have heretofore been encountered in handling the product of hot strip mills owing to the fact that a satisfactory method of automatically forming hot hoop or strip into ribbon coils has never been developed. While it has been found practicable to employ automatic means for handling hot rods and bars, nevertheless hot hoop and strip still continue to be handled by the traction type of reel. It has also been proposed to employ magnetic means for automatically handling the product of cold rolling mills, but the use of magnetic means in connection with continuous hot mills has not heretofore been found practicable, owing to the high temperatures at which the rolling is done.

It is well known to metallurgists that when steel is heated above a certain point, called the point of decalescence, certain internal changes occur in the metal, among which is the loss of its magnetic properties. It is also well known that if the steel is allowed to cool below a certain point, called a point of recalescence, that the metal regains its former properties and can be attracted by a magnet, as before.

By my invention, I propose to make use of the above described phenomena in the continuous rolling and coiling of hot metal strip by cooling the front end of the strip to a temperature slightly below the point of recalescence after its delivery by the rolls, so that the end may be seized by an automatic magnetic reel.

In the accompanying drawings,

Figure 1 is a diagrammatic view showing the arrangement of the apparatus used in carrying out my method of hot coiling.

Figure 2 is an enlarged sectional view along the line 2—2, Fig. 1.

Like reference characters refer to like parts in the different figures.

In the drawings, a series of finishing rolls 1 are adapted to deliver a thin strip 2 to a magnetic reel 3. A guide 4 incloses the strip 2 between the rolls 1 and the reel 3, the guide 4 preferably being U-shaped in cross section, as shown in Fig. 2. A trough 5 extends longitudinally within the guide 4 and is provided along the bottom with a plurality of perforations 6. The trough 5 is connected to a suitable water supply pipe 7, through a valve 8, and when the valve 8 is open, water is sprayed upon the strip 2 through the perforations 6 in the trough 5. The guide 4 is provided with a discharge pipe 9.

In carrying out my method, the strip 2 is delivered by the rolls 1 at a temperature above the point of recalescence, and in passing through the guide 4 is cooled by the water sprayed upon it through the perforations 6, the amount of water delivered to the trough 5 being determined by the cross sectional area of the strip to be cooled. It is obvious then that by the time the forward end of the strip reaches the magnetic reel 3 it has been cooled somewhat below the point of recalescence and consequently has regained more or less of its original magnetic properties. The forward end of the strip 2 is then seized by the magnetic reel 3 and readily coiled.

The cooling of the strip 2 may be continuous during the coiling or preferably the water may be shut off at any time so that only the forward end of the strip is cooled. The amount of cooling water and the length of the trough necessary will vary in accordance with the cross section of the strip being coiled, with the speed of delivery and with the strength and diameter of the magnetic reel. The amount of water may readily be controlled by the valve 8. In order to minimize oxidation, it may prove desirable to use closed and externally cooled conduits or guides. The type of magnetic reel employed or the exact method of

cooling are immaterial to my invention, for it is obvious that any magnetic reel or any quick cooling medium, such as a blast of cold air, will serve the purpose.

From the foregoing, it is apparent that by the practice of my method, the production of metal strip may proceed continuously and automatically from the time the stock enters the mill, until after it is coiled upon the reel, without much lowering the temperature thereof. A further advantage lies in the fact that as soon as the strip has been coiled upon a reel, the coil may be readily placed in a non-oxidizing atmosphere, or the reel itself may be located within a nonoxidizing chamber, thus entirely eliminating the formation of scale.

While I have shown my method as being carried out by a specific arrangement of apparatus, it is not so limited, but may as well be carried out by other apparatus capable of obtaining the same results, and only such limitations should be imposed thereon as come within the scope of the appended claims.

I claim,

1. The method of handling thin hot metal strip having inherent magnetic properties after its delivery by the finishing rolls of a mill which consists in coiling the strip by magnetic means after cooling the forward end below the point of recalescence during its continuous passage between the finishing rolls and the said magnetic means, the remainder of the strip being coiled at substantially the temperature of rolling.

2. The method of handling thin metal strip having inherent magnetic properties which consists in first passing the strip through finishing rolls at a temperature above the point of recalescence, then passing the strip through a guide wherein a portion of the strip is cooled below the point of recalescence, and finally in coiling the strip upon an automatic magnetic reel at substantially the temperature of rolling.

3. The method of handling thin hot steel strip which consists in rolling said strip at a temperature above the point of recalescence, then cooling the forward end of said strip to a temperature below the point of recalescence while it is being guided to an automatic magnetic reel, and then in coiling said strip on said reel at substantially the temperature of rolling.

4. The method of handling thin hot strip having inherent magnetic properties which consists in rolling the strip at a temperature above the point of recalescence, cooling the forward end to a temperature below the point of recalescence, and then magnetically seizing the cooled forward end and coiling the remainder of the strip at substantially the temperature of rolling.

5. In a strip rolling mill, the combination with a set of finishing rolls and an automatic magnetic reel, of a guide interposed between said rolls and said reel, and adjustable means for therein lowering the temperature of the advancing end of the strip.

6. In a strip rolling mill, the combination with rolling means and magnetic coiling means, of controllable cooling means interposed between said rolling and coiling means for cooling a limited length of strip.

Dated this 17th day of September 1919.

VICTOR E. EDWARDS.

Witnesses:
NELLIE WHALEN,
RUFUS B. FOWLER.