

Oct. 30, 1928.

1,689,656

J. D. WILLIAMS

ROLL POLISHER

Filed April 6, 1926

3 Sheets-Sheet 1

Fig. 1.

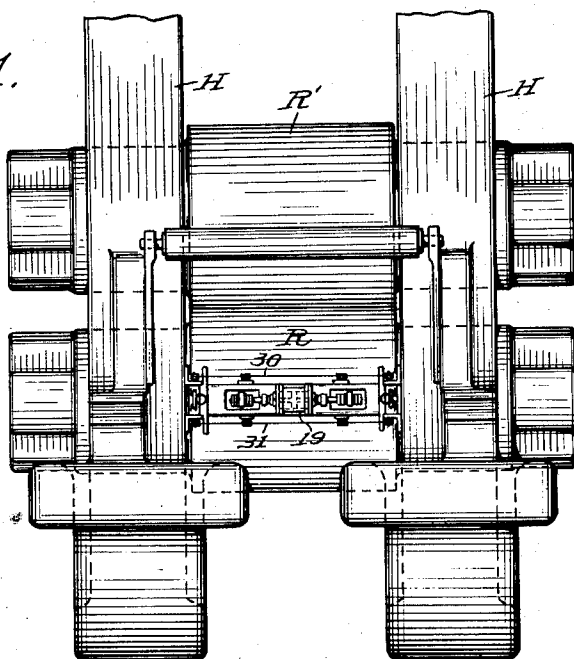
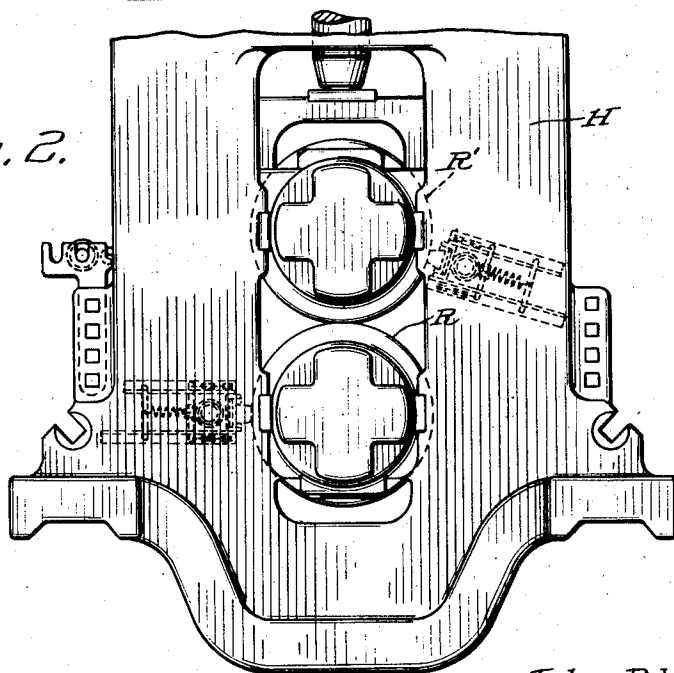


Fig. 2.



WITNESS

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3 Sheets-Sheet 2

Fig. 3.

