

Sept. 30, 1958

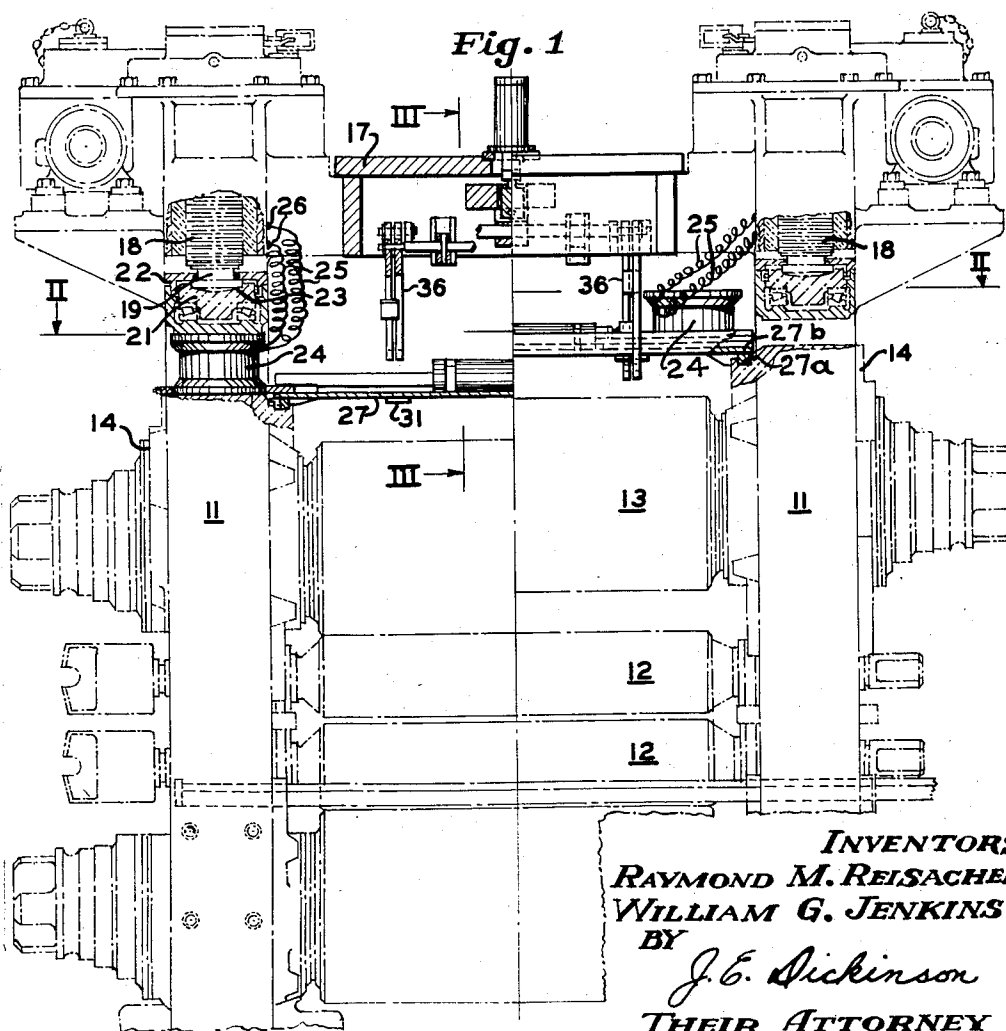
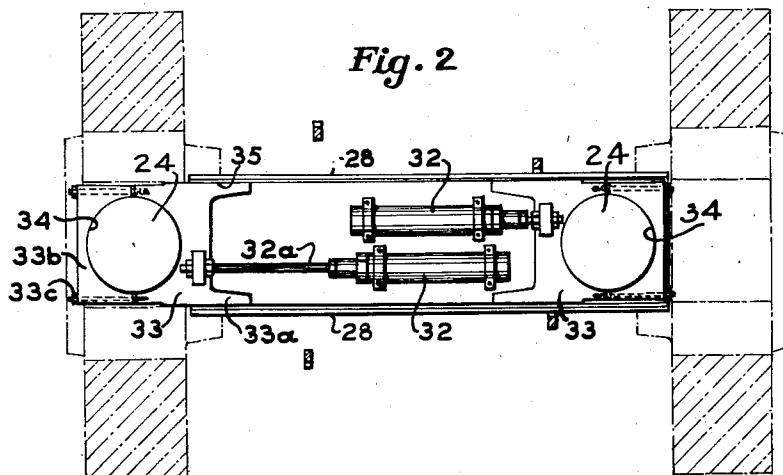
R. M. REISACHER ET AL

