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APPARATUS FOR HANDLING METAL BARS IN ROLLER MILLS.

APPLICATION FILED MAR. 6, 1915.

1,164,423.

Patented Dec. 14, 1915.

2 SHEETS—SHEET 1.

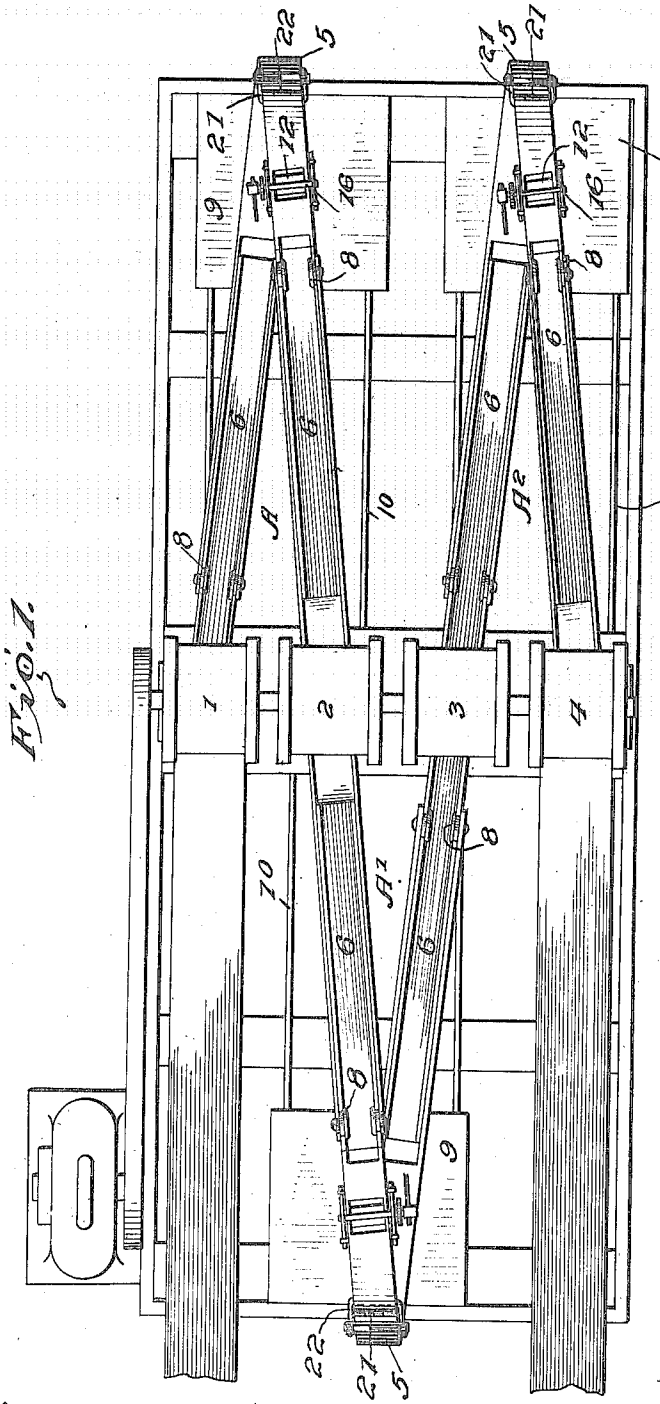


Fig. 1.

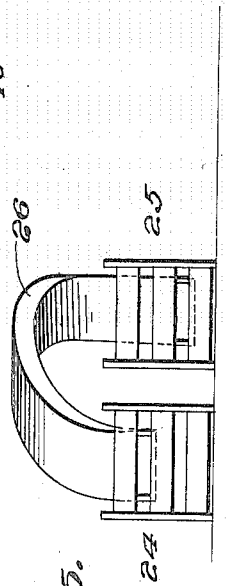


Fig. 3.

