

(No Model.)

2 Sheets—Sheet 1.

J. ROBERTSON.

AUTOMATIC FEEDING DEVICE FOR ROLLING MILLS.

No. 507,166.

Patented Oct. 24, 1893.

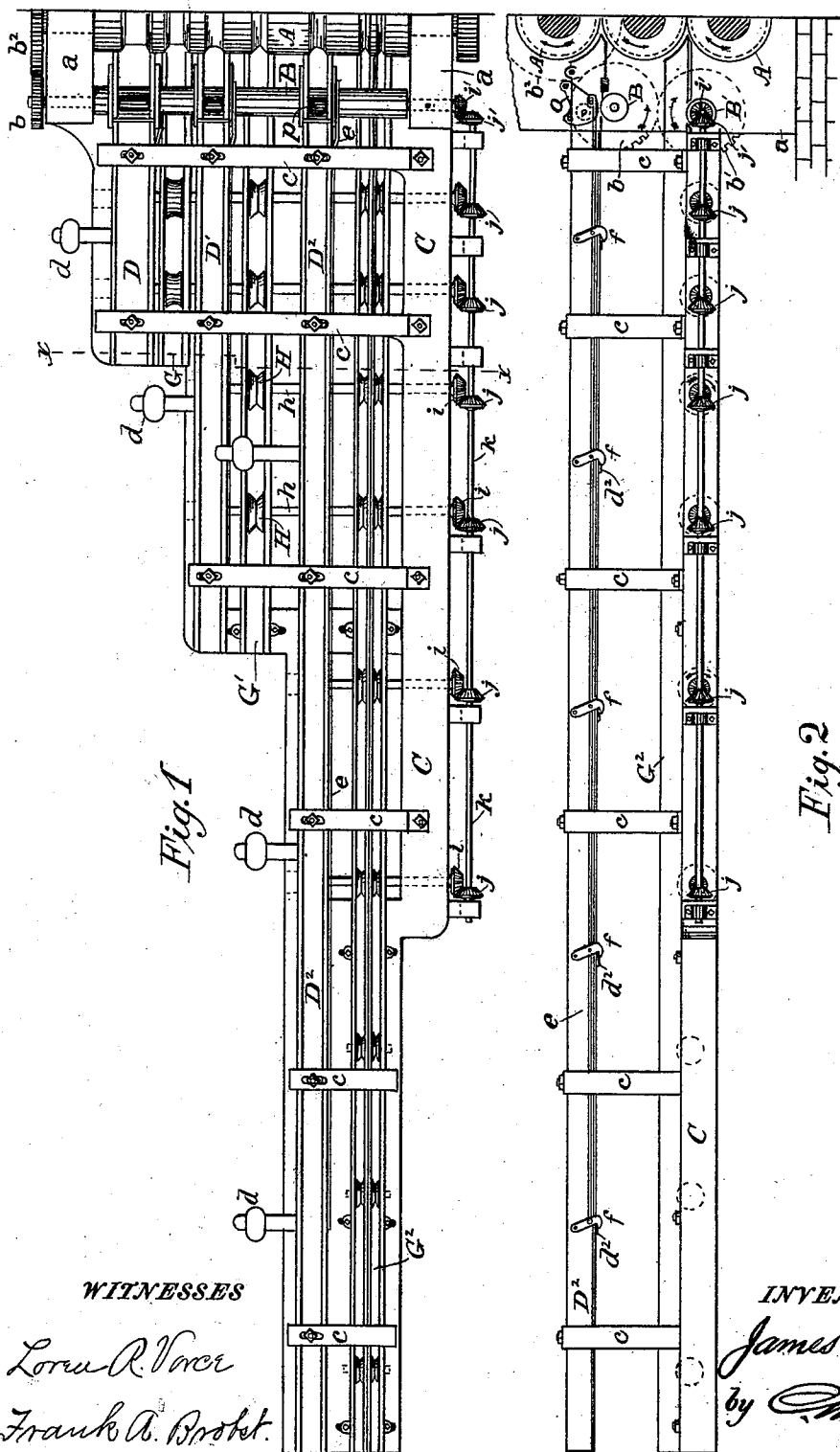


Fig. 1

Fig. 2

WITNESSES

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J. ROBERTSON.