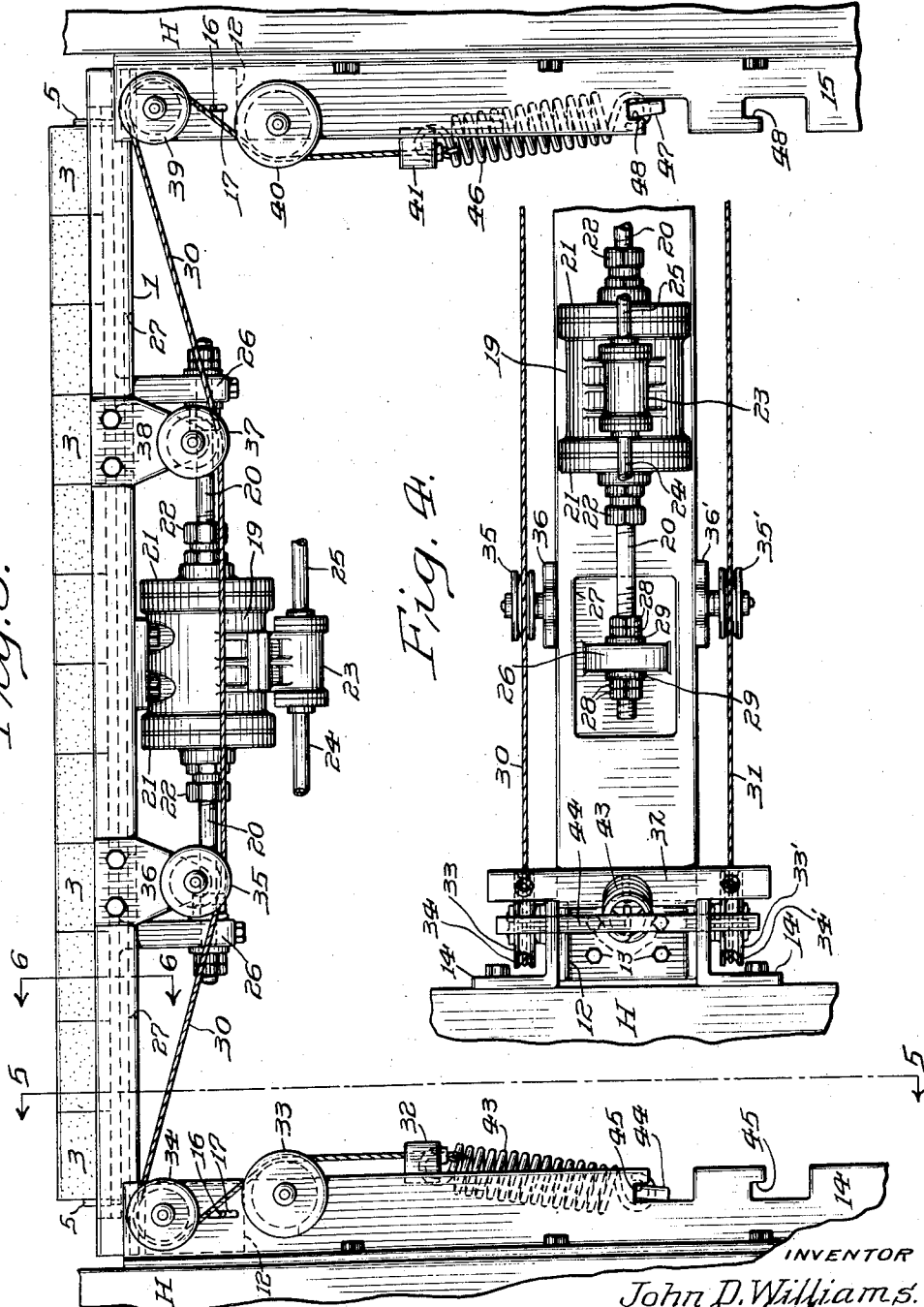


Fig. 4.

WITNESS

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Fig. 5.

