W. T. DRAKE
APPARATUS FOR HANDLING RAILS

Filed Nov. 21, 1922

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William T. Drake,

By

Attorneys
WILLIAM T. DRAKE, OF HARRISBURG, PENNSYLVANIA, ASSIGNS TO BETHELHEM STEEL COMPANY, OF BETHELHEM, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

APPARATUS FOR HANDLING RAILS.

Patented June 16, 1925.

To whom it may concern:

Be it known that I, WILLIAM T. DRAKE, a citizen of the United States, and residing at Harrisburg, Dauphin County, State of Pennsylvaania, have invented certain new and useful Improvements in Apparatus for Handling Rails, of which the following is a specification.

The present invention relates to apparatus for handling rails and particularly to apparatus for handling hot rails as they come from a rolling mill and properly positioning such rails for air treatment in accordance with the process described in Patent No. 1,178,952, dated April 4, 1916, issued to C. P. Sandberg.

Various devices have been heretofore designed or suggested for picking up rails from the hot bed on which they are deposited immediately after rolling and presenting them to an air blast apparatus so that the head of the rail may be rapidly cooled or chilled in accordance with the Sandberg process. Such devices have, however, numerous disadvantages which, while not neutralizing their utility, have left the way open for considerable improvement.

The object of the present invention is to provide a mechanism of this character which is of great simplicity and effectiveness in operation and which, due to its compactness, does not require the large amount of shop space generally required by former devices of this character. A minimum of power is used by the apparatus, and a further advantage lies in the fact that the apparatus will handle rails which are not carefully positioned on the hot beds as has been found necessary heretofore. The invention may have a number of different embodiments, as will be apparent to one skilled in the art, and in the accompanying drawings one form is illustrated by way of example. In the drawings:

Figure 1 is a sectional view taken through a portion of the hot bed associated with a rolling mill and showing the improved rail handling apparatus in position to lift rails from the hot bed, position them for air treatment, and lower them again to the hot bed.

Figure 2 is a section on line 2—2 of Figure 1.

Figure 3 is a section on line 3—3 of Figure 1 to a larger scale, and

Figure 4 is a diagrammatic view of the rail lifting mechanism.

The stationary hot bed rails are indicated at 10 in the drawings and it will be understood that the rails to be treated are passed on to this hot bed from the roller train (not shown) by any well known means, in a direction longitudinally of the stationary supporting rails 10.

Extending across the hot beds, transversely to rails 10, are spaced parallel girders 11, the ends of which are supported on columns 12 (one only of which is illustrated in the drawings), these columns being at the sides of the hot bed. Cross beams 13 connect the girders 11 and these cross beams support the supply mains 14 for the cooling air, and also the frames or suspension members 15 from which the rail handling mechanism is hung.

It will be seen that each of conduits 14 has a number of pipes 16 extending downwardly therefrom, which pipes bring into communication the supply pipes 14 and jet pipes 17 which serve to spray the air on the rails. In Figure 3 an enlarged section of one of the pipes 17 is shown together with one of the ducts 18 which extend downwardly from this pipe. Ducts 18 open into a slot 19 extending continuously along the length of pipe 17 and which slot is flanked by guide members 20 having guiding surfaces 21 adapted to engage the head of a rail moved upwardly toward slot 19 and to so position the rail head that its central portion is opposite slot 19, as shown in Figure 3.

The rails coming on to the hot bed are naturally in a heated condition and in accordance with the Sandberg process the air jet is applied to their upper surfaces while in such heated condition to effect a rapid cooling thereof so that a harder wearing surface for the rail may be realized. The rails are held in the position in which they are illustrated in Figure 3 only for a short interval of time and are again lowered to the hot bed and from there removed. The means for effecting the raising of a rail from the hot bed to the air blast device and lowering them again comprises essentially a series of arms 30 mounted on a shaft 31 rotatably...
supported in the suspending frames 15, and means for rotating this shaft under the control of the operator. As clearly shown in Figure 3 each of the arms 30 has a hook shaped end portion 32 provided with a slight projection 33 extending inwardly toward shaft 31. Adjacent the angle of the L-shaped arm is a curved projection 34 adapted to engage a rail base and so shaped that the rail may rock thereon when the arm is moving into its horizontal position, and the rail head is being guided by the members 20 into the position shown in full lines in Figure 3.

There are a plurality of shafts 31 and each shaft is provided with a plurality of arms 30 so that the heated rail may be engaged by the lifting devices at a number of points along its length, the necessary number of shafts 31 being provided to handle the output of the particular rolling mill with which the apparatus is to be used.

Rigidly secured on each of the shafts 31 are two or more drums 35, these drums being axially aligned and eccentrically positioned relatively to shaft 31. To each of these drums are connected the ends of two wire ropes or cables indicated respectively at 36 and 37. Each cable 36 has its end secured to a drum 35 at 38 and cables 37 have their ends secured to the drums at 39. If desired several turns of each rope may be made round the pulley. Each cable 36 extends upwardly, over pulleys 40 and 41 and thence downwardly to a weight 42, and it will be seen that this weight acting on drum 35 through cable 36 constantly tends to rotate shaft 31 in a clockwise direction to the position in which it is shown in Figure 3.

Weight 42 is also connected by cable 43 to a crane hoist 44 or other similar lifting appliance by means of which the weight may be lifted under the control of an operator. Cable 37 has connected to its free end a second weight 45 considerably smaller than weight 42 but yet sufficiently large to effect the rotation of shaft 31 and movement of the arm 30 in a counter-clockwise direction as weight 42 is lifted by the hoist.