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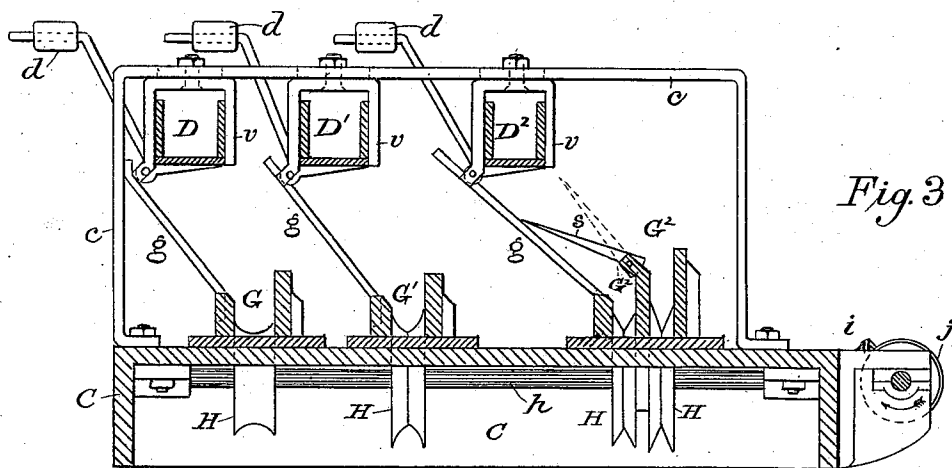


Fig. 3

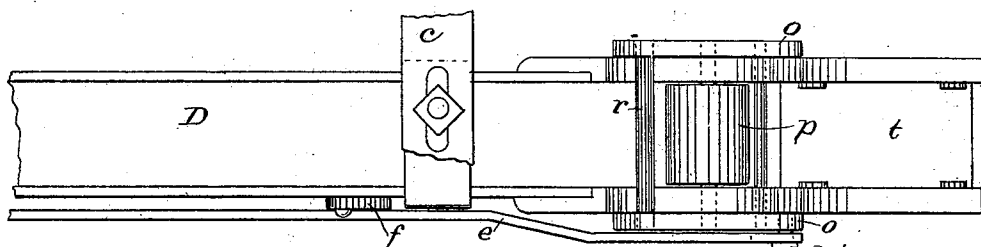


Fig. 4

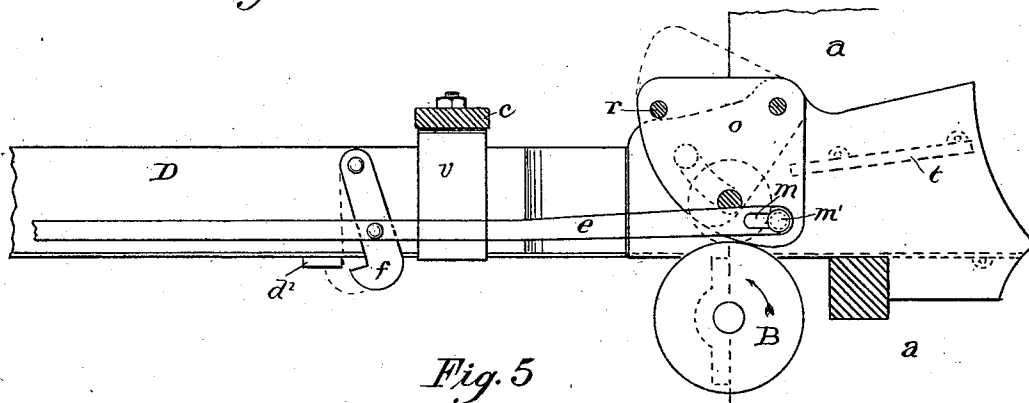


Fig. 5

WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES ROBERTSON, OF CLEVELAND, OHIO.

AUTOMATIC FEEDING DEVICE FOR ROLLING-MILLS.

SPECIFICATION forming part of Letters Patent No. 507,166, dated October 24, 1893.

Application filed January 18, 1893. Serial No. 458,793. (No model.)

To all whom it may concern:

Be it known that I, JAMES ROBERTSON, a subject of Victoria, Queen of Great Britain and Ireland, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Automatic Feeding Devices for Rolling-Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to apparatus for automatically feeding billets or rods to rolls; its object is to economize labor and thereby reduce the cost of rolling as well as to increase the output of a train of rolls; and it consists in the arrangement of means and the construction and combination of parts, hereinafter described and pointed out in the claims.

In the drawings Figure 1 represents, in plan view, a device embodying my improvement, shown as attached to a train of rolls. Fig. 2 is a side elevation of the same. Fig. 3 is a transverse sectional view, on the line $x-x$ of Fig. 1. Fig. 4 is a detail showing in plan view the latch tripping mechanism. Fig. 5 is a side elevation of the same.

A A represent the rolls, and $a a$ the housing, of an ordinary three-high train of rod-mill rolls.

B B' are guide rolls, actuated by gears $b b'$ b^2 , for guiding and feeding the billet or rods to and from the rolls as hereinafter described.

C represents a bed-plate or suitable foundation on which is supported the feeding device and its operative parts.

D D' D² are troughs or chutes, supported by clips u upon frames $c c c$ or other suitable means, at a proper level to receive the billet or rod emerging from between the top and middle rolls, and hence designated as receiving troughs. These troughs D D' D² may be covered at the top or left open as shown. The bottoms are hinged to one of the sides and normally kept closed up against the sides by a gravity acting device, such as the counterweights $d d d$ or similar means. On the side of the trough opposite the hinge side are latches $f f f$ pivoted to the trough and connected by a bar e operated as hereinafter de-

scribed. A deflecting plate t in the upper part of the trough next the rolls serves to direct the rod into the trough. Below the troughs D D' D², at the level of the pass between the middle and lower roll and in line with the pass next in order after that of the preceding receiving trough is located a series of troughs G G' G² each of which serves to receive the billet or rod from one of the receiving troughs and return it to the rolls for the back-pass, and are designated as returning troughs. Guiding ways $g g g$ are arranged below each of the receiving troughs, by which guides the billet or rod discharged from each receiving trough is conducted into the proper returning trough, which is necessarily more or less laterally displaced from the vertical plane of the preceding trough.

The troughs G G' G² have fixed bottoms through which protrude at suitable intervals feeding rollers H H, which are preferably grooved or V shaped on their periphery so as to approximately fit the rod to be fed, for the double purpose of better keeping the rod edge up and also securing a better hold upon the rod to feed it. These rollers are carried on shafts $h h$, supported below the troughs G G' G² and actuated by gears, such for instance as shown in Figs. 1 and 2, wherein $i i$ represent bevel gears on the shafts h meshing with gears $j j$ upon a shaft k supported on the bed-plate C and carrying a gear j' meshing with a gear i' on the shaft of the guide roll B'. The bolts which secure the troughs to the frames pass through clips $v v$ rigidly secured to the troughs and through slots in the frames $c c$. The bolts securing the returning troughs to the bed plate also pass through slots in the bed plate, and the rollers H are movable along the shafts h , so that by loosening the bolts any one or all of the troughs can be moved to one side and readjusted to fresh passes of the rolls whenever required.

I accomplish the automatic latching and unlatching of the bottoms of the returning troughs by the movement of the rod or billet itself, by the following means: In each trough I arrange in the path of the rod a movable tripping-piece suitably connected to the latch bar e and so adjusted that the rod on entering the trough meets and displaces this tripping piece and thereby latches the trough, and

when the rod has passed, the tripping piece, by gravity or the action of springs or weights, returns to its place, thereby unlatching the trough. This tripping piece may easily be arranged to move laterally or vertically as preferred, and it may be a swinging, sliding or rotating part. I prefer a roller journaled in a swinging arm or frame to which the latch-bar is connected. An adaptation of this device is shown in Figs. 4 and 5; the hooked latches $f f$ engage lugs d^2 projecting from the bottom of the trough, the bar e pivoted to each of the latches is provided at the end adjoining the roll train with a slot m in which is engaged a pin m' on the pivoted arm or segment o which carries a roller p playing in the trough, upon or near the bottom of which it rests while the trough is empty. Preferably I arrange an arm or segment o on each side of the trough, each arm carrying one of the journals of the roller p , which pass through curved slots in the sides of the trough, and I connect the two arms above the trough by a crosspiece r , which acts as a stop to limit the fall of the arms o and roller p . Each receiving trough has a similar arrangement of latches and tripping mechanism.

The operation of the apparatus is as follows: The billet having been properly heated is taken by the operator and entered at the first pass of the rolls in the ordinary manner. It emerges into the receiving trough D opposite that pass, the bottom of the trough being by the action of its counterweight d held in the closed position. As the billet emerges from the rolls it passes over the guide roll B and under the roller p , lifting the latter and with it the arm or segment o , whose pin m' moving forward in the slot m pushes forward rod e and thereby hooks all the latches on that trough under their corresponding lugs, and thus latches the bottom of the trough at the moment the billet begins to emerge from the rolls. As soon as the billet fully passes the roll B the roller p drops off the end of the billet and falls behind it, carrying back the arm o and causing the pin m' to strike the end of slot m with some force and instantly to draw back the rod e and latches f , allowing the bottom of the trough to fall by the weight of the billet and spill the billet upon the guides $g g$, down which it slides into the returning trough G and upon the feed rollers H H in its bottom, by which it is instantly returned to the second pass of the rolls. On emerging from this second pass the rod is caught by the rougher in the usual way and returned to the third pass, from which it emerges into trough D' and is therefrom dropped into trough G' and returned to the rolls for the fourth pass, in precisely the same manner as described, and so on. In the drawings I have shown three sets of receiving and returning troughs, but any required number may be used. As the billets are square in section and are at the first pass reduced more in one dimension than the other they emerge as thick bars wider than

their thickness: hence it is important that on the back-pass they should be "edged-up" or entered to the rolls with their widest dimension vertical, and to this end they are in ordinary rolling turned by the hands of the rougher one quarter turn at each pass. This I accomplish automatically by the arrangement shown. The bar as received into trough D lies on its widest side, and as it is dropped it falls with its wide side upon the guides g and is delivered to the trough G in such way as to be turned one quarter over and rest in that trough upon its edge, so as to be correctly presented to the rolls for the second pass. The same quarter turn is given to the rod at each transfer from a receiving to a delivering trough. As the successive passes increase the length of the rod, it of course takes longer to go through, so that two or three billets would go through in the same time required for a single pass of the rod near the finishing end of the rolls. For this reason the rod will always pass into a receiving trough in less time than it will take to pass out of the returning trough to which it will be transferred, and as it is desirable to keep the rods passing without any delay, not only to save reheating but also to increase the tonnage of the output, it becomes important to provide for the passage of more than a single rod near the finishing end of the rolls during the same time that a rod is being put through the preceding pass. This is best done by providing two returning troughs to receive each a rod from the same receiving trough, the two rods returning through two similar adjoining passes while a third is entering the same receiving trough. This I accomplish by arranging below the receiving trough a double returning trough constructed as shown in Fig. 3, a single series of guide pieces $g g$ being made to serve for both sides of the double returning trough by the following means. The trough is made with one side supporting the lower end of the guides g , the other side much higher, and a middle partition extending the length of the trough and supporting pivoted fingers $s s$ which are located opposite each of the guides g of that trough, and pivoted so as to move in a plane transverse to the length of the trough, so as to rest their upper ends on the guide pieces g when turned to that side. These fingers have a projection or an enlargement of their lower end below the pivotal point, as seen in Fig. 3, and are adjusted to turn so stiffly on their pivots as to retain whatever position they are placed in, until turned by the rod striking their enlarged lower end or projection. Assuming that the fingers s in the beginning are in the position shown in full lines in Fig. 3, the first rod coming into trough D² will be dropped upon guides g and slide down the same and over fingers s into the right hand side of the double trough G², and in doing so will strike the enlarged lower ends of the fingers s and throw them up into the position shown in dotted lines. The next rod dropped

from trough D^2 will slide into the left hand side of trough G^2 , thereby restoring the fingers s to their first position, and so on, the rods being conducted into the two sides of trough G^2 alternately. The rod first dropped into trough G^2 will have partly passed out before the second rod is dropped into the other side of the same trough, and before a third rod is dropped from trough D^2 the first rod will have completely passed through the rolls, leaving that side of the trough empty and ready to receive the third rod when dropped.

By my invention one man is enabled to tend a train of rolls, which at present requires two men, one at each side of the rolls, and it has the further advantage of returning the rod on the back pass much quicker than the most active man can do so, in both ways increasing the output of a given amount of labor.

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

1. The combination with a train of rolls of receiving troughs adapted to open and discharge their contents, returning troughs adjacent to the receiving troughs and having means for automatically feeding the rod to the rolls, guides for conducting the rod from the receiving to the returning trough, and means for actuating the feeding mechanism of the returning troughs, substantially as described.

2. The combination with a train of rolls of receiving troughs having bottoms adapted to open and drop the contents of the trough, returning troughs placed below the receiving troughs and having means for automatically feeding the rod to the rolls, guiding ways adapted to receive the rod dropped from the receiving trough and conduct it into the returning trough, and means for actuating the feeding mechanism of the returning troughs, substantially as described.

3. In combination with a train of rolls a series of receiving troughs having bottoms adapted to open and discharge the contents, returning troughs below the receiving troughs and having feed rollers in their bottom, guiding ways below the receiving troughs to receive the rod dropped therefrom and conduct it into the returning trough, and means for actuating the feed rollers of the returning troughs, substantially as described.

4. In combination with a train of rolls a series of receiving troughs having hinged bottoms normally closed by counterweights, returning troughs below the receiving troughs and having feed rollers to feed the rod to the rolls, guiding ways below the receiving troughs to receive the rod dropped therefrom and conduct it into the returning troughs, and means for actuating the feed rollers of the returning troughs, substantially as described.

5. In combination with a train of rolls a series of receiving troughs having hinged bottoms, normally kept closed by counterweights,

and latches to lock said bottoms shut, returning troughs located below the receiving troughs and having means for feeding the rod to the rolls, guiding ways adapted to receive the rod dropped from the receiving trough and guide it into the returning trough, means for actuating the feeding mechanism of the returning troughs, and means for tripping the latches of the receiving troughs by the movement of the rod entering the trough, substantially as described.

6. In combination with a train of rolls, a bed-plate and a framework thereon, a series of receiving troughs supported upon said framework and having hinged bottoms with counterweights keeping the same normally closed, a series of returning troughs supported upon the bed plate and having in their bottoms feed-rollers adjusted upon shafts below the bed plate, guides to receive the rod dropped from the receiving troughs and conduct it to the proper returning trough, and a shaft supported on the bed-plate in gear with the roll train and having gears which mesh with gears upon the feed roll shafts, whereby the feed rolls are synchronously actuated, substantially as described.

7. The combination with a receiving trough adapted to receive a rod from the rolls and having a hinged bottom and latches to retain the same closed, of the tripping device comprising a pivoted frame embracing the trough in juxtaposition to the rolls, a roller journaled in said frame and resting normally upon or near the bottom of said trough, a rod connected to the latches and having its slotted end engaging a pin on said frame, substantially as described.

8. In rod feeding apparatus the combination with a trough having a dividing partition, feed mechanism in each part, and guides leading to one side of said trough, of guiding fingers pivoted on the partition and adapted to rest their upper ends upon said guides, said fingers having a projection below the pivoting point to be struck by a rod entering the trough, substantially as described.

9. The combination with the trough-supporting frames c and the troughs D D' D^2 of the clips u , rigidly secured to the trough and adjustably secured to the frame, substantially as described.

10. In a rod feeding apparatus the latch tripping device, comprising a movable tripping piece located in the trough in the path of the rod and having an arm connected to the latch bar, whereby the latches will be simultaneously shut when the bar enters the trough and opened when it has passed the tripping piece, substantially as described.

In testimony whereof I hereto affix my signature in presence of two witnesses.

JAMES ROBERTSON.

Witnesses:

LOREN PRENTISS,
FRANK A. BROBST.

It is hereby certified that in Letters Patent No. 507,166, granted October 24, 1893, upon the application of James Robertson, of Cleveland, Ohio, for an improvement in "Automatic Feeding Devices for Rolling-Mills," errors appear in the printed specification requiring correction as follows: On page 1, line 40, and on page 2, line 117, the reference letter "u" should read *v*; and that the said Letters Patent should be read with these corrections therein to conform to the papers pertaining to the case in the Patent Office.

Signed, countersigned, and sealed this 12th day of December, A. D. 1893.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.