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3,552,171

ROLL CHANGING DEVICE FOR ROLLING MILLS

Filed May 14, 1968

2 Sheets-Sheet 1

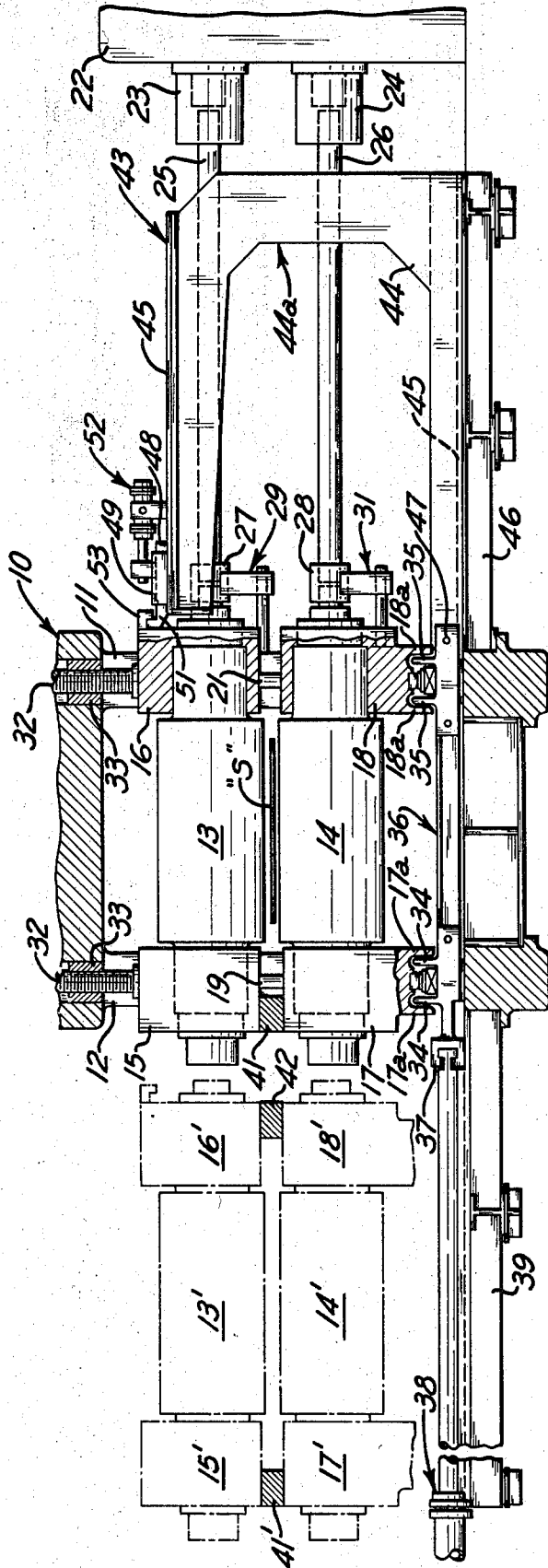


Fig. 1

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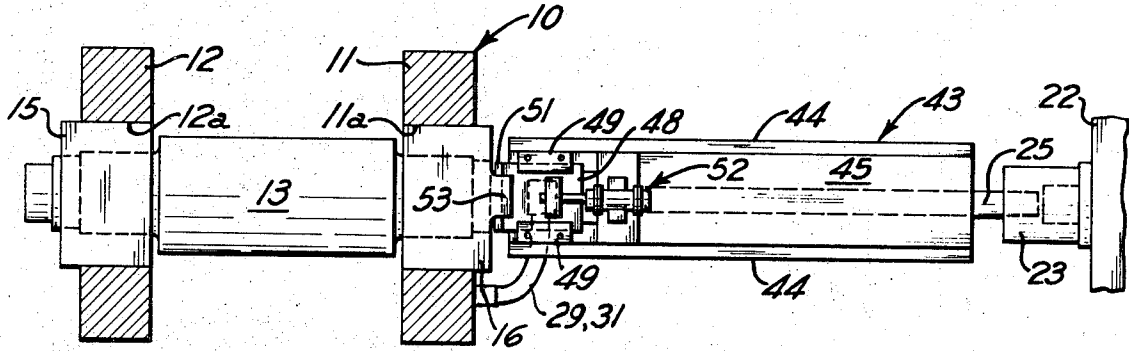