2,853,905

ROLLING MILL PRESSURE BLOCK SUPPORT

Filed March 28, 1955

2 Sheets-Sheet 1



INVENTORS
RAYMOND M. REISACHER
WILLIAM G. JENKINS
BY
J. E. Dickinson
THEIR ATTORNEY

Sept. 30, 1958

R. M. REISACHER ET AL

2,853,905

ROLLING MILL PRESSURE BLOCK SUPPORT

Filed March 28, 1955

2 Sheets-Sheet 2

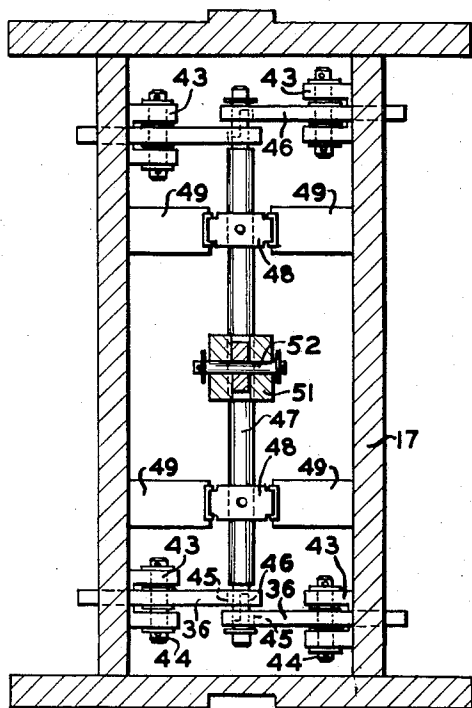


Fig. 4

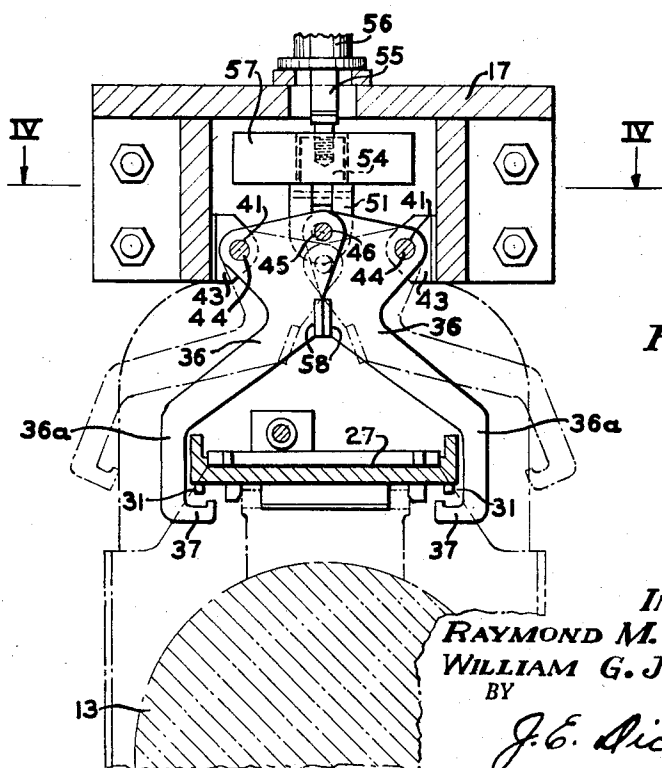


Fig. 3

INVENTORS
RAYMOND M. REISACHER
WILLIAM G. JENKINS
BY
J. E. Dickinson
THEIR ATTORNEY

1

2,853,905

ROLLING MILL PRESSURE BLOCK SUPPORT

Raymond M. Reisacher, Dormont, and William G. Jenkins, New Castle, Pa., assignors to United Engineering and Foundry Company, Pittsburgh, Pa., a corporation of Pennsylvania

Application March 28, 1955, Serial No. 497,048

6 Claims. (Cl. 80—55)

This invention relates to rolling mills and in particular to a mechanism for removing the pressure blocks associated with the mill in order to facilitate the removal and replacement of both the work and back-up rolls of the mill.

When roll changes are to be made in a mill of the four-high or backed-up type, it is to be appreciated that considerable time and effort must be expended in carrying out the operation. Depending upon the type of mill involved and the particular rolls to be removed and changed, the time required to be taken may well be from two to ten hours. This condition is even more critical where the screws of the mill screwdown are of the high reduction type for it takes approximately twenty minutes to withdraw the screws even for as small a clearance as two inches. Thus, the time required alone for withdrawing and repositioning the screws would be forty minutes. Roll changing, of course, depends upon the roll surface condition required for a particular product being rolled and if frequent redressing and replacement of the rolls is necessary, then it is of extreme importance that roll changing be accomplished quickly and efficiently in order that the mill be not idle for any extended periods of time.

It is, therefore, one of the objects of this invention to provide a mechanism of simple construction which will facilitate the efficient removal and replacement of the rolls of a mill.

It is another object of this invention to provide a device which will permit the rapid removal of the pressure blocks, interposed between the screwdown screws and the roll chucks, to a position closely adjacent to their normal operating position for storage in order to rapidly provide sufficient clearance between the screws and the chucks so that the top roll may be raised quickly by the hydraulic balancing mechanism associated with the rolls to provide the clearance for rapid removal of the work rolls.