The maximum force to be exerted by the lifting arms on the rail is necessarily required when the rail is in position as shown in Figure 3, since the pressure of the air is downwardly exerted on the head of the rail and also the rail has a maximum moment about shaft 31 when in this position, and in a counter-clockwise direction. For this reason the drums 35 are eccentrically secured to shaft 31 as shown, so that when the maximum force is required, the force exerted by weight 42 through cable 36 and drum 35, on shaft 31, will be a maximum, the lever arm of this force then being at its greatest. As arm 30 rotates from its horizontal position toward the other limit of its travel the lever arm of the force exerted on the drum by the cable 36 decreases while the lever arm of the force exerted on the drum by weight 45 increases, which is desired.

The swinging arms 30 sweep a relatively wide strip of the surface of the hot bed and it is not necessary to place the rails accurately in a definite position or to provide means for overturning them so that their heads are uppermost. In a single swinging motion the arms engage the rails and guide them accurately to the air blast and in the return movement deposit them on the hot bed.

The weight 42 may be adjusted in accordance with the weight of the rails being treated. The amount of power consumed is a minimum and it is obvious that the apparatus is of the greatest simplicity. The amount of space required is much less than any prior machines and the operation of overhead cranes is interfered with in no manner. While I have shown four devices used on a single hot bed, it will be apparent that the number may be increased or decreased as desired in accordance with the mill production. It will also be seen that the design and arrangement of the component elements of the invention may be varied without departing from its spirit and scope.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating a heated rail with fluid under pressure, of mechanism for lifting a heated rail from the bed to said device along an arcuate path, holding it in position to be treated, and lowering it again to the bed.

2. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating a heated rail with fluid under pressure, of mechanism for engaging the base and side of a rail lying on its side on the hot bed, lifting the rail to said device along an arcuate path in such manner that the head of the rail is in position to be treated, holding the rail during treatment, and lowering the rail again to the hot bed.

3. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating a heated rail with fluid under pressure, of mechanism for engaging a rail lying on its side on the bed, lifting the rail from the bed toward the fluid spraying device, and simultaneously rotating it about its longitudinal axis so that the rail presents its head to the fluid spraying device, holding the rail in position to be treated, and lowering it to the hot bed after treatment.

4. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating a heated rail with fluid under pressure, of mechanism for engaging a rail lying on its side on the bed, lifting the rail from the bed toward the fluid spraying device, and simultaneously rotating it about its longitudinal axis so that the rail presents its head to the fluid spraying device, holding the rail in position to be treated, and lowering it to the hot bed after treatment.

5. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating a heated rail with fluid under pressure, of mechanism for engaging a rail lying on its side on the bed, lifting the rail from the bed toward the fluid spraying device, and simultaneously rotating it about its longitudinal axis so that the rail presents its head to the fluid spraying device, holding the rail in position to be treated, and lowering it to the hot bed after treatment.
4. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating a heated rail with a fluid under pressure, of mechanism for engaging the base and side of a rail lying on its side on the bed, lifting the rail from the bed toward the fluid spraying device and simultaneously rotating it about its longitudinal axis so that the rail presents its head to the fluid spraying device, holding the rail in position to be treated and lowering the same to the hot bed after treatment.

5. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating a heated rail with fluid under pressure, of mechanism for engaging a rail lying on its side on the bed, lifting the rail from the bed toward the fluid spraying device, and simultaneously rotating it about its longitudinal axis so that the rail presents its head to the fluid spraying device, holding the rail in position to be treated and lowering it to the hot bed after treatment, said mechanism including a plurality of parallel arms rotatable about a fixed axis and adapted to engage the rail to give it an arcuate movement.

6. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating the heated rail with fluid under pressure, of guide means associated with said device for guiding the head of a rail into position to be treated, of mechanism for lifting a heated rail from the bed toward said device along an arcuate path, so that the head of the rail strikes said guide means and is guided thereby, holding the rail in position to be treated and lowering it again to the bed.

7. In a device of the class described, the combination with a bed for heated steel rails, and a device supported above the bed for treating a heated rail with fluid under pressure, guides associated with said device for guiding the head of a rail into position to be treated, and mechanism for engaging a heated rail lying on the hot bed and lifting said rail along an arcuate path towards said device, said mechanism supporting the rail in the lifting operation so that it may slide horizontally relatively thereto while the head of the rail is in contact with the guides, holding the rail during treatment, and lowering the rail again to the hot bed.

8. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating a heated rail with fluid under pressure of a plurality of parallel arms rotatable about a fixed axis for lifting a rail from the bed and presenting it to the treating device by a continuous angular movement about said axis.

9. In a device of the class described, the combination with a bed for heated steel rails and a device supported above the bed for treating a heated rail with fluid under pressure, of mechanism for lifting a heated rail from the bed to said device, holding it in position to be treated, and lowering it again to the bed, said mechanism including a plurality of rail engaging arms rotatable about a fixed axis, gravity means normally tending to move said arms in one direction of rotation and power means for moving said arms in the opposite direction.

10. In a device for lifting rails from a hot bed, holding them for treatment and depositing them again on the hot bed after treatment, the combination of rail engaging arms rotatable about a fixed axis and variable lever means to effect the rotation of said arms, whereby the position of maximum leverage in said means coincides with the position of greatest moment in the arms about the fixed axis.

11. In a device for lifting rails from a hot bed and rotating said rail about its longitudinal axis during the lifting movement, the combination of rail engaging arms rotatable about a fixed axis, said arms having ends of hook-shaped section, inwardly projecting webs disposed near the extremity of said hook sections, and curved projections in the angle of the hook sections, said webs and said projections engaging respectively a side of the rail head and the rail base during the lifting movement, so as to bring the rail to a definite predetermined position for treatment.

In testimony whereof I hereunto affix my signature.

WILLIAM T. DRAKE.