March 12, 1935. J. R. COE 1,993,919

ROLLING MILL

Filed Aug. 27, 1934 4 Sheets-Sheet 1

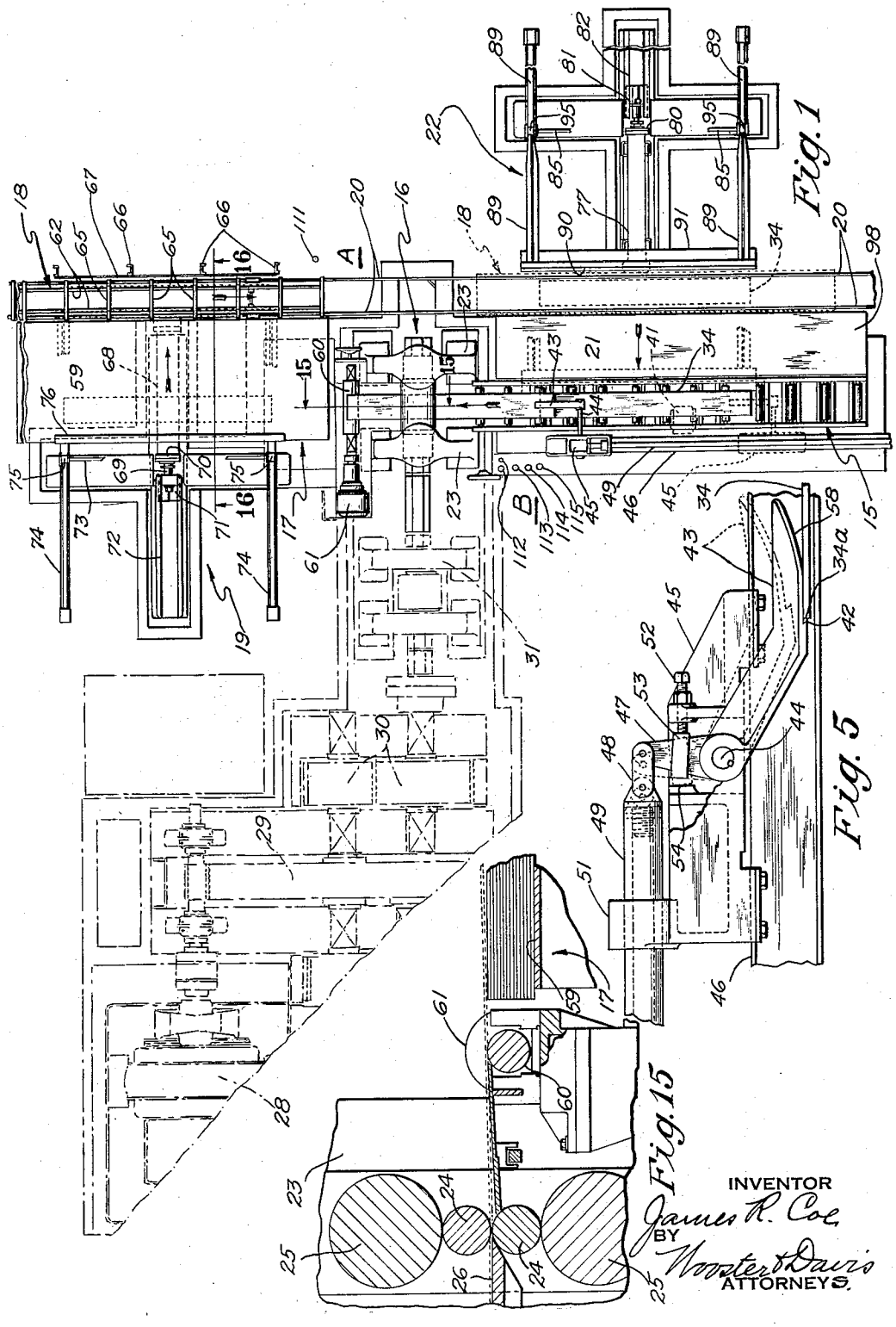

Fig. 1

Fig. 5

Fig. 15

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ROLLING MILL

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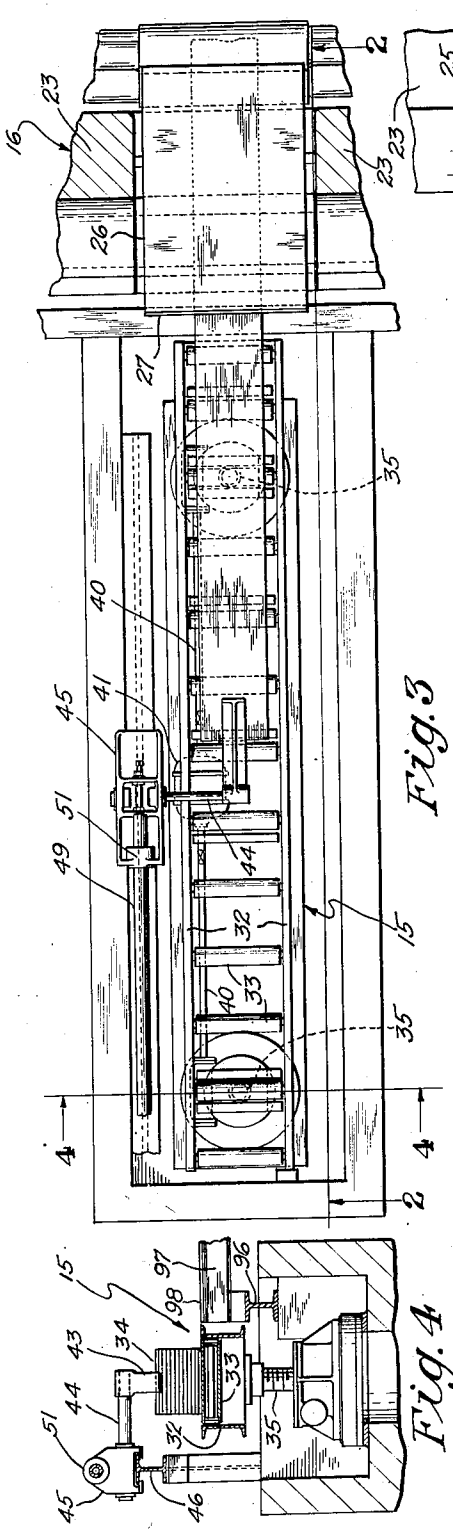