It is a further object of this invention to provide a platform employing members connected to the pressure blocks of the mill for withdrawing and supporting the blocks at a point closely adjacent to their normal operating position so that sufficient clearance is provided for removing both the work and the back-up rolls of the mill.

Still another object of this invention is to provide a platform for receiving the pressure blocks of a mill and suspending them from the mill housing and independently of the upper back-up roll chucks.

A further object of this invention is to provide a mill pressure block removal and supporting platform having incorporated therewith elements for preventing accidental displacement of the platform and pressure blocks during or after removal of the rolls from the mill.

These objects, as well as the various other novel features and advantages of this invention, will become apparent from the following description and accompanying drawings of which:

Figure 1 is an elevation view of a four-high mill in which there is shown, partly in section, the pressure block

2

removal and supporting device in both its operative and inoperative positions;

Figure 2 is a sectional view taken at II—II of Figure 1;

Figure 3 is an elevation sectional view taken at III—III of Figure 1, and

Figure 4 is a sectional plan view taken at IV—IV of Figure 3.

With reference to the drawings, particularly Figures 1 and 2, there is illustrated therein the preferred embodiment of the invention herein disclosed in which there is shown in outline form a pair of rolling mill housings 11 having mounted therein a pair of work rolls 12 and back-up rolls 13, the upper back-up rolls 13 being supported at their ends in chucks 14 slidably mounted within the windows of the mill housings. The housings 11 are joined together at their tops by a separator 17 extending between the inner vertical faces of the housings. At the top of each housing 11 there is provided centrally thereof a pressure screw 18 which is raised or lowered by means of a suitable motor connected to a gear reduction drive, such as are normally employed in mills of this type for applying the desired pressure to the rolling mill rolls through their chucks.