Fig. 2

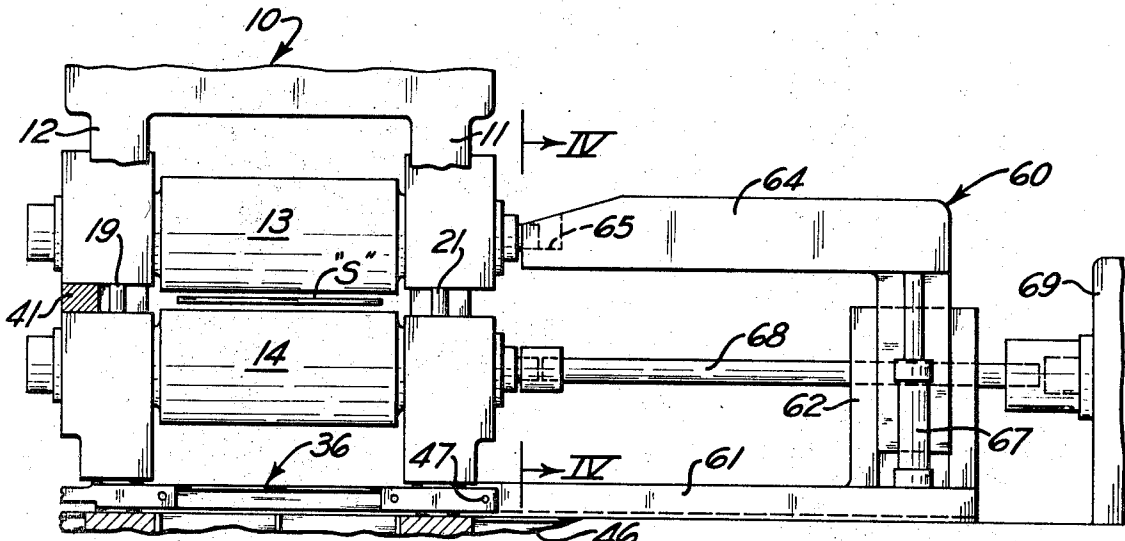


Fig. 3

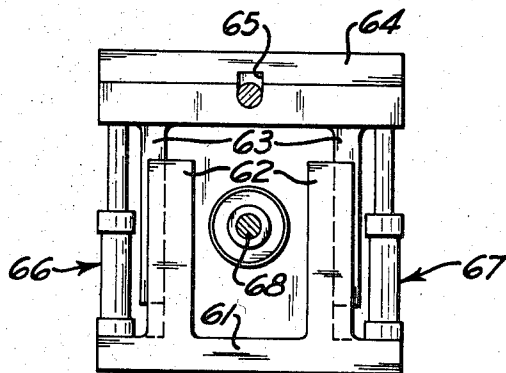


Fig. 4

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ROLL CHANGING DEVICE FOR ROLLING MILLS
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5 Claims

ABSTRACT OF THE DISCLOSURE

The disclosure provides a roll changing device for a rolling mill having a housing for supporting upper and lower roll assemblies and drives located at one side of the housing for transmitting torque to at least one of said roll assemblies, a C-shaped support is located at the drive side of the mill for carrying at least the drive side of the upper roll assembly through the housing during removal of the upper roll assembly. The lower roll assembly is removed from the housing by a standard roll changing rod.

It has become a common practice in recent years to include a rolling mill as an integral part of a processing line, such as, a continuous pickling or annealing line. In this arrangement it becomes necessary to change the rolls of the mill without requiring the discontinuance of operation of the processing line. While, in this instance, the rolling mill will not be employed to process the material, the material continues to be fed through the line. It is important, however, that the rolling mill be brought back into operation as quickly as possible.

Therefore, it is an object of this present invention to provide in combination with a rolling mill an apparatus for facilitating the quick changing of the rolls thereof while the material is passing through the mill, but not engaged by the rolls thereof.

The various novel features and advantages of the present invention will be better appreciated from the following description thereof when considered along with the accompanying drawings of which:

FIG. 1 is a sectional elevational view of a mill incorporating one form of the present invention;

FIG. 2 is a plan section view taken along lines I—I of FIG. 1;

FIG. 3 is a sectional elevational view of a second embodiment of the present invention; and

FIG. 4 is a sectional view taken along lines IV—IV of FIG. 3.

With reference to the drawings, there is shown in FIG. 1 a rolling mill 10 having a housing 11 on the drive side of the mill and a similar housing 12, but on the operator's side of the mill. Each of the housings 11 and 12 are formed with conventional window openings 11a and 12a, respectively. Upper and lower work rolls 13 and 14, respectively, are rotatably mounted in bearing chock assemblies 15, 16 and 17, 18, respectively, which are in turn received in the windows 11a and 12a of the housings. The rolls are urged apart from each other by the usual balance piston cylinder assemblies 19 and 21 carried in bearing chocks 17 and 18.