Witnesses

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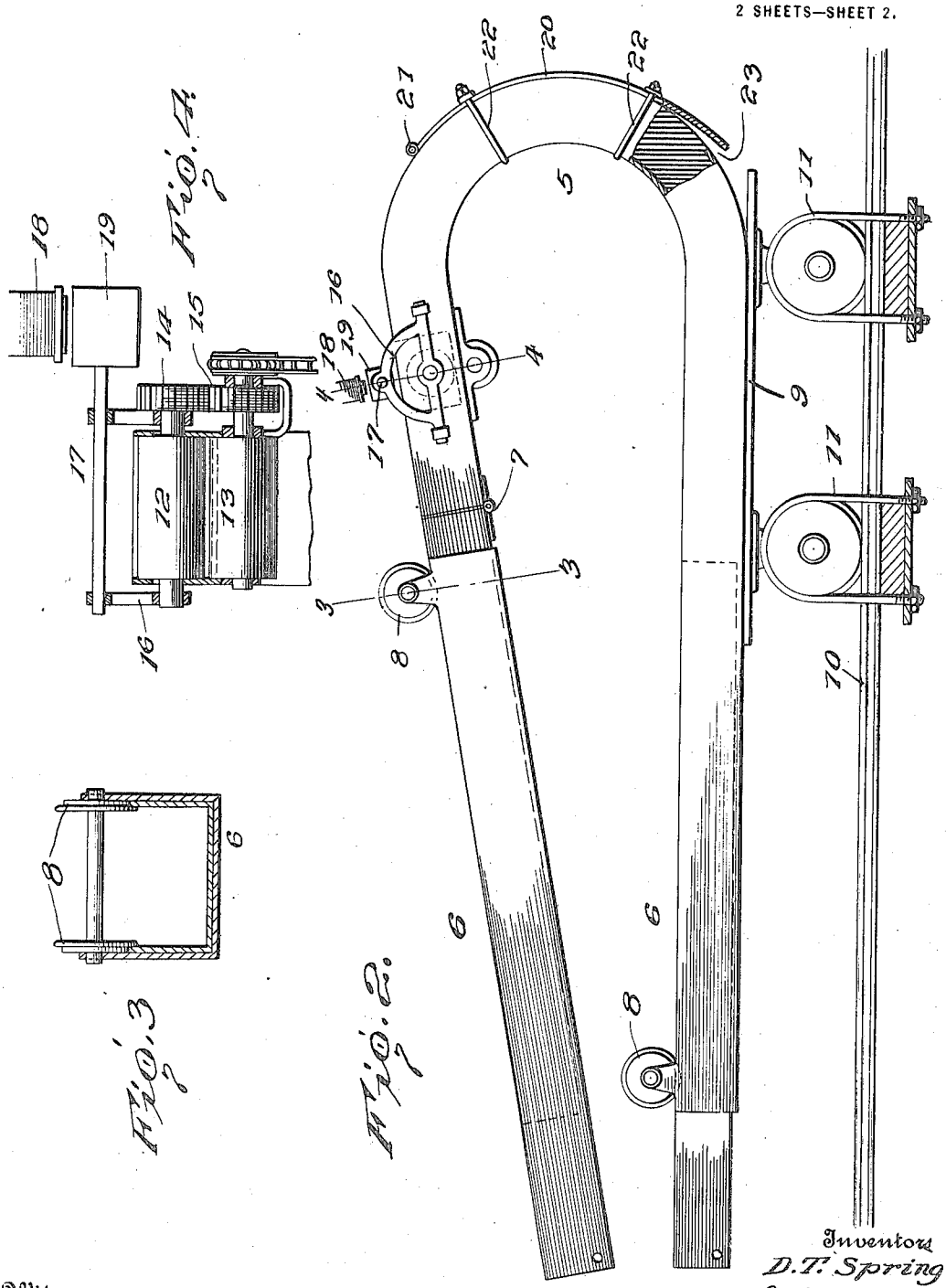
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UNITED STATES PATENT OFFICE.

DANIEL T. SPRING, SAMUEL E. SPRING, AND WILLIAM N. BANDI, OF WHEELING, WEST VIRGINIA.

APPARATUS FOR HANDLING METAL BARS IN ROLLER-MILLS.

1,164,423. Specification of Letters Patent. Patented Dec. 14, 1915.

Application filed March 6, 1915. Serial No. 12,581.

To all whom it may concern:

Be it known that we, DANIEL T. SPRING, SAMUEL E. SPRING, and WILLIAM N. BANDI, citizens of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented certain new and useful Improvements in Apparatus for Handling Metal Bars in Roller-Mills, of which the following is a specification.

This invention is primarily designed to facilitate the handling of metal bars, skelps or the like during the rolling or drawing process, thereby facilitating the work and materially reducing the cost of manufacture.

In foundries or metal rolling mills the billet to be formed into a skelp or bar is drawn by successive stages by being passed through graduated drawing rolls, each serving to extend and elongate the bar or skelp. The skelp or bar in accordance with the practice in vogue is entirely passed through one set of rolls and is then passed through the next set of drawing rolls and so on throughout the series until elongated and given the required shape. The bar or skelp is usually transferred by hand from one set of drawing rolls to the other, thereby consuming time and frequently requiring a reheating.