Fig. 3

Fig. 4

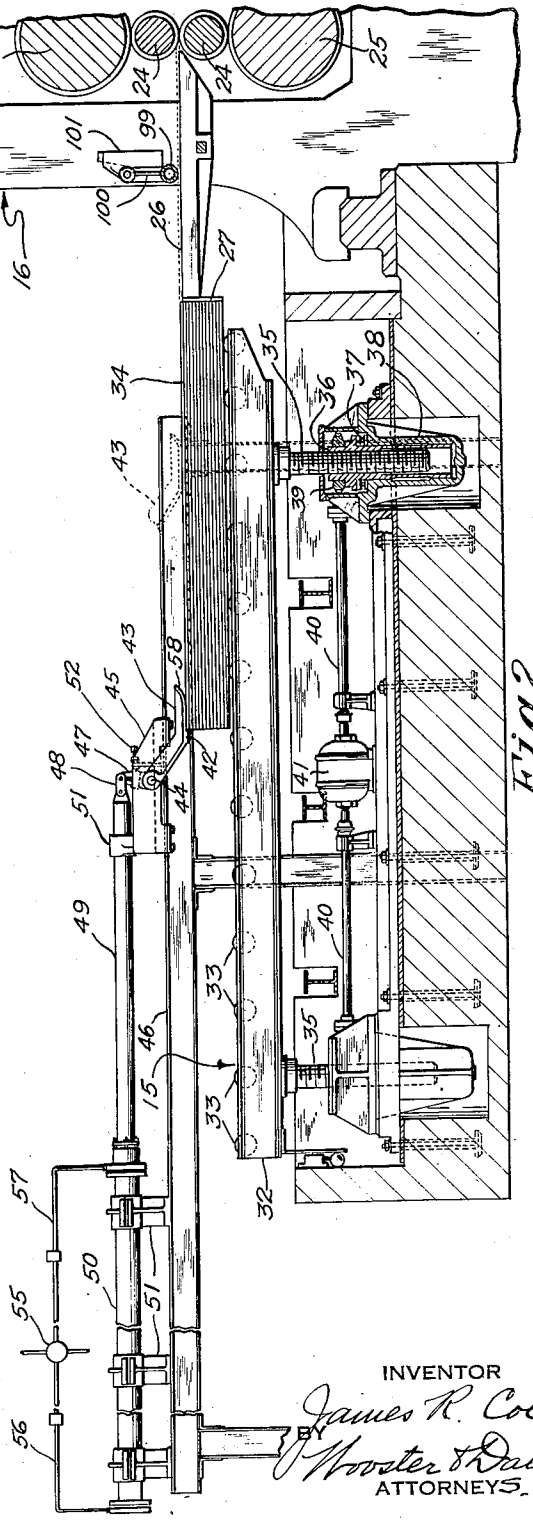

Fig. 2

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ROLLING MILL

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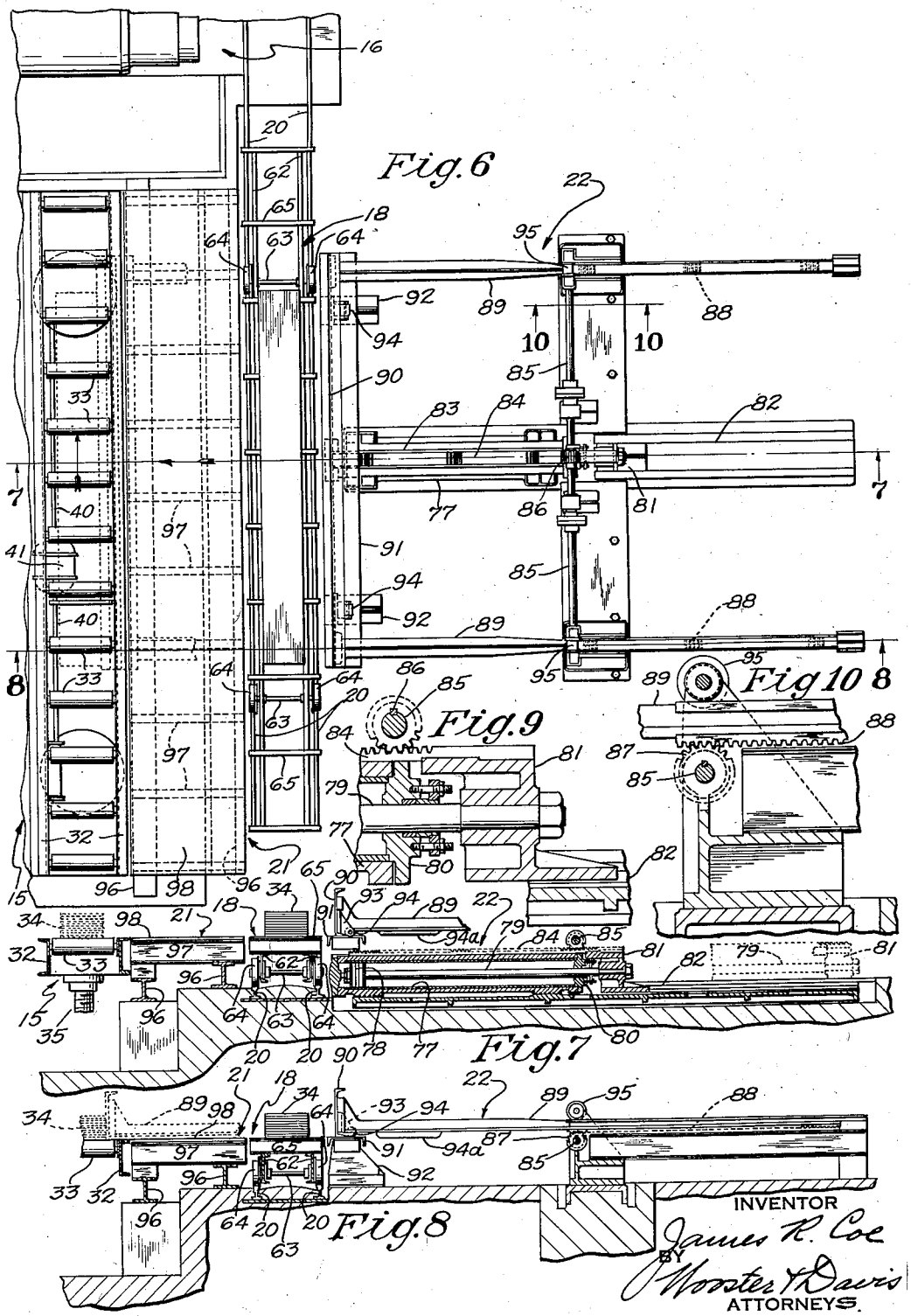
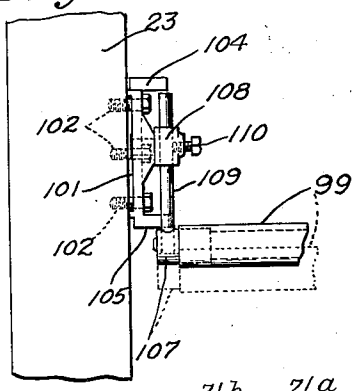


March 12, 1935. J. R. COE 1,993,919

ROLLING MILL

Filed Aug. 27, 1934 4 Sheets-Sheet 4

Fig. 14



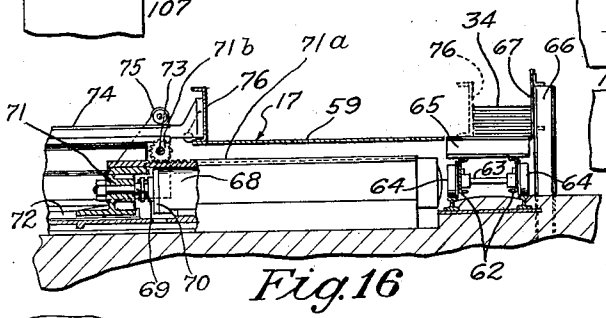


Fig. 16

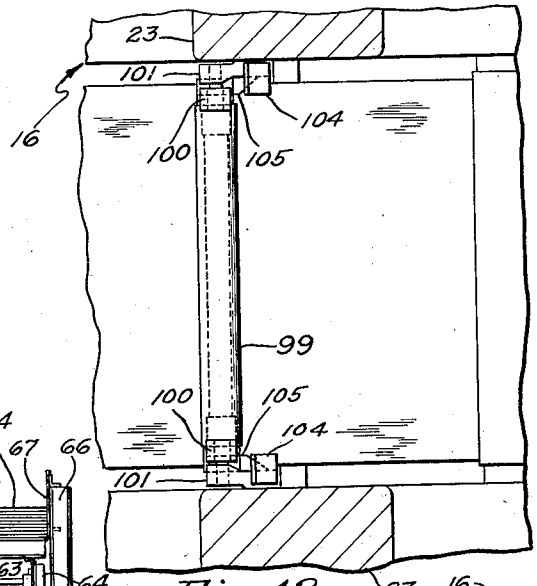


Fig. 12

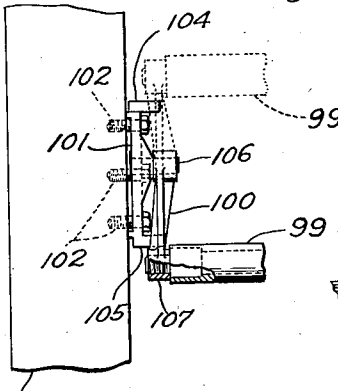


Fig. 13

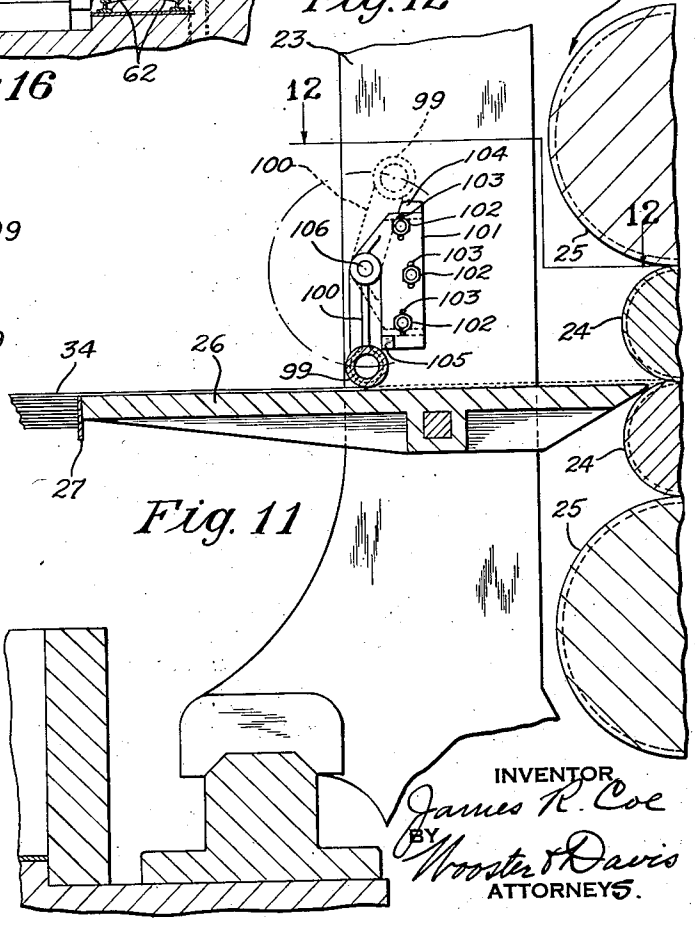


Fig. 11

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UNITED STATES PATENT OFFICE

1,993,919

ROLLING MILL

James R. Coe, Watertown, Conn., assignor to The American Brass Company, Waterbury, Conn., a corporation of Connecticut

Application August 27, 1934, Serial No. 741,570

14 Claims. (Cl. 80—44)

This invention relates to a method and mill for rolling metal, and has for an object to provide an improved means and method for mechanically handling very heavy bars at a mill with a minimum of manual effort and with the greatest possible saving of time.

Since considerable time is required for the adjustment of the rolls and auxiliary mechanism of a mill to effect a reduction in the thickness of a bar to be passed therethrough it is desirable to pass bars through the mill in batches. When such a procedure is followed each bar of a batch of ten or twenty or more is passed through the mill rolls and then the latter are reset and the bars of the batch again passed through. Thus it is required that the rolls be reset only after all of the bars of a batch have been passed between the rolls.

In general this particular apparatus is intended to provide mechanical handling for very heavy bars or castings weighing several hundred pounds each. This mechanical means and its arrangement and the method of handling the bars comprise the present invention, an object of which is to reduce as far as possible the amount of manual handling required in the rolling operation.

In actual operation the bars are, by means of an overhead crane or the like, deposited in a pile or piles on an elevator in front of rolls and the elevator is operated to raise the bars until the top one is above the top edge of a guide table to the rolls. The back end of such top bar is then engaged by a power operated pusher by which the bar is pushed forward until its front end is jammed into the rolls. After passing through the working rolls, which may be of any design, although they are preferably of the 4-high type to permit heavy reductions, the metal passes over a driven roller and falls onto a table in back of the rolls.

From such table the bars are moved, by means of a power operated pusher, onto a transfer car movable along tracks between a position at one side of said table and a position at one side of a platform laterally of the elevator. When the car is at the platform station another power operated pusher means is available to push the pile of bars from the car onto the platform and from the latter onto the elevator provided the elevator is in its lower position.

It should now be understood that the bars of a pile are moved from the elevator through the rolls and piled one on the other on a table in the rear of such rolls and then the pile of bars is moved from the table onto a transfer car by a power means. Thereafter the car is shifted and a power means operated to move the pile of bars from the car onto a platform from which the power means may move them onto the elevator. Before the bars are again passed between the rolls the latter are reset and the cycle described is repeated until the bars have been reduced to the desired thickness.

The accompanying drawings show a satisfactory embodiment of the invention although it is to be understood that the invention is not limited to the details of construction or precise arrangement of parts shown, but includes all such variations and modifications as fall within the spirit of the invention and the scope of the claims.

In the drawings:

Fig. 1 is a top plan view showing somewhat diagrammatically the relative arrangement of the various mechanisms;

Fig. 2 is a partial side elevation and partial vertical section of the means for feeding and sticking the bars into the rolls; the view being taken substantially along the plane of the line 2—2 of Fig. 3;

Fig. 3 is a top plan view of the mechanisms of Fig. 2, a part of the sticking means or pusher being omitted;

Fig. 4 is a vertical sectional view taken substantially along the plane of the line 4—4 of Fig. 3;

Fig. 5 is an enlarged side elevational view of a pusher head showing the same in position to engage the end of a bar;

Fig. 6 is a top plan view on an enlarged scale showing the pusher for pushing the stack or stacks of castings from the transfer car onto a platform at one side of the elevator, and showing the relation of the pusher, the transfer car, the platform and the elevator;

Fig. 7 is a sectional view taken substantially along the plane of the line 7—7 of Fig. 6;

Fig. 8 is a sectional view taken substantially along the line 8—8 of Fig. 6;

Fig. 9 is an enlarged detail sectional view showing the construction at the outer end of the cylinder of the pusher of Fig. 6;

Fig. 10 is an enlarged sectional view taken substantially along the line 10—10 of Fig. 6;

Fig. 11 is an enlarged detail sectional view through a portion of the rolling mill and showing the stop plate at the front edge of the guide table and also showing an idler roll acting to

prevent the entrance of more than one bar at a time to the working rolls;

Fig. 12 is a sectional view taken substantially along the line 12—12 of Fig. 11;

Fig. 13 is a front view showing the mounting for but one end of the idler roll;

Fig. 14 is a view somewhat similar to Fig. 13 but showing a modification;

Fig. 15 is a vertical section substantially on line 15—15 of Fig. 1; and

Fig. 16 is a section substantially on line 16—16 of Fig. 1.

Referring in detail to the drawings and at first particularly to Fig. 1 wherein is shown the relative arrangement of the various mechanisms, at 15 is generally indicated an elevator arranged in front of a rolling mill 16, and in back of which is a receiving table 17. To one side of such table is a transfer car 18 while at the opposite side thereof is a pusher 19 for moving stacks or piles of bars from the table onto the car. Car 18 is movable along tracks 20 between its position at one side of the table 17 and a position at one side of a platform 21, the latter position between such platform and a pusher means 22 for pushing a pile of bars from the car onto the platform 21 and from the latter onto the elevator 15.

The mill 16 includes the usual housings 23, and as indicated above is preferably of the 4-high type, although not necessarily so, comprising smaller working rolls 24 and larger backing rolls 25. A guide table 26 forms part of the mill and is mounted on the housing 23 thereof and is so located as to guide stock into the working rolls 24. On the front edge of table 26 there is arranged a stop plate 27 positioned to be engaged by the forward ends of the bars of a pile of bars 34 located on the elevator or other support 15 as will later more fully appear. Any suitable means may be used for driving the rolls, and in Fig. 1 a drive is shown in broken lines including an electric motor 28 which operates through gear trains 29 and 30 to drive the rolls through a coupling 31.

As suggested above, the metal to be passed through the mill is in the form of flat bars or castings, and by means of an overhead crane or the like a pile of such bars are delivered to the mill. This pile of bars is preferably deposited on the elevator 15 which is located in front of the mill and comprises a platform consisting of a channel frame 32 on which are mounted idler rollers 33 comprising the bed of the platform onto which the bars are delivered in a pile 34. The platform is mounted on two screws 35 threaded into rotating nuts 36 carried on thrust bearings 37 in a supporting bracket 38. The nuts may be revolved in either direction by means of worm wheels 39 engaging with worms (not shown) driven by shafts 40 connected to an operating motor 41. In regular operation the vertical piles of metal bars 34 are placed on the rollers 33 of the elevator and pushed forward toward the mill 16 until the front ends of the bars engage the stop plate 27 at the edge of the guide table 26. The elevator 15 is operated by the motor 41 until the top bar 34 is above the top of the guide table 26 and directly in line with the gap between the work rolls 24, as shown in Figs. 2 and 11.

In this position the top bar 34 is engaged at its rear end by the heel 42 on a shoe or slipper 43 keyed to a shaft 44 mounted in bearings in a cross head 45. This cross head is mounted to slide on a suitable guide, such as the I-beam 46. Also, mounted on the shaft 44 is an upright arm 47 (see Fig. 5) connected by a link 48 to the forward end of a piston rod 49 operated by a piston (not shown) in an air cylinder 50 mounted in suitable brackets 51, which may be mounted on the I-beam 46 along which the cross head 45 may slide back and forth. The cross head carries a supporting bearing 51 for the piston rod 49, and the head also carries an adjusting screw 52 adapted to be engaged by a stop 53 on the arm 47 to limit forward movement of this arm and therefore the downward movement of the shoe 43 during the forward or pushing stroke of the latter.

The cross head 45 also carries an abutment 54 to limit the backward movement of the arm 47 and the uplift of the shoe 43 during its backward or return stroke for engagement with the succeeding bar of metal when the latter has been raised into the sticking position by the elevator 15. Operation of the piston in the cylinder 51 may be controlled by any suitable means such as a valve 55 controlling the passage of air through the pipes 56 and 57 leading to opposite ends of the cylinder.

It will be evident that when the cross head 45 is forced forwardly by the piston rod 49 the arm 47 is forced forwardly against the stop 52 lowering the shoe 43 to such a position that its curved forward portion 58 rests on the top of the upper bar 34 and the heel or shoulder 42 will engage the rear end 34a of this bar as shown in Fig. 5. As the cross head is advanced the shoulder 42 pushes the top bar 34 forwardly into the rolls 24 and therefore sticks the forward end of such bar into the mill. After the bar has been properly started in the rolls the cross head 45 is withdrawn or shifted backwardly. As this is done by a pull on the rod 49 it will be evident that during such backward movement the lever 47 is against the stop 54 and the shoe 43 is raised as indicated by the dotted lines in Fig. 5. After the top bar 34 has passed off the pile of bars the elevator 15 may be operated to raise the next uppermost bar of the pile to the proper level or above the edge of the stop plate 27, and then the cross head 45 and shoe 43 is again advanced to push this second bar into the rolls, and so on until all the bars have been rolled.

The table 17 at the back of the rolls includes a suitably supported top 59, the upper surface of which is considerably below the metal line of the mill or the line of contact between the work rolls 24 of the mill. Between the rolls and the table 17 is a roller 60 driven in any suitable manner as by means of a motor 62, and this driven roller acts to feed or pass the bars 34 from the rolls to the table. The upper surface of the roller 60 is considerably above the upper surface of the table so that as the bars pass over this driven roller 60 they fall to the table one on top of the other and build up in a vertical pile.

When the bars are on the table 17 they are between the pusher 19 and the car 18 if the latter is in position at the side of the table as shown in Fig. 1. Car 18 comprises relatively long channel members 62 through which are passed the axles 63 mounting the wheels 64. Such wheels operate on the tracks 20 which as before explained extend along at the side of the machine so that the car can be movable along them from a position at the side of the table 17 to a position at the side of the platform 21. The upper edges of the channel members 62 are spanned by cross

pieces 65 which may be short sections of channel or I-bars. The rails 20 are preferably imbedded in the concrete floor or other base for the machine and the height of the car and the location of said rails is such that the receiving surface of the car, comprising the upper surfaces of the cross pieces 65, is flush with the upper surface of the table 17 when the car is at the side of such table.

With the car 18 at the side of the table 17 the pusher 19 may be operated to push a pile of bars across the table and onto the car. Directly beyond the car when it is in receiving position is mounted a bumper extending upwardly from the floor of the mill. As shown in Figs. 1 and 16 this bumper comprises vertically arranged posts 66 between which extend a bumper or stop plate 67 parallel with the rails 20. When the pusher 19 shifts a pile of bars across the table 17 and onto the car 18 the said pile of bars will be pushed sidewise against the bumper plate 67 and brought into sidewise alignment. Since the bars fall from the roller 60 onto the table 17, to build up a pile, it will be appreciated that they will not necessarily be in sidewise alignment on the table, but when they are pushed against the bumper plate 65 they will be brought into alignment sidewise.

The pusher 19 is of substantially the same construction as the pusher 22 which is shown in detail in Figs. 6 through 10 and will later be described in detail. Pusher 19 includes an air cylinder 68 in which operates a piston (not shown) secured to the inner end of a piston rod 69 operable through the cylinder head 70. On the outer end of the piston rod 69 is a cross head 71 corresponding to cross head 81 and slidable in a guideway 72, and secured to such cross head and operating in a guideway (not shown) in the upper surface of the cylinder 68 is a rack 71*a* corresponding to rack 84 of Figs. 6, 7 and 9. Extending transversely of said rack is a shaft 73 corresponding to shaft 85 to an intermediate portion to which is secured a pinion 71*b* corresponding to pinion 86 of Figs. 6, 7 and 9 above and meshing with the rack.

A pair of pusher columns 74 corresponding to columns 89 are arranged to extend transversely of and above the outer end portions of the shaft 73, and on its under side each of these columns carries a rack (not shown) corresponding to racks 88 meshing with the pinions (not shown) on the outer end portions of the shaft 73 corresponding to pinions 87 on shaft 85. Idler rolls 75 corresponding to idlers 95 prevent upward movement of the pusher columns 74 so that the racks on said columns are maintained in mesh with the pinions on the outer end portions of the shaft 73. A pusher plate or channel member 76 corresponding to channel 90 extends between and is mounted by the forward ends of the pusher columns 74 and is normally located at the edge of the table 17 as shown in Fig. 1. It is adapted to be moved across the table to push the pile of bars therefrom onto the car 18.

On air being admitted to the inner end of the cylinder 68 the piston rod 69 will be forced outwardly and will carry the cross head 71 outwardly together with the rack secured to said cross head. On outward movement of such rack the shaft 73 will be rotated in a clockwise direction and the pinions on the outer ends of said shaft meshing with racks on the under sides of the pusher columns 74 will cause said columns to be moved in a direction to carry the pusher plate 76 across the table 17. On exhausting the air from the inner end of cylinder 68 and admitting air under pressure to the outer end of said cylinder the pusher mechanism will be returned to normal position.

When a pile of bars is on the car 18 the latter may be rolled from its position at the side of the table 17 to a position at the side of the platform 21, between such platform and the pusher 22. That is, the car with the load of bars may be shifted from the full line position of Fig. 1 to the dotted line position of that figure. When the car with the pile of bars is positioned at the side of the platform 21 the pusher 22 may be operated to push such pile of bars from the car onto the platform, and if the elevator 15 is in its lowered position the same pusher may push the pile of bars from the platform onto the elevator.

Pusher 22, which is similar to pusher 19, includes an air cylinder 77 within which operates a piston 78 secured to a piston rod 79 movable through the cylinder head 80 as the piston is moved in the cylinder. The piston is moved in one direction or the other in the cylinder as air under pressure is admitted at one end of the cylinder and exhausted from the other. Secured to the outer end of piston rod 79 is a cross head 81 slidable in a guideway 82. Slidable in a guideway 83 in the upper side of the cylinder 77 and at its outer end secured to the crosshead 81 is a rack bar 84.

Extending transversely of the rack 84 and above the same and the cylinder head 80 is a shaft 85 to an intermediate portion of which is secured a pinion 86 meshing with the rack. To the outer end portions of the shaft 85 are secured pinions 87 arranged below and meshing with racks 88 secured to the undersides of pusher columns 89 extending transversely with respect to the shaft 85. To the forward ends of these pusher columns is secured a pusher plate or channel 90 which in the normal position of the pusher is arranged above a support comprising an angle member 91 supported by base members 92. Brackets 93 on the plate 90 carry rollers 94 resting on the angle member 91 when the pusher is in retracted position. Shoes 94*a* on the lower sides of the pusher column move onto the member 91 as the rollers 94 move off the same when the pusher is operated to move a pile of bars onto or from the platform.

On air under pressure being admitted to the inner end of cylinder 77 the piston 78 and piston rod 79 will be forced outwardly carrying the rack 84 outwardly. Since the rack is in mesh with the pinion 86 the shaft 85 will be rotated in a counterclockwise direction with the result that the pinions 87 on said shaft meshing with the racks 88 on the pusher columns will move these columns inwardly or toward the platform 21, moving the pusher plate 90 across the car 18, if the latter is at the side of the platform and shifting a pile of bars from the car onto the platform. Idler rollers 95 engage the upper surfaces of the columns 89 and prevent vertical movement of the racks 88 away from the pinions 87.

The stroke of pusher 22 is such that (see the dotted lines in Fig. 8) the pusher can move the pile of bars across the platform 21 and onto the elevator 15 when the latter is lowered so that its upper surface is not above the upper surface of the platform. On air under pressure being admitted to the outer end of cylinder 77 while

the air is exhausted from the inner end thereof the parts are returned to their normal positions.

Platform 21 may be of any strong construction having its receiving surface flush with the surface of the car 18 and the table 17. As shown the platform includes longitudinally extending I-beams 96 by which are supported cross members 97 over which may be disposed a top or table 98.

It will now be understood that in the operation of the machine a pile of bars or castings to be rolled are placed on the elevator 15 and the latter adjusted so that the top bar of the pile is above the stop plate 27 against which the forward end of the pile is pushed. Then the pusher shoe 43 is operated to push such top bar forward and stick its front end between the working rolls 24 of the mill. When that top bar is off the pile and when the shoe 43 has been retracted the elevator is again operated to raise the pile to bring the next topmost bar above the stop plate after which said next topmost bar is pushed forward to the rolls 24. This is repeated until all of the bars have been passed through the mill.

As each bar leaves the mill it moves onto the driven roller 60 and is fed over the table onto which it falls, the table being below the level of the roller so that the bars pile up vertically on the table. The pusher 19 is then operated to push the pile of bars across the table onto the car 18, and as the pile of bars is moved sidewise against the bumper 67 the piled bars are forced into alignment sidewise. Thereafter the car 18 with its pile of bars is moved along the tracks 20 to a position at the side of platform 21 after which pusher 22 is operated to move the bars onto the platform, and if the elevator is lowered, across the platform and onto the elevator. The elevator may now be raised to bring the top bar of the pile above the stop plate 27 and on the rolls 24 being reset the bars are again passed through the mill for further reduction. This is repeated until the bars have been reduced as required.

During the first few passes, while the bars are still thick and comparatively short, it is customary to place two or more piles of castings on the elevator, passing each pile in succession through the mill without change in roll adjustment, but for the later passes, when the bars are comparatively thin but of correspondingly increased length, it is customary to combine the independent piles, and at this time it is necessary to provide some means for preventing the entrance of more than one bar at a time into the rolls 24.

The means provided for this purpose as shown in Figs. 2 and 11 through 13, includes an idler roller 99 extending across the guide table 26 in front of the work rolls 24 and suspended from brackets 100 by links 101 at each of its ends. Brackets 101 are secured to the roll housings 23 for vertical adjustment relative to said housings as by means of screws 102 passing through slots 103 in the brackets. Top and bottom stop lugs 104 and 105 are provided on the brackets 101. Links 100 at their upper ends are rotatable about short shafts 106 on the brackets 101 and at their lower ends the links rotatably support the ends of the roller 99 as at 107. The bottom lugs 105 are positioned to be engaged by the links 100 when the roller 99 is swung down to the full line position of Figs. 11 and 13 to limit swinging movement of the roller beyond a vertical position. Stop lugs 104 are rearwardly with respect to the lugs 105 so as to permit the roller to swing beyond a vertical position when up, as shown by the dotted lines in Figs. 11 and 13, whereby the idler will remain in up or inoperative position until moved therefrom.

Fig. 14 illustrates a modified mounting for the idler roller 99 and in such figure the bracket 104 is not vertically adjustable on the housing 23 but rotatably mounts a short sleeve 108 through which passes a link or rod 109 at its lower end rotatably mounting an end of the roller 99. A similar mounting for the other end of roller will be provided at the other side of the mill. The link 109 is adjustable through the sleeve 108 to raise or lower the roller and may be secured in adjusted position as by a clamping screw 110. Since the sleeve 108 is pivotally mounted by the bracket 101 the roller 99 may be swung between its down and up positions, its links 109 engaging the stop lugs 104 and 105 as explained in the description of Figs. 11 through 13.

In use adjustments are made in the structure of either Fig. 11 or Fig. 14 so that when the roller 99 is in its down position it will be in such relation to the guide table 26 as to prevent the entrance of more than one bar at a time to the working rolls 24. When the idler is not needed as a stop it may easily be swung to its up or inoperative position, in which it is supported by its suspending links engaging the stop lugs 104. When the idler is in its down or operative position the lugs 105 are in the path of movement of the links and limit rearward swinging movement of the roller so that the latter cannot go beyond the vertical position of Fig. 11. When it its down position the roller is so spaced above the guide table as to permit of the passage across said table to the rolls 24 of but one bar at a time.

In operating the mill and associated mechanism a control, as a valve 111, for the pusher 19 may be located convenient for operation by an operative stationed at A. Convenient to station B are valves 112 for controlling the admission of air under pressure to the respective ends of the sticking cylinder 50. Also, at such station B there may be located a push button 113 for controlling the elevator 15, a valve 114 for controlling the pusher 22 and a push button 115 for roll adjustments.

Having thus set forth the nature of my invention, what I claim is:

1. A method of rolling metal comprising placing a pile of bars at the front of a rolling mill, successively passing the uppermost bar of the pile through the mill until all of the bars have been passed therethrough, piling the bars one on the other at the back of the mill as they leave the latter, forcing the pile of bars laterally against a stop to insure sidewise alignment of the piled bars, returning the pile of bars to the front of the mill, and again passing the bars through the mill after resetting the rolls of the latter.

2. In a device for rolling metal, a rolling mill, means at the front of the mill for feeding bars to the mill, a table at the back of the mill for receiving bars passed through the mill, a platform at the side of said feeding means and of the height of said table, a car having its carrying surface substantially flush with the surface of said table and movable between a position at the side of the table and a position at the side

of said platform, power means to push the bars from the table to said car when the latter is at the side of the table, other power means operative to push the bars from the car to the platform when the car is at the side of the platform, and said last power means also operative to push the bars from said platform to the feeding means.

3. In a device for rolling metal, a rolling mill, means at the front of the mill for feeding bars to the mill, a table at the back of the mill for receiving bars passed through the mill, a driven roller at the back of the mill for shifting bars from the mill to the table, said table having its receiving surface below the upper side of said roller whereby the bars from the roller fall to the table one on the other to build a pile, a platform at the side of said feeding means and of the height of said table, a car having its carrying surface substantially flush with the surface of said table and movable between a position at the side of the table and a position at the side of said platform, power means to push a pile of bars from the table to said car when the latter is at the side of the table, other power means operative to push a pile of bars from the car to the platform when the car is at the side of the platform, and said last power means also operative to push a pile of bars from said platform to the feeding means.

4. In a device for rolling metal, a rolling mill, means at the front of the mill for feeding bars to the mill, a table at the back of the mill for receiving bars passed through the mill, said table having its receiving surface below the metal line of the mill whereby the bars from the mill fall to the table one on the other to build a pile, a car movable to and from a position at one side of the table, means for shifting a pile of bars from the table to the car when the car is at the side of the table, and a bumper beyond the car when the latter is at the side of the table and against which the pile of bars is forced sidewise when moved from the table to the car to cause sidewise alignment of the piled bars.

5. In a device for rolling metal, a rolling mill, means at the front of the mill for feeding bars to the mill, a table at the back of the mill for receiving bars passed through the mill, said table having its receiving surface below the metal line of the mill whereby the bars from the mill fall to the table one on the other to build a pile, a bumper at one side of and spaced from the table, a car movable to and from a position at said side of the table between the table and bumper, pusher means at the other side of the table, and said pusher means operative to push a pile of bars sidewise from the table onto the car and against the bumper to load the car with the pile of bars and bring about sidewise alignment of the piled bars on the car.

6. In a device for rolling metal, a rolling mill, means at the front of the mill for feeding bars to the mill, a table at the back of the mill for receiving bars passed through the mill, said table having its receiving surface below the metal line of the mill whereby the bars from the mill fall to the table one on the other to build a pile, a bumper at one side of and spaced from the table, a car movable between a position at said side of the table between the table and bumper and a position at the side of the feeding means, pusher means at the other side of the table, said pusher means operative to push a pile of bars sidewise from the table onto the car and against the bumper to load the car with the pile of bars and bring about sidewise alignment of the piled bars on the car, and other pusher means operative to push a pile of bars from the car to the feeding means when the car is positioned at the side of the latter.

7. In a device for rolling metal, a rolling mill, means at the front of the mill for feeding bars to the mill, a table at the back of the mill for receiving bars passed through the mill, said table having its receiving surface below the metal line of the mill whereby the bars from the mill fall to the table one on the other to build a pile, a bumper at one side of said table, a pusher means at the other side of the table, and said pusher means operative to push the pile of bars on the table sidewise against the bumper to bring about sidewise alignment of the piled bars.

8. In a device for rolling metal, a rolling mill, means at the front of the mill for feeding bars to the mill, a table at the back of the mill for receiving bars passed through the mill, a platform at the side of said feeding means, a car movable between a position at the side of the table and a position at the side of said platform, power means to push a bar from the table to said car when the latter is at the side of the table, other power means operative to push a bar from the car to the platform when the car is at the side of the platform, and said last power means also operative to push a bar from said platform to the feeding means.

9. In a device for rolling metal, a rolling mill, means at the front of the mill for feeding bars to the mill, a table at the back of the mill for receiving bars passed through the mill, a platform at the side of said feeding means, a car movable between a position at the side of the table and a position at the side of said platform, power means to push a bar from the table to said car when the latter is at the side of the table, and other power means operative to push a bar from the car to the platform when the car is at the side of the platform.

10. In a device for rolling metal, a rolling mill including rolls, a guide table and roll housings at the ends of the rolls, means for feeding bars to the rolls, means for preventing the entrance of more than one bar at a time to the rolls, said last means including brackets on the roll housings, links pivoted on said brackets, an idler roll supported by said links and swingable therewith between a down position spaced slightly above the guide table and an up position in which it is inoperative, and stop means limiting swinging of the roll beyond a vertical position when down and permitting the roll to be swung slightly beyond vertical position when up.

11. In a device for rolling metal, a rolling mill including rolls, a guide table and spaced housings for the rolls, means for feeding bars to the rolls, and means for preventing the entrance of more than one bar at a time to the rolls, said last means including an idler roll and means mounting said roll on said housings for movement between operative and inoperative positions.

12. In a device for rolling metal, a rolling mill including rolls, a guide table and spaced housings for the rolls, means for feeding bars to the rolls, and means for preventing the entrance of more than one bar at a time to the rolls, said last means including brackets on the roll housings, links pivoted on said brackets, an idler roll supported by said links and swingable

therewith between a down position spaced slightly above the guide table and an up position in which it is inoperative, stop means limiting swinging of the roll beyond a vertical position when down and permitting the roll to be swung slightly beyond vertical position when up, and means mounting the brackets on the housings for vertical adjustments relative thereto.

13. In a device for rolling metal, a rolling mill including rolls, a guide table and spaced housings for the rolls, means for feeding bars to the rolls, and means for preventing the entrance of more than one bar at a time to the rolls, said last means including brackets on the roll housings, means turnable on said brackets, arms secured to and vertically adjustable on said means, an idler roll carried by said arms and swingable therewith between a down position spaced slightly above the guide table and an up position in which it is inoperative, and stop means limiting swinging of the roll beyond a vertical position when down and permitting the roll to be swung slightly beyond vertical position when up.

14. In a device for rolling metal, a rolling mill, a support for a pile of flat bars one on the other in front of the mill, elevator mechanism for raising and lowering the support, means for pushing the bars one at a time from the pile to the mill, a table at the back of the mill for receiving bars passed through the mill, said table having its receiving surface below the metal line of the mill whereby the bars from the mill fall to the table one on the other to build a pile of bars, a platform at the side of the support and flush with the upper surface thereof when the support is lowered and said platform of the height of said table, a car having its carrying surface substantially flush with the surface of said table and movable between a position at the side of the table and a position at the side of the platform, power means to push a pile of bars from the table onto said car when the latter is at the side of the table, other power means operative to push a pile of bars from the car onto said platform when the car is at the side of the platform, and said last means also operative to push a pile of bars from the platform onto the support when the latter is lowered.

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