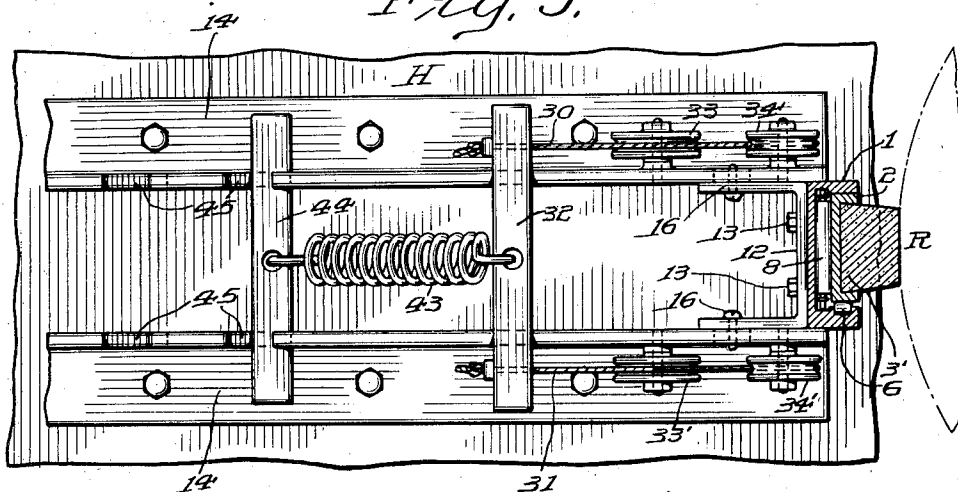


Fig. 6.

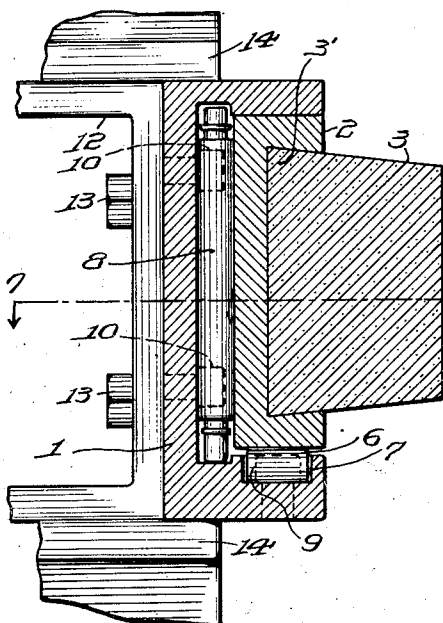
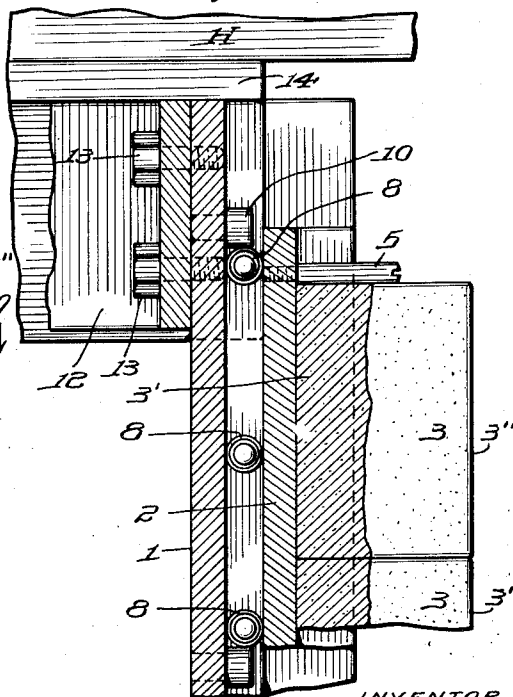


Fig. 7.



WITNESS
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Patented Oct. 30, 1928.

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UNITED STATES PATENT OFFICE.

JOHN D. WILLIAMS, OF NILES, OHIO.

ROLL POLISHER.

Application filed April 6, 1926. Serial No. 100,031.

The present invention relates to roll polishers for the continuous polishing of sheet, tin and plate mill hot or cold rolls or other rolls of a similar nature so as to maintain the rolls constantly in proper operative condition.

It is well known in the rolling mill industry that the mill rolls accumulate scales and abrasions which are inimical to the turning out of a satisfactory product and which must consequently be removed by a suitable polishing operation; it has been customary therefore to periodically discontinue rolling operations and polish the rolls by the application thereto of a block of abrasive material either manually or by means of some suitable mechanism. This method of polishing the rolls results in a material loss of time, involves the expenditure of a considerable amount of labor and is objectionable in that during the period of shut-down the mill rolls become cool with resulting loss of accuracy and finish in the product of the mill after it is again started up until the rolls once more attain proper operating temperature. With a view to overcoming these objections various devices have been hitherto suggested for polishing the rolls continuously while the mill is in operation with a view to avoiding the necessity for discontinuing rolling operations from time to time to polish the rolls, but all of these devices, so far as I am aware, have been more or less unsatisfactory under the practical operative conditions encountered in sheet, tin and plate mills and the like, and it is therefore an object of the present invention to provide a roll polisher adapted to continually polish the rolls during the operation of the mill which is satisfactorily operative under the said conditions.