Depending upon the purpose for and the type of mill involved, the pitch of the screws 18 may be quite low as is the case in mills such as those employed for rolling extremely thin material as, for example, aluminum foil. As the motors and gear reduction units connected to and for driving the screws deliver a relatively low effective speed to the screws, considerable time is therefore expended in raising or lowering the screws an appreciable distance.

In the instant embodiment, the screws 18 of the mill are of the low pitch slow speed type and are provided with a naked portion 19 to which a thrust bearing 21 is secured by its casing 22 for movement up and down with the screws. The lower ends of the screws are rounded so as to firmly seal themselves in recesses provided on the upper surface of the bearing race 23. Engaging with and mounted upon the upper back-up roll chucks 14 there are two pressure blocks 24 embodying load cells of the variable resistance type such as those customarily employed for measuring extremely high pressures and from which there extend two electrical conductors 25 which are permanently connected at their ends to binding posts 26 secured to the inner upper face of the mill housings. Although not shown, there are two additional electrical conductors which extend from the posts 26 to an electrical pressure indicating meter located preferably in the mill operator's pulpit so that when pressure is applied to the rolls and mill housings the intensity thereof will be readily ascertainable by the mill operator. If, during a rolling operation, it is desired to maintain a permanent record of the pressures applied, then for this purpose a recording meter may be employed and readily connected into the circuit. Also, for safety purposes, an alarm can be provided in the circuit for audibly warning the mill operator of an extremely high and dangerous loading condition which may be imposed upon the housings and rolls.

At the top inner portion of each of the top roll chucks 14 there is provided a recess 27a within which there are received projections 27b which extend downwardly from beneath the ends of the platform 27. Secured to and extending lengthwise along the upper edges of the platform 27 there are two spaced guides 28 and beneath the platform there are provided at either side adjacent to the edges a pair of spaced lugs 31. At the top of the platform there are two double acting piston-cylinder assemblies 32 with the piston rods 32a thereof extending in opposite directions toward the mill housings. To the outer end of each rod there is secured a slide plate 33 made up of two portions 33a and 33b secured together

with bolts 33c and having an opening 34 therein which encircles the pressure block 24. The inner portion 33a of each plate is slightly wider than the other portion in order to provide a complementary guide 35 which communicates with guides 28 secured to the top of the platform 27.

When the work rolls are to be changed it is necessary to back-off the screws only a slight amount to free the pressure blocks and permit their withdrawal to a position on the platform by actuation of the piston-cylinder assemblies 32, thereby to provide the necessary clearance for raising the back-up rolls and chucks by means of the roll balance system provided therefor to permit the withdrawal of the work rolls. The electrical connections for the pressure block need not be disturbed when the blocks are moved onto the platform inasmuch as the blocks are supported at points in close proximity to their normal operating positions, a sufficient length of conductor wire being available to permit such limited movement.