In accordance with the present invention means are provided for engaging the bar as it leaves one set of drawing rolls and bending and returning the same to the next set of drawing rolls with the result that the drawing process from start to finish is practically continuous since the end portion of the bar passing from one set of drawing rolls may be passed between the next set of drawing rolls. As a result the process of drawing is greatly facilitated and the bar is not given a chance to cool, hence a reheating thereof is not necessary.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts which will be hereinafter fully described and particularly claimed.

In the accompanying drawings has been illustrated a simple and preferred form of the invention, it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that changes, alterations and modifications within the scope of the invention as claimed may be resorted to when desired.

Referring to the drawings, Figure 1 is a top plan view of a series of metal drawing rolls and means coöperating therewith for directing and returning the bar from one set of drawing rolls to the other; Fig. 2 is a side view of the metal bar returning means showing the same on a larger scale; Fig. 3 is a transverse section on the line 3—3 of Fig. 2; Fig. 4 is a cross section on the line 4—4 of Fig. 2; Fig. 5 is a modification.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The numerals 1, 2, 3 and 4 designate a series of metal drawing rolls, such as are generally employed in metal rolling mills, such drawing rolls being set for successive operation upon a billet of metal bar during the drawing or elongated process. The billet when properly heated is passed between the drawing rolls 1 and the bar thus formed is passed through the drawing rolls 2 and again in successive order through the remaining drawing rolls until given the required shape and size. By the usual method the bar as it passes through one set of drawing rolls is received upon one or more trucks or a suitable support and after passing through the drawing rolls is shifted to the next set of drawing rolls in order, the end last to pass between the previous drawing rolls being the first to pass between the successive set of drawing rolls and as a result the drawing process is intermittent and opportunity is afforded for the end of the bar first passing between a set of drawing rolls to cool before passing between the next set of drawing rolls.

In accordance with the present invention the drawing or elongating of the bar is continuous since the end first issuing from a set of drawing rolls is returned and passed first through the next set of drawing rolls. This is accomplished by means of a return guide which is substantially of loop-shape, the extremities of such loop-shaped guide being operatively arranged with reference to adjacent sets of drawing rolls so that the bar as it passes between one set of drawing rolls is returned upon itself and directed be-

tween the drawing rolls of the next set in order. The return guides between adjacent drawing rolls are substantially the same and a detailed description of one will suffice for a clear understanding of all. However, to distinguish one return guide from the other they are designated by the reference characters A, A′ and A^2. The return guide A is disposed between the drawing rolls 1 and 2, the return guide A′ between the drawing rolls 2 and 3 and the return guide A^2 between the drawing rolls 3 and 4. As a result of this arrangement the billet is first passed between the drawing rolls 1 and the resultant bar is directed and returned by the guide A to the drawing rolls 2. The bar passing between the drawing rolls 2 is received by the guide A′ and returned thereby to the drawing rolls 3 and after passing between the drawing rolls 3 the bar is received by the guide A^2 and directed between the drawing rolls 4. It will thus be understood that the drawing process is continuous and without interruption and no intermediate handling is required and as a result no opportunity is afforded for the bar to become cool and thereby require a reheating. The return guides are extensible to admit of their being lengthened or shortened according to the length of the bar so as to insure proper action of the guides according to their relative position.

Each return guide comprises a middle section 5, and end sections 6. The middle section 5 is substantially of U-shape and its longitudinal members are deflected laterally so as to stand at an angle to each other depending upon the distance between adjacent drawing rolls, as indicated most clearly in Fig. 1. The curvature of the section 5 is such as to facilitate the bending of the bar during the returning thereof from one set of drawing rolls to the next set in order. It is to be understood that the return guide is of substantial structure so as to withstand the character of work for which it is designed. The section 5 is preferably hollow so as to inclose the bar at the bend thereof, the end sections 6 are preferably of trough-shape and are straight because the bar in its travel therethrough is straight. The end sections 6 are extensible and comprise telescoping parts, each being of like formation. One of the end sections is hinged, as shown at 7, the purpose being to admit of adjusting the guide with its extremities at different levels depending upon the relative position of the spaces between adjacent drawing rolls. Each part of the end sections 6 is of trough shape and is disposed with the open side facing upward. One of the parts is provided with a pair of wheels 8 which is disposed to travel upon the upper edges of the side members of the other part, thereby enabling the lengthening or shortening of the return guide being effected with the expenditure of a minimum amount of energy or power. The U-shaped section 5 is mounted upon a truck 9 which is arranged to travel upon a track 10. The extremities of the end sections 6 are adapted to be secured to adjacent drawing rolls so as to hold the return guide in proper position. After the return guide has been properly adjusted by moving the section 5 in or out the section 5 is made secure in any manner, preferably by means of clamps 11 which embrace the wheels of the truck 9 and which are secured to the rails of the track 10.

The bar is advanced through the return guide by means of feed rolls 12 and 13 which are disposed one above the other. These feed rolls may be located at any convenient point in the length of the guide and any number of feed rolls may be provided to insure a positive movement of the bar through the guide. The feed rolls are adapted to be positively driven in a direction to move the bar through the guide. The lower feed roll, as 13, is mounted in fixed bearings and is adapted to be positively driven from any suitable source of power. The feed roll 12 is mounted in movable bearings and is connected with the feed roll 13 by means of intermeshing gears 14 and 15. A movable frame 16 has the feed roll 12 mounted therein and is yieldably held in a given position by means of a weighted arm 17. The construction is such as to admit of the feed roll 12 being thrown up out of the way so that a bar may be removed from the guide or placed in position therein according to circumstances. The feed rolls are preferably mounted upon the middle section 5 because they are less liable to be interfered with by means of the telescoping parts, such as would be the case if applied to either one of the end sections 6.

The length of the guides between adjacent sets of drawing rolls is such as to accommodate the bar without causing the same to buckle, hence the advantage of having the guides adjustable to adapt them to varying lengths of bars. The feed rolls insure a positive movement of the bars when traveling from one set of drawing rolls to the next set.

The drawing rolls 1, 2, 3 and 4 are adjusted so as to act in succession and progression in the process of elongating or drawing the metal bar to be lengthened and shaped. The guides are also adjusted with reference to length. The billet properly heated is passed between the drawing rolls 1 and the bar resulting from such step is received by the guide A and automatically returned to the drawing rolls 2 which further lengthen the bar, the latter being received by the guide A′ and returned thereby to the drawing rolls 3 which further lengthen and shape

the bar if needs be, such bar after passing between the rolls 3 being received and directed by the guide A^2 to the drawing rolls 4 which complete the operation. It is to be understood that any number of drawing rolls may be provided and that a return guide is positioned for each two adjacent drawing rolls so as to receive the bar from one and direct the same to the other.

As indicated most clearly in Fig. 4 an electro-magnet 18 is employed for varying the effect of the weight 19 at the outer end of the arm 17. By energizing the electro-magnet 18 by means of a current of greater or less strength the attractive force may be adjusted with the result that the weight 19 may be drawn upward with a greater or less force so as to press the roll 12 toward the roll 13 with a greater or less degree of pressure.

The rear wall 20 of the U-shaped section 5 of the return guide is movable to admit of access being readily had thereto for any purpose whatsoever, thereby enabling a bar being readily removed in the event of the same becoming chilled and lodging in the return guide. The wall 20 is preferably hinged at 21 and is made secure by means of clips 22. A space 23 is formed in the lower portion of the section 5 for the escape of scale or other foreign matter which may find its way into the return guide. The space 23 is formed at the lower end of the wall 20 preferably by deflecting the lower end of such wall outward.

In the modification illustrated in Fig. 5, 24 and 25 designate roller mills, each comprising three compressing rolls. The numeral 26 designates a return guide, the same being disposed with one end arranged to receive the bar from between the upper rolls of the mill 24 and with its opposite end disposed to deliver the bar between the lower rolls of the mill 25. This view is in the nature of a diagram to indicate the application of the return guide to roller mills having more than two pressure rolls.

Having thus described the invention what is claimed as new is:—

1. In combination with two sets of rolls, a return guide comprising a U-shaped section and end sections, a track, supporting wheels for the guide, and means for clamping the wheels to the track for securing the guide in the required position.

2. A return guide of the character specified comprising telescoping parts of trough-shape and wheels carried by one of such parts and adapted to travel upon the upper edges of the side members of the other part.

3. In combination with a guide for receiving and directing work, feed rolls disposed in the length of the guide for advancing the work therethrough, one of such feed rolls being mounted in fixed bearings and the other feed roll being mounted in movable bearings and geared to the first-mentioned feed roll, and a weight normally pressing the two feed rolls together.

4. A return guide of the character specified comprising a U-shaped section and telescoping end sections, feed rolls for advancing the work through the guide and mounted upon the U-shaped section, one of such feed rolls being movable, and means for yieldably pressing the movable feed roll toward the companion feed roll.

5. In combination with a guide for receiving and directing work, feed rolls disposed in the length of the guide for advancing the work therethrough, a weight cooperating with one of the feed rolls, and an electro-magnet disposed to vary the effective force of such weight to move the feed rolls together with a greater or less pressure.

In testimony whereof we affix our signatures in presence of two witnesses.

DANIEL T. SPRING. [L. S.]
SAMUEL E. SPRING. [L. S.]
WILLIAM N. BANDI.

Witnesses:
FRANK W. CARNEY,
GEORGE W. STONER.