A further object of the invention is to provide a continuous roll polisher which may be readily attached to a rolling mill of ordinary construction without making any material changes therein and which, after being so attached, may be very readily and quickly removed from the mill when it is desired to change the rolls or the like, and to provide a continuous roll polisher which is operative to reciprocate the polishing or abrasive material longitudinally of the roll while continuously pressing said material against the surface of the roll with an equalized yielding pressure and embodying means for adjusting the extent of reciprocation or travel of the polishing material relative to the roll and

also for adjusting the yielding pressure with which the material is pressed against the roll.

The invention further contemplates the provision of a roll polishing device having the foregoing features and characteristics which is of relatively simple construction, not liable to get out of order under the conditions under which devices of this character must ordinarily operate, which can be readily taken care of and adjusted by rolling mill operatives and which when operatively attached to a rolling mill will in no wise interfere with the normal use and operation thereof.

Still other objects, advantages and novel features of design, construction and arrangement comprehended by the invention will be apparent from the following description of a preferred embodiment thereof as illustrated in the accompanying drawings.

In the said drawings, Fig. 1 is a somewhat conventional front view of a two high rolling mill showing the roll polisher in operative association with the lower roll and Fig. 2 is an end view of the mill showing the polisher illustrated in Fig. 1 as well as another and similar polisher in operative association with the upper roll. Fig. 3 is an enlarged top plan view of the polisher in operative position between the mill housings, fragments of which are also shown, and Fig. 4 is a fragmentary rear view of a portion of the mechanism shown in Fig. 3. Fig. 5 is a vertical section on line 5—5 in Fig. 3; Fig. 6 is a fragmentary enlarged view in vertical section on line 6—6 in Fig. 3, and Fig. 7 a fragmentary horizontal section on line 7—7 in Fig. 6, all looking in the direction of the arrows. The same symbols are used to designate similar parts in the several figures.

The rolling mill proper, to which I have shown two of the roll polishers as operatively attached, may comprise the usual housings H in which are journaled a pair of rolls R, R' in the ordinary manner, the specific construction of the mill forming no part of the present invention. The construction and arrangement of the latter will now be more particularly described, from which description its manner of attachment to and operation in connection with the rolling mill will be better understood.

The preferred embodiment of the invention which I have chosen to illustrate to enable those skilled in the art to comprehend and practise the same, is more particularly illustrated in Figs. 3 to 7 inclusive, to which

reference may now be had. As shown, the polisher comprises a guide 1 preferably a little shorter than the distance between the housings H, H of the mill to which the device is to be attached, this guide being adapted to extend parallel to the axis of the roll and to be supported as hereinafter described. The guide is of substantially channel section and is positioned so that the open side of the channel will face forwardly toward the roll; in this channel is disposed the polishing block holder 2 which is preferably somewhat shorter than the guide and adapted for reciprocation longitudinally thereof. This holder is operative to support a plurality of polishing stones or blocks 3, which may be of carborundum or other suitable abrasive material, and are secured in the holder in any convenient way as, for example, by forming the holder with overhanging opposed undercut lips adapted to grip the bases 3' of the blocks, the vertical section of which approximates that of a truncated pyramid, so that the blocks can be slid endwise into the holder one after the other and are thereafter securely held thereby, as best shown in Fig. 6. While I prefer to employ a plurality of blocks abutting endwise one against the other so as to extend for substantially the full length of the holder, the precise number of blocks utilized is immaterial and it may even be possible under certain conditions to employ but a single strip or block of suitable length instead of a plurality of blocks, and any convenient means may be provided for holding the blocks from endwise movement in the holder after they are seated therein as, for example, removable dowel pins 5 inserted into the holder near the ends thereof and abutting the ends of the outermost blocks. When the device is in operation the operating faces 3'' of the blocks engage the face of the roll and the blocks are therefore preferably initially made of sufficient height to dispose their operating faces at a relatively considerable distance in front of the face of the holder but of course the frictional engagement between the blocks and the roll gradually wears the former down so as to bring the faces 3'' progressively closer to the holder while the machine is in use, and means hereinafter described are provided for automatically compensating for this gradual wearing away of the blocks until so little of the abrasive material is left that new blocks are required.

With a view to eliminating friction between the holder 2 and guide 1 when the former is reciprocated in the latter, the holder may be mounted on rollers 6 disposed in a groove 7 formed in the lower flange of the guide, while for minimizing the friction resulting from the rearward thrust of the holder vertically extending rollers 8 may be disposed between the back of the holder and the adjacent face of the guide, roller stops 9 and

10 being mounted in the guide at suitable points so as to prevent the rollers from bunching together and also from escaping endwise from the guide. Thus as the weight of the holder and blocks is taken by the rollers 6 and its rearward thrust by the rollers 8 a relatively small amount of power is required to effect its reciprocation in the guide.

The guide 1 with its attached parts is operatively supported between the housings H, H of the mill in such manner that, while incapable of movement parallel to the axis of the roll with which it is associated, it is capable of limited movement toward or away from the face of the roll. Conveniently this result may be effected by providing the guide at each end with a rearwardly projecting support 12 which may either be integral with the guide or, as shown, in the form of a member of channel section secured by bolts 13 to the back of the guide, these supports being adapted to engage between the opposed faces of vertically spaced pairs of angle iron rails 14 and 15 respectively detachably bolted to the inner faces of the housings and extending parallel to each other either horizontally or at a suitable angle to the horizontal as may be preferred. Preferably the guide is slightly shorter than the distance between the housings, and for preventing endwise movement of the guide therebetween I may employ any suitable means such as one or more vertically extending pins 16 carried by the supports 12 and each engaging in a slot 17 in the adjacent rail extending longitudinally thereof, thus enabling the guide to move longitudinally of the rails for a distance determined by the length of the slot but preventing the guide from any endwise movement between the housings.

For the purpose of reciprocating the holder 2 in the guide when the machine is in operation so as to move the polishing stones back and forth along the face of the roll, I preferably provide a cylinder 19 which is rigidly secured in any suitable manner to the back of the guide 1 and in which is disposed a piston mounted on a piston rod 20 which extends outwardly in opposite directions through the cylinder heads 21, leakage about the rod being prevented by stuffing boxes 22 of any suitable construction carried by the cylinder heads. Reciprocation of the piston within the cylinder may be effected by alternate admission and exhaust from the opposite ends thereof of any suitable fluid such as air, oil, steam or the like, the flow of the fluid being controlled through suitable valve mechanism arranged in a valve chest 23 conveniently mounted on the cylinder, the fluid being supplied to and conducted from the chest by pipes 24 and 25 which may preferably be flexible. The specific construction of the valve mechanism forms no part of the present invention and therefore any mecha-

nism suitable for the purpose may be employed and preferably so constructed that the speed with which the piston reciprocates may be varied as desired.

5 The ends of the piston rod are connected to the holder 2 through the medium of a pair of laterally spaced arms 26 extending rearwardly from the holder and preferably integral therewith; these arms project through
10 slots 27 formed in the guide and of sufficient length to allow the arms to move back and forth relatively to the guide for the maximum stroke of the piston. At their extremities the arms are bored for the passage of
15 the ends of the piston rod which are threaded for the reception of adjusting nuts 28 mounted on the rod on opposite sides of each arm, fibre washers 29 being preferably disposed between the nuts and the adjacent faces of
20 the arms. It will thus be apparent that when the nuts are screwed up so as to force the washers snugly against the arms reciprocation of the piston in the cylinder will cause the holder to correspondingly reciprocate in
25 the guide, the stroke or extent of movement of the holder being similar to that of the piston, but that when the nuts are backed off so as to leave a space or clearance somewhat greater than the thickness of the washers between
30 their faces and the adjacent faces of the arms, the stroke of the holder will be correspondingly less than the stroke of the piston, which latter is constant under all conditions. Thus by suitable adjustment of the
35 nuts 28 the stroke of the holder may be varied within limits as desired to accord with the camber of the particular roll with which the polisher is associated which is of advantage in obtaining the most satisfactory results.

40 For constantly maintaining the stones against the face of the roll with a yielding pressure irrespective of irregularities in its surface and to compensate for the gradual
45 wearing down of the stones, I provide means which are continuously operative to urge the guide with its attached parts forwardly toward the roll so as to bring the operative
50 faces 3" of the stones into suitable engagement therewith, said means preferably comprising a pair of steel or other suitable cables 30 and 31 respectively arranged above and below the guide, yielding means for maintaining the cables under tension, and means
55 for guiding the cables in such manner that they will apply pressure to the guide in the proper direction to effect the desired result.

60 More specifically, the cable 30 which is disposed above the stationary guide has its left hand end (when the machine is viewed in Fig. 3) secured in any suitable way to the upper end of a vertically extending bar 32 which abuts the edges of the rails 14 and may be provided with a central tongue disposed
65 between the rails to afford vertical sup-

port to the bar. From this point of attachment the cable extends forward over sheaves 33 and 34 mounted near the forward end of the upper rail 14 and is thence carried angularly rearward over a sheave 35 mounted on
70 a bracket 36 secured to the guide, thence parallel to the guide over another sheave 37 carried by a similar bracket 38 on the opposite side of the center of the guide, thence angularly forward over sheaves 39 and 40 mounted
75 on the upper rail 15 and corresponding to sheaves 34 and 33 on the opposite rail and thence rearwardly to a bar 41 similar to bar 32 and abutting the edges of rails 15 in a similar way. The cable 31 which is disposed
80 below the guide and attached to the bars 32 and 41 near the lower ends thereof follows a similar course, passing in a corresponding way from the bar 32 over sheaves 33' and 34' which are mounted on the flange of the
85 lower rail 14 directly beneath sheaves 33 and 34, thence over sheave 35' on a bracket 36' mounted on the lower side of the guide beneath sheave 35 and thence over other sheaves (not shown) below sheaves 39 and 40 to the
90 lower end of the bar 41. The bars 32 and 41 are slidable along the edges of the rails to which they are respectively adjacent, and for continuously exerting a rearward pull on each of the bars a spring 43 is connected at
95 its forward end to the center of the bar 32 and at its rear end to a key 44 which is engageable in any one of a series of notches 45 formed in the edges of the adjacent rails 14 so that by placing the ends of the key in
100 different notches the tension of the spring may be adjusted; in a similar way the forward end of a spring 46 is attached to the bar 41 and its rear end to a key 47 engageable in notches 48 in the rails 15. Preferably the springs are arranged to diverge slightly toward the rear so as to maintain the bars to which they are respectively attached in snug abutting engagement with the adjacent rails without, however, interfering
105 with the capacity of the bars to slide along the edges thereof.

It will thus be apparent that the springs 43 and 46 are effective to exert a constant
110 rearward pull on the bars 32 and 41 which, in turn, maintains the cables 30 and 31 under considerable tension with the result that the portions of the cables adjacent the guide exert a forward thrust on the sheaves 35 and 37 and the corresponding subjacent sheaves
120 which tends to urge the guide and its attached parts forward so as to press the stones against the face of the roll with which the device is operatively associated. It will be further apparent that the thrust so exerted
125 is equalized throughout the length of the guide so that all of the stones are pressed against the face of the roll with an equal pressure while the guide with its attached parts is free to recede from or move toward
130

the roll in conformity with any irregularities thereof, thereby maintaining the stones constantly in suitable frictional engagement with the roll as well as automatically compensating for the gradual wearing down of the stones as it occurs.

My improved roll polisher when constructed substantially in the manner hereinbefore described may be readily attached to a rolling mill of ordinary construction, as shown in Figs. 1 and 2, by merely bolting the rails to the housings of the mill either with the rails extending horizontally as in the case of the polisher adjacent the roll R which, in Fig. 2, is shown as attached in this manner, or with the rails extending at a slight angle to the horizontal as in the case of the polisher associated with the roll R' in the said figure. With equal facility the polisher may be detached from the mill to allow the rolls thereof to be changed or for other purposes either by removing the pins 16 and disengaging keys 44 and 47 to permit the guide with its attached parts to be slid out of the rails, the latter being allowed to remain on the housings, or by detaching the whole mechanism from the mill by removing the rails.

Under ordinary conditions of operation the roll polisher may preferably be kept on the mill and continuously operated whenever the mill is in use thereby keeping the rolls properly polished and in condition for satisfactory operation at all times, the pressure with which the polishing stones are held against the face of the roll being adjusted by varying the tension of the springs 43 and 46, the length of the stroke of the stone holder being regulated by adjustment of the nuts 28 and the speed with which the stones are moved back and forth across the roll being controlled through the valve mechanism so as to produce the best results under the particular conditions under which the mill is working. If desired, however, the polisher may be operated so as to polish the rolls at predetermined intervals instead of continuously, the stones between the intervals of polishing being held out of engagement with the roll by relieving the tension on the springs and pushing the guide with its attached parts rearwardly to the limit of the movement permitted by slots 17.

While I have herein illustrated and described a preferred embodiment of my invention which is adapted for installation on and use in connection with a rolling mill of ordinary construction, I do not thereby desire or intend to confine myself specifically thereto or to the use of the invention with any particular type of mill as the design, construction and arrangement of the various elements may be modified in numerous particulars from the precise embodiment to which I have referred, and the roll polisher may be utilized for the

polishing of the rolls of apparatus other than rolling mills and suitably adapted therefor if required, without departing from the spirit and scope of the invention as defined by the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. In combination with a rolling mill, a roll polishing device comprising a polishing block, a guide, a holder for the block mounted in the guide and adapted for reciprocation with respect thereto, means for supporting the guide between the housings of the mill adjacent one of the rolls thereof, said means being adapted to permit limited movement of the guide to and from the roll, means for reciprocating the holder in the guide to move the block back and forth longitudinally of the roll, and yielding means connected with said supporting means and with the guide operative to continually urge the guide forwardly toward the roll so as to maintain the block in operative engagement therewith.

2. In combination with a rolling mill, a roll polishing device comprising a polishing block, a guide, a holder for the block mounted in the guide and adapted for reciprocation longitudinally thereof, means for supporting the guide between the housings of the mill adjacent and parallel to one of the rolls thereof, means for permitting limited movement of the guide to and from the roll relative to the supporting means, means for reciprocating the holder in the guide, and means for urging the guide toward the roll comprising a flexible element bearing on the guide and resilient means connecting said element with a point relatively stationary with respect to the housings of the mill.

3. In combination with a rolling mill, a roll polishing device comprising a guide, a reciprocatory holder mounted in the guide, polishing blocks mounted in the holder, means for supporting the guide between the housings of the mill so as to dispose the blocks adjacent and parallel to the axis of one of the rolls thereof, means adapted to permit the guide to move in its supporting means to or from the roll and to restrain said guide from movement longitudinally of the roll, means for reciprocating the holder in the guide, and means for applying a yielding pressure to the guide to move it forwardly toward the roll relatively to its supporting means comprising a flexible cable bearing on the guide and resilient means connecting the ends of the cable with a point relatively stationary with respect to the guide.

4. In combination with a rolling mill, a roll polishing device comprising a guide, a reciprocatory holder mounted in the guide, polishing blocks mounted in the holder, means for supporting the guide between the housings of the mill so as to dispose the blocks adjacent and parallel to the axis of one of the rolls

thereof, means adapted to permit the guide to move in its supporting means to or from the roll and to restrain said guide from movement longitudinally of the roll, means for reciprocating the holder in the guide, and means for applying a yielding pressure to the guide to move it forwardly toward the roll relatively to its supporting means comprising a flexible cable extending across the central portion of the guide, thence angularly forward to the supporting means on either side of the guide and thence rearwardly and yielding means connecting the ends of the cable with said guide supporting means.

5. In combination with a rolling mill, a roll polishing device comprising a guide, a reciprocatory holder mounted in the guide, polishing blocks mounted in the holder, means for supporting the guide between the housings of the mill so as to dispose the blocks adjacent and parallel to the axis of one of the rolls thereof, means adapted to permit the guide to move in its supporting means to or from the roll and to restrain said guide from movement longitudinally of the roll, means for reciprocating the holder in the guide, and means for applying a yielding pressure to the guide to move it forwardly toward the roll relatively to its supporting means comprising a pair of flexible cables respectively disposed in vertically spaced relation and each extending across the central portion of the guide, thence angularly forwardly in opposite directions to the forward ends of the supporting members and thence rearwardly substantially parallel to said members and resilient means connecting the ends of said cables to said supporting members.

6. A continuous roll polisher adapted to polish a roll of a rolling mill comprising a polishing block, a holder for the block, a guide for supporting the holder, means for supporting the guide from the housings of the mill, fluid actuated means carried by the guide and connected with the holder for reciprocating the holder in the guide, and adjustable means for regulating the stroke of the holder relatively to the guide.

7. A continuous roll polisher adapted to polish a roll of a rolling mill comprising a polishing block, a holder for the block, a guide for supporting the holder, means for supporting the guide from the housings of the mill, a cylinder supported from the guide and enclosing a piston, means for effecting reciprocation of the piston in the cylinder, means connecting the piston with the holder whereby reciprocation of the piston is operative to reciprocate the holder in the guide and means for regulating the stroke of the

holder without varying the stroke of the piston.

8. A roll polishing device for a rolling mill, comprising supporting means adapted for attachment to the housings of the mill, a polishing block, a guide extending between said supporting means and capable of movement longitudinally thereof, a reciprocatory holder for the block mounted in said guide, means for reciprocating the holder, and means including a spring-tensioned cable operative to constantly urge the guide in a predetermined direction along the supporting means.

9. A roll polishing device for a rolling mill, comprising supporting rails adapted for attachment to the housings of the mill, a guide extending transversely between said supporting rails and adapted for limited longitudinal movement therealong, a polishing block, a holder for the block arranged for reciprocation in the guide, fluid actuated means carried by the guide for reciprocating the holder, and means comprising a spring-tensioned cable operative to continuously urge the guide along the rails in a predetermined direction.

10. A continuous roll polisher adapted to polish a roll of a rolling mill and comprising a polishing block, a holder for the block having a rearwardly extending arm, a guide for supporting the holder, means for supporting the guide from the housings of the mill, a cylinder carried by the guide, a fluid actuated reciprocating piston therein, and a piston rod extending therefrom to said arm and provided with a nut on each side thereof adjustable on the rod whereby the extent of reciprocation of the holder in the guide in correspondence with the movement of the piston may be varied by adjustment of said nuts on the piston rod.

11. In combination with a rolling mill, a roll polishing block, a holder therefor, a guide extending parallel to the axis of the mill roll and supporting the holder, means for automatically reciprocating the holder in the guide so as to move the block back and forth across the face of the roll, means for supporting the guide between the housings of the mill and adapted to permit limited movement of the guide toward or away from the roll, and yielding means for constantly urging the guide and holder toward the roll with a yielding pressure equalized throughout their length so as to maintain the block in engagement with the roll.

In witness whereof, I have hereunto set my hand this 1st day of April, 1926.

JOHN D. WILLIAMS.