For removing the back-up rolls, in addition to the work rolls, however, it is necessary that additional means other than the back-up roll chucks be provided for supporting the platform and pressure blocks in the upper position. Such a means is shown in Figures 1, 3 and 4 of the drawings and comprises two pairs of tongs 36 located at equal distances on either side of the centerline of the mill. Each pair of tongs comprises two limbs 36a which are provided at their lower ends with hook portions 37 adapted to engage with the underside of the platform 27. The upper portions of the limbs 36a are provided with openings 41 which match with similar openings in bifurcated brackets 43 affixed to the separator 17 and through which there are passed pins 44 for pivotally suspending the limbs from the platform. At a point directly on the centerline of the tongs portions of the limbs overlap and are provided with enlarged openings 45 through which the reduced ends 46 of a shaft 47 are passed and within which sufficient clearance is provided to avoid jamming of the limbs when they are transposed from their full line to their dotted line positions as shown in Figure 3. The shaft 47 extends along the under portion of the separator and is secured within two guide blocks 48 which engage with vertical guides 49 secured to the separator. At the center of the shaft 47 there is a clevis 51 and through openings in the arms thereof there is passed a pin 52 for securing a piston rod extension 54 to the clevis. The extension 54 is threadably engaged with a piston rod 55 which through an opening in the separator 17 projects downward from a piston-cylinder assembly 56 secured to the top of the separator. A counterweight 57 surrounds the extension 54 and is supported by the clevis and so arranged as shown in Figure 3 that when the piston-cylinder assembly is under no pressure, the counterweight will cause the tongs to move outward away from the platform and assume the attitude shown in dot and dash lines in Figure 3 thereby providing adequate clearance between the platform and the tongs in order to avoid interference therebetween during normal operation of the mill. For limiting the extent to which the tongs can be moved on closing, the limbs are provided with pads 58 welded thereto which strike against one another as the limbs move inward. By reason of the shape of the hooks and the manner in which the hooks are arranged relative to each other, when the platform and the pressure blocks supported thereby are loaded onto the hooks, the loading forces act inwardly, as is evident from Figure 3, so as to cause the tongs to be urged toward their closed position. For safety reasons the lugs 31 have been provided at the bottom of the platform which will engage with the hooks 37 should the hooks for some reason tend to slip outwardly toward the edges of the platform in the engaged position.

The present invention having thus been described and defined the operation thereof may be briefly summarized as follows:

When the work rolls 12 of the mill are to be changed, the screws 18 and the pressure blocks 24, as shown in the half section to the left of Figure 1, are free of contact with the screws and bearings carried at their ends and without disturbing the electrical connections thereof they are thereby withdrawn by actuation of the piston-cylinder assemblies 32 and placed upon the platform 27 as is shown in the half section to the right of Figure 1. With the pressure blocks 24 out of the way of the upper back-up roll chucks 14, the upper back-up rolls and chucks are quickly raised by actuation of the roll balance system, not shown, to assume the position shown to the right of Figure 1 and the work rolls may be withdrawn from the mill and readily replaced. During this operation, the tongs remain in their fully open position since the platform 27 is continually supported by the upper back-roll chucks as is indicated in the right half section of Figure 1 and in the dotted line portion of Figure 3.

In the event the back-up rolls 13 of the mill are also to be removed for replacement, after the work rolls have been removed in accordance with the procedure outlined above and the upper back-up rolls and platform are in the position as shown to the right of Figure 1 and the positions of the platform and the hooks in outline are as shown in Figure 3, pressure is applied to the piston-cylinder assembly causing the piston rod to move upward and move the tongs to their full line closed position. When the upper back-up roll and chucks with the platform supported thereby are then lowered from their positions as shown in Figure 3, the platform engages with the closed hooks 37 thereby removing the platform from the back-up roll chucks as the chucks move downward. Thus, the back-up rolls and chucks are free of the platform and pressure blocks so that the rolls can then be removed from the mill. As mentioned heretofore, the action of the load upon the tongs, which by far offsets the effect of the counterweight, the tongs are urged toward their closed position thereby securely supporting the platform.

From the foregoing it is appreciated that considerable saving in time in roll changing operations can be effected especially if the pressure blocks are provided with pressure responsive elements connected to an electrical circuit provided with gages for determining the pressures applied by the mill screws to the housings and the rolls. In the use of this invention there is avoided not only the inconvenience of disconnecting the pressure blocks from the electrical system and removing them to a place remote from the mill but also the necessity for recalibrating the electrical circuits since they normally require readjusting each time the electrical circuits are disturbed.

In accordance with the provisions of the patent statutes, we have explained the principle and operation of our invention and have illustrated and described what we consider to represent the best embodiment thereof. However, we desire to have it understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. For use in combination with a rolling mill having a pair of housings, a pair of rolls, chucks secured to the ends of said rolls and mounted for vertical movement in the windows of said housings, a pair of adjustable screws mounted in the housings above the roll chucks and a removable pressure block interposed between each of said screws and the roll chucks, apparatus comprising a horizontal platform normally supported by the roll chucks of the upper roll during the operation of the mill, means secured to each pressure block and to said platform adapted to be actuated for moving said pressure blocks from their operative positions beneath the screws to their inoperative positions onto said platform, hook-like elements, means pivotally suspending said hook-like

5

elements from said housing, said hook-like elements extending downwardly therefrom towards said platform, means for pivoting said elements to place them in such a position as to engage and support said platform when the rolls are lowered for removal from the mill.

2. For use in combination with a rolling mill having a pair of housings, a pair of rolls, chucks secured to the ends of said rolls and mounted for vertical movement in the windows of said housings, a pair of adjustable screws mounted in the housings above the roll chucks and a removable pressure block interposed between each of said screws and the roll chucks, apparatus comprising a horizontal platform normally supported by the roll chucks of the upper roll during the operation of the mill, means secured to each pressure block and to said platform adapted to be actuated for moving said pressure blocks from their operative positions beneath the screws to their inoperative positions onto said platform, hook-like elements, means pivotally securing said hook-like elements to said housing, said hook-like elements projecting downwardly therefrom toward said platform, means for spreading said hooks normally to prevent their engaging said platform, and means for pivoting said elements to place them in such a position as to engage and support said platform when the rolls are lowered for removal from the mill.

3. For use in combination with a rolling mill having a pair of housings, a pair of rolls, chucks secured to the ends of said rolls and mounted for vertical movement in the windows of said housings, a pair of adjustable screws mounted in the housings above the roll chucks and a removable pressure block interposed between each of said screws and the roll chucks, apparatus comprising a platform normally supported during operation of the mill by that portion of the upper roll chucks extending beyond the inner face of the housings, a pair of members secured to said platform and to said pressure blocks, means connected to and for actuating said members to transfer said pressure blocks from their normal positions beneath the screws and onto said platform, a pair of tongs, means pivotally suspending said tongs from said mill, said tongs extending downwardly therefrom towards said platform, means operatively connected to said tongs for normally maintaining said tongs in their open position, means operatively connected to said tongs for overcoming the

6

influence of said last-mentioned means and to close said tongs for engagement with said platform and stop means for limiting the extent to which said tongs can be closed.

4. Apparatus for use in conjunction with a rolling mill according to claim 1 in which the means that suspends said hook-like elements from said housings engage said hook-like elements at points adjacent to one another and above and between the points at which the loads are applied thereto whereby when a load is applied to said elements, said elements are pivotally urged in a direction toward their closed position.

5. For use in combination with a rolling mill having a pair of housings having windows in the sides thereof, a pair of rolls, chucks secured to the ends of said rolls and mounted for vertical movement in the windows of said housings, a pair of adjustable screws mounted in the housings above the roll chucks and a removable pressure block interposed between each of said screws and the roll chucks, apparatus comprising a horizontal platform normally supported by the roll chucks of the upper roll during operation of the mill, means connected to and for transferring said pressure blocks onto said platform, a pair of tongs for supporting said platform between the housing when the rolls are to be removed from the mill, a counterweight secured to and for normally maintaining said tongs in their open position and means connected to said tongs for overcoming the influence of said weight to close the tongs thereby to engage and support said platform.

6. Apparatus for use in combination with a rolling mill according to claim 5 in which stop means are provided for limiting the extent to which said tongs can be closed.

References Cited in the file of this patent

UNITED STATES PATENTS

591,713	Worth	Oct. 12, 1897
873,439	Keller	Dec. 10, 1907
1,004,500	Taylor	Sept. 26, 1911
1,630,456	Wehr	May 31, 1927
1,957,719	Naugle	May 8, 1934
2,229,800	Dean	Jan. 28, 1941
2,260,762	Yarrington	Oct. 28, 1941
2,365,831	Mogiljanskij	Dec. 26, 1941