Arranged at the drive side of the mill, i.e., to the right of the mill 10 as one views FIGS. 1 and 2, there is provided in a usual form a drive 22 having torque output shafts connected to flexible couplings 23 and 24 of spindles 25 and 26. The spindles are, in turn, connected by flexible couplings 27 and 28 to the rolls 13 and 14. Spindle supports 29 and 31 are pivotally secured by conventional means to the housing 11. These supports are adapted to be selectively positioned into a supporting relation with the couplings 25 and 26 during the time when the rolls 13 and 14 are being removed from the mill and replacement rolls inserted into the mill.

As shown in FIG. 1, the upper roll 13 is adjusted vertically in the housing windows relative to the lower roll 14 by a pair of screws 32 which are received in nuts 33 secured against rotation in the top of the housings, the screws being driven through a motor or gear drive, not shown. The chocks 17 and 18 of the lower roll 14, as shown in FIG. 1, have downward projections 17a and 18a forming recesses into which there are received, in an interlocking relationship, upward projections 34 and 35 which form part of a horizontally extending sled 36 that runs between the housings 11 and 12 and extends into the windows thereof. The rolling loads pass from the lower chocks 17 and 18 of the lower roll 14 into the sled and, thus, into the housings.

The sled 36 is supported by the housings 11 and 12 and is constructed to be slidably removed from the mill and, thus, serves an essential part of the roll changing apparatus. The sled projects outward from the housing 12, viewing FIG. 1, toward the operator's side of the mill, where the sled is provided with a yoke 37 to which is connected a piston cylinder assembly 38. The piston is capable of moving the sled and rolls carried thereby out of the mill to the position shown by phantom lines in FIG. 1, where the sled is supported by rails 39. In the phantom line position of the rolls, the upper roll 13' is adapted to be supported by stools 41 and 42 on the lower roll 14'.

Since it is an object of the present invention to provide a construction which will allow the rolls to be removed and inserted into the mill while strip S is still passing between the rolls, means must be provided for supporting the drive side upper chock 16 while the rolls are being moved out of and into the mill on the operation of the piston cylinder assembly 38. To accomplish this, there is provided, as shown in FIGS. 1 and 2, a generally C-shaped frame 43 made up of vertically arranged C-shaped plates 44 connected together by upper and lower spacer plates 45. It is pointed out that the central portion 44a of the frame 43 has a void area between the plates 44 through which the spindles 25 and 26 extend for unobstructed rotation.

Slidably supporting the frame 43 are rails 46 which are horizontally arranged at the drive side of the mill at an elevation common to the sled 36. A pin 47 secures the lower adjacent end of the C-shaped frame 43 to the sled whereby the sled and frame move in unison when the piston cylinder assembly 38 is operated. As shown in FIGS. 1 and 2, a latch 48 is slidably carried by the plate 45 adjacent to the housing 11. Gib plates 49 are secured at each side of the latch 48 for restricting movement thereof to only a horizontal direction. Formed on

the latch 48 is a chock supporting end 51 which is horizontally positioned by a piston cylinder assembly 52 mounted on the plate 45 and having its rod end connected to the latch. As illustrated in the drawings, the chock 16 is constructed with a horizontal projection having a hook 53 formed on the end thereof which is complementary to the supporting end 51.

The rolls of the illustrated mill are changed according to the following procedure. In order to remove the rolls while the material is still passing between them, the screws 32 are rotated so as to allow the upper roll 13 to be moved away from the lower roll on operation of the balance piston cylinder assemblies 19 and 21. When this occurs, the stool 41 is inserted between the chocks 15 and 17 at the operator's side of the mill following which the balance cylinder 19 can be collapsed so that the chock 15 of the upper roll 13 is actually carried by the chock 17 of the lower roll.

The operation of the piston cylinder assembly 21 continues so as to hold the upper chock 16 of the upper roll away from the lower roll and at a preselected elevation. The piston cylinder assembly 52 is then operated to extend the latch 48. Following this, the balance cylinder 21 is retracted to lower the chock 16 until the hook 53 engages the end 51 of the latch 48. The chock 16, as well as the drive end of the roll 13, are then supported above the strip S by the C-shaped frame 43. Following this, the supports 29 and 31 are positioned to carry the coupling ends 27 and 28 when they are disengaged from their respective rolls. The actual removal of the rolls can now be effected by operation of the piston cylinder assembly 38 which withdraws the sled 36 carrying the lower roll and its chocks along with the chock 15 of the upper roll. As the sled is displaced to the operator's side so is the C-shaped frame of the first embodiment, the second em-

strip S as it continues to pass through the mill. The rolls 13 and 14 being completely removed from the housings 11 and 12 are then located at the position indicated by the phantom lines in FIG. 1. At this location the stool 42 is placed between the chocks 16' and 18', after which a crane or other means is employed to remove this pair of rolls and their chocks from the sled 36.

When a new set of rolls is to be inserted into the mill, they are brought to the mill by a crane or other means and located in the phantom line position on the sled 36. The above procedure is then followed in reverse order to insert these rolls and their chocks into the mill.

FIGS. 3 and 4 illustrate a second embodiment of the present invention in which regard similar reference numerals have been applied to elements common to the embodiment illustrated in FIGS. 1 and 2. In place of the C-shaped frame of the first embodiment, the second embodiment provides a vertically adjustable member 60 for carrying the upper roll at the drive side and its bearing chock. The member 60 essentially consists of a support platform 61 carried by the rails 46 at the drive side of the mill. The platform is connected to the sled 36 by the pin 47 so that they move as a unit relative to the housings. The support platform 61 has vertically extending arms 62 that receive in a guiding relation downwardly extending arms 63 of a roll support bar 64. The roll support bar extends toward the mill and has a recess 65 formed in its end adjacent the upper roll. Arranged between the platform 61 and the support bar 64 are piston cylinder assemblies 66, 67 employed to elevate the support bar 64 into a roll supporting position wherein the roll end is supported in the recess 65.

It is pointed out that in the embodiment illustrated by FIGS. 3 and 4 that only the bottom roll 14 is driven by a spindle 68 that is, in turn, connected to a drive 69. FIG. 4 illustrates the spindle passing through a void area between the arms 62. The embodiment illustrated by FIGS. 3 and 4 has the advantage of elevating the support bar 64 relative to the mill to engage the drive side of the roll 13. Thus, it is not necessary to position the upper

roll at some predetermined location, but instead, the rolls 13 and 14 are separated a minimum distance to enable free passage of the rolls out of the mill relative to the strip S.

In accordance with the provisions of the patent statutes, I have explained the principle and operation of my invention and have illustrated and described what I consider to represent the best embodiment thereof. However, I 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.

I claim:

1. In a roll changing device for changing of a rolling mill while material is passing between the rolls but not being rolled,

said mill having a housing including a window for rotatably receiving upper and lower rolls, said rolls having drive ends and operating ends and carrying bearing chocks at each of said ends forming upper and lower assemblies,

a support frame including means for engaging and carrying the drive end of the upper roll assembly in a manner that the drive ends of the rolls are separated from each other by a predetermined distance, means at the drive ends of said rolls located outside of the housing and extending through said housing from the drive ends of said rolls for supporting said frame, a sled supported by the lower portion of said housing for carrying the lower roll assembly, and power means for moving said support frame and sled relative to said housing in a direction toward the operating ends of said rolls for simultaneously removing the upper and lower roll assemblies from the housing.

2. In a roll changing device according to claim 1, in which said rolling mill also includes a means for moving said upper roll assembly into a predetermined position, and

means for supporting a portion of said drive means when said one roll assembly is removed from the housing.

3. In a roll changing device according to claim 1, wherein said first means includes a base and an upper portion movable relative to said base, and

means for moving said upper portion to bring it into a supporting relationship with said roll when said one roll is removed from said housing.

4. In a roll changing device according to claim 1 including:

means for inter-connecting said support frame and said sled, and

support means for carrying the operating end of the upper roll in a manner that the operating ends of the rolls are separated from each other by a predetermined distance.

5. In a roll changing device according to claim 1 wherein said support frame comprises a C shaped structure having its upper longitudinal arm substantially coplanar with the axis of said upper roll and its lower arm substantially coplanar to said sled and having a width less than the width of said window and wherein said support frame passes into said window during removal of the rolls from the housing.

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CHARLES W. LANHAM, Primary Examiner

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,552,171

Dated January 5, 1971

Inventor(s) Charles Storer Shumaker

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, lines 35 and 36, "of the first embodiment, the second em-" should read -- which carries the chock 16 above the --.

Signed and sealed this 15th day of June 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents