United States Patent [19]

Gegick

[11] **3,779,062**

[45] **Dec. 18, 1973**

[54] **ROLL POSITIONING MEANS FOR A ROLLING MILL**

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[22] Filed: **June 5, 1972**

[21] Appl. No.: **259,634**

[52] **U.S. Cl.** **72/244**

[51] **Int. Cl.** **B21b 31/30**

[58] **Field of Search** 72/244, 238, 239, 72/237

[56] **References Cited**

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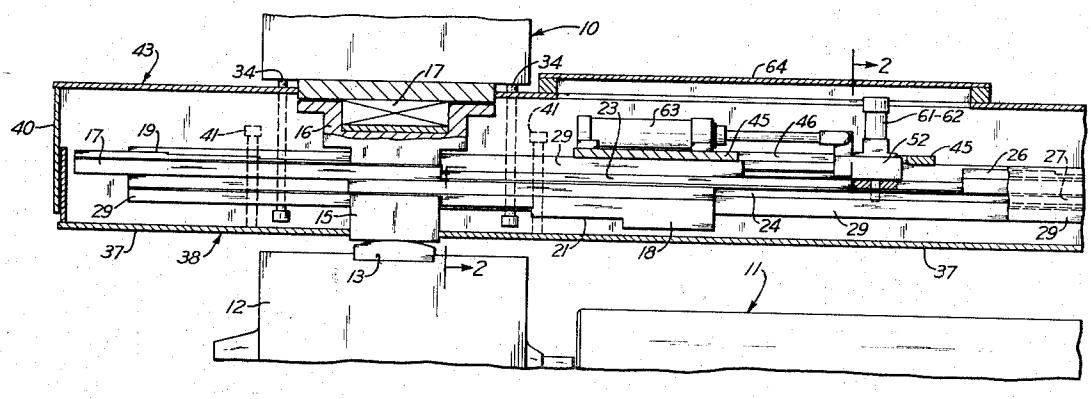
[57] **ABSTRACT**

This disclosure relates to an incremental adjusting device for a roll of a rolling mill. The device includes two cooperative sliding bars arranged back to back and each having an equal number of steps, the steps of one bar being fine compared to the coarse steps of the other bar. A piston cylinder assembly selectively moves the coarse and fine steps between the mill housing and the bearing chocks of the roll when the mill is unloaded in order to maintain the roll at a predetermined passline of the mill during rolling.

10 Claims, 3 Drawing Figures



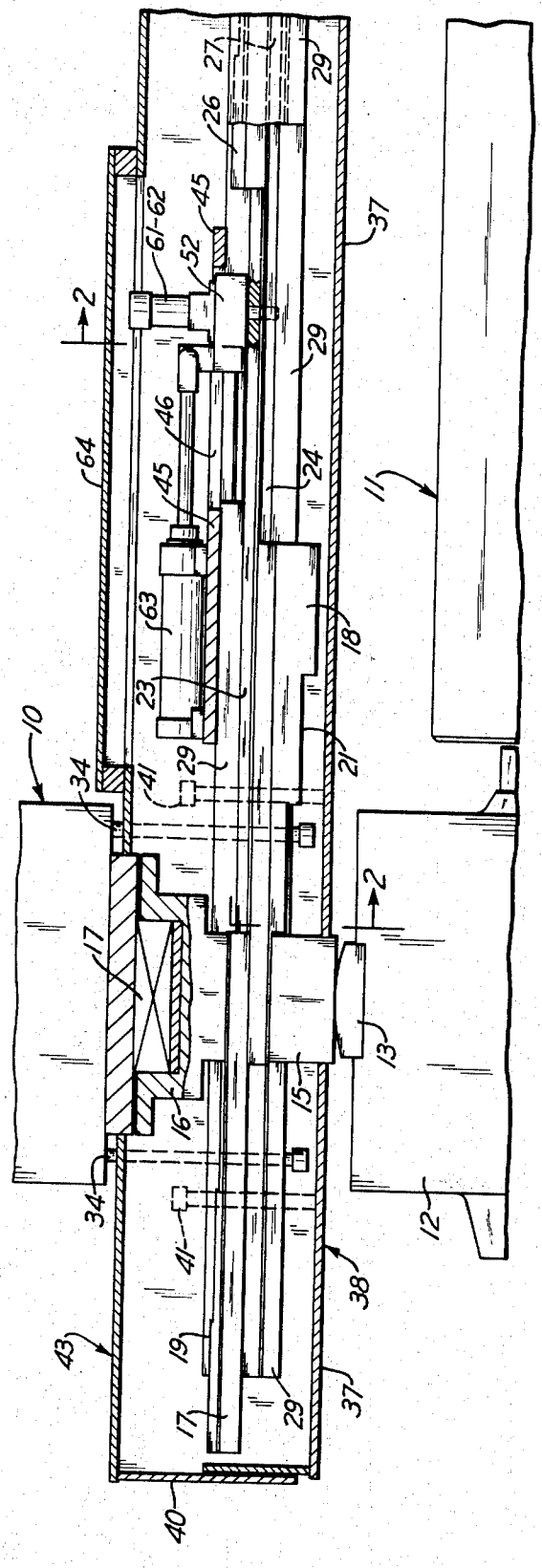


Fig. 1

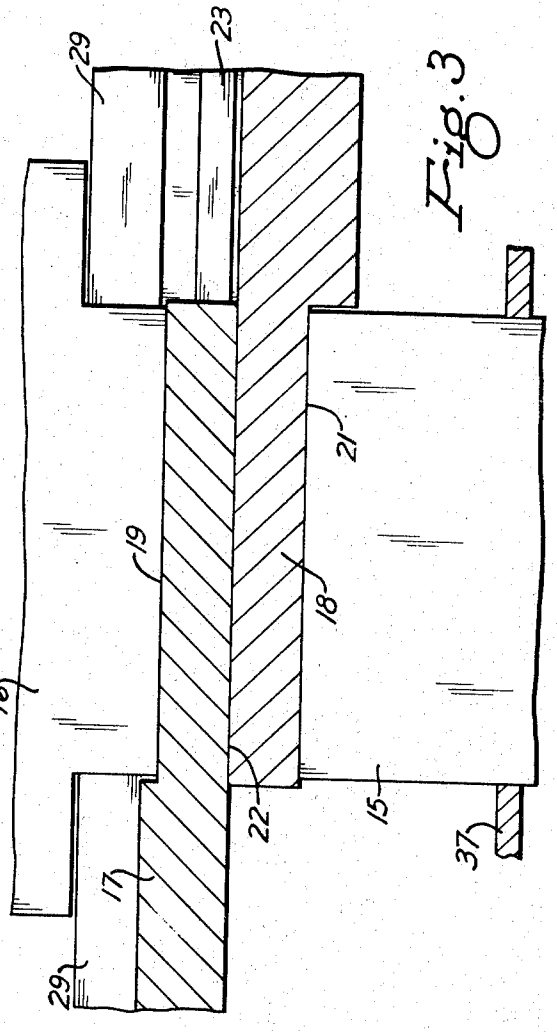


Fig. 3

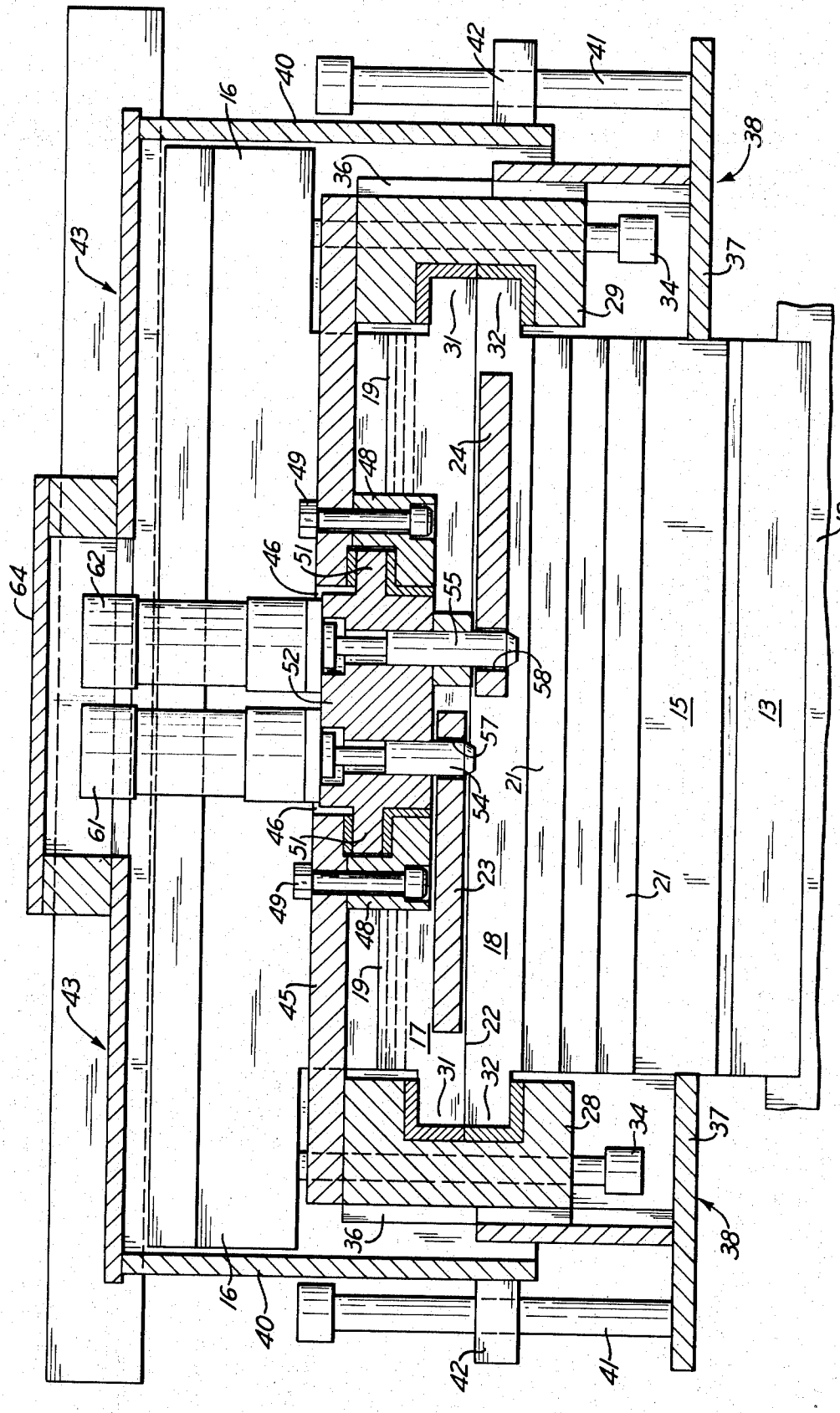

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Fig. 2

ROLL POSITIONING MEANS FOR A ROLLING MILL

In present-day rolling mills, and particularly hydraulic mills, it is customary to provide a screwdown mechanism for positioning the work rolls on the side of the housing opposite the roll positioning hydraulic cylinder so that this work roll can be maintained at a given passline even though its diameter has been reduced by redressing or regrinding. While such screwdown mechanisms are not normally required to operate under the rolling load, they still add significantly to the economy of the rolling mill.

It is an object of the present invention, therefore, to eliminate the aforesaid costly screwdown mechanism and replace it by a very inexpensive, simply constructed, trouble-free device for maintaining a roll of a rolling mill in a selected adjustable position.

It is another object of the present invention to provide an incremental adjusting means for a roll which is arranged between the housing and bearing chocks of one of the rolls of the mill, in which said means includes a first member having a series of graduated steps of a first thickness range, a second member having a series of graduated steps of a second thickness range, which latter range is substantially larger than the former range, and means for selectively moving said members into a position between said housing and bearing chocks.

These objects, as well as other novel features and advantages of the present invention, will be better understood when the following description is read along with the accompanying drawings of which:

FIG. 1 is a sectional view of the center and left-hand portions of a roll adjusting device built in accordance with the present invention;

FIG. 2 is a sectional view taken on lines 2 — 2 of FIG. 1; and

FIG. 3 is an enlarged view of a portion of FIG. 1.

In referring first to FIGS. 1 and 2 of the drawings, it will be noted that only a portion of one of the housings 10 of a rolling mill and single roll assembly 11 is illustrated. The other well-known components of the rolling mill, including the other roll or rolls, have been omitted for simplicity and in view of the fact that the present invention has no immediate relationship to them. The roll assembly 11 includes a bearing chock 12; there being a similar bearing chock mounted on the other end of the roll, not shown. The bearing chock is provided with the usual rocker bar 13, having a spherical upper surface for contacting a spacer block 15. Between the housing 10 and the spacer block 15 there is provided a load cell assembly having an outer housing 16 and a load cell 17.

Between the lower portion of the housing 10 and the bearing chock 12 and extending into the windows of the housings of the mill is arranged the incremental roll adjusting device of the present invention. It should be noted, aside from the mechanism for locking and traversing the device, that the device continues to the right of FIG. 1 on which side the mechanism is duplicated. The device comprises on each side of the mill two cooperative horizontal bars 17 and 18. In the region adjacent the bearing chocks the bars have formed thereon four equal length flat surface steps 19 and 21. The steps 19 of the bar 17 face away from the bearing chock 12 and have graduations much finer than the coarse steps 21 of the bar 18, which it will be noted face towards the bearing chock 12. In the illustrated form of the invention, the steps 19 are graduated at a quarter inch increments; whereas, the graduations of the steps 21 are at one inch increments. The bars 17 and 18 have flat adjacent surfaces 22, best shown in FIG. 3 against which they slide when the steps are to be positioned between the housing 10 and the bearing chock 12.

On the right-hand side of the bars 17 and 18 they take the form of uniform plates 23 and 24 that extend towards the right until they join the step portions 26 and 27 of the right-hand assembly of the roll adjusting device. It should be noted at this point that the step portions 26 and 27, as can be seen as to the portion 26 in FIG. 1, have their steps in the same disposition as the steps 19 and 21.

The bars 17 and 18 are restrained and guided by a pair of channel-shaped guide members 28 and 29, best shown in FIG. 2. FIG. 1 shows that the guide members extend for almost the entire length of the bars 17 and 18. The bars having end projections 31 and 32 that fit into the interior lined portions of the guide members 28 and 29. The guide members are secured to the housing 10 by horizontal guide pins 34; the lower ends of which have enlarged heads that are contacted by the lower portions of the guide members 28 and 29. As shown best in FIG. 2, to the guide members 28 and 29 there are formed downwardly extending guideways 36 that receive upwardly extending portions of an horizontal plate 37; this plate helps form an open top rectangularly shaped box 38. The horizontal plate 37 extends outwardly, as shown in FIG. 1, and at its inner ends the spacer block 15 is secured. The plate 37 itself is connected to plates 40 by a series of guide pins 41 having enlarged heads that serve as stops when allowed to contact brackets 42 secured to the plates 40.

The plates 40 form two of the side walls of a bottom open rectangularly shaped box 43 that extend downwardly past the top of the upward extensions of the plate 37 of the box 38, which fits within the box 43; thus, forming an enclosure of the entire roll adjusting device and isolating it from outside contaminants.

At the center of the roll adjusting device a horizontal plate 45 is secured to and adapted to bridge the guide members 28 and 29, the plate at its center being provided with an opening 46. Beneath the plate 45, adjacent to the opening 46, L-shaped members 48 are secured to the plate by bolts 49. The members 48 form opposed guides and receive projections 51 of a block 52, having two vertical holes for receiving pins 54 and 55. The pin 54 is arranged directly above a portion of the plate 23 of the bar 17; whereas, the pin 55 is arranged above the plate 24 of the bar 18. Each of the plates 23 and 24 have a series of equally spaced openings 57 and 58, respectively, spaced from each other an amount equal to the spacings of the steps 19 and 21. At the top of the block 52 two piston cylinder assemblies 61 and 62 are supported and connected to the pins 54 and 55. The cylinder 62 has a somewhat larger piston rod and pin to compensate for the fact that the plate 24 is below the plate 23, as shown in FIG. 2. The block 52 is advanced horizontally by a piston cylinder assembly 63 mounted on top of the plate 45. The piston cylinder assembly 63 and the opening 46 are enclosed by a cover plate 64, shown only in FIG. 1.

In briefly describing the operation of the aforesaid roll adjusting device, let it be assumed that the roll **11** is to be removed and replaced by a roll of a smaller diameter requiring, in order to keep the roll at a given passline, a lowering of the roll as viewed in FIG. **1** by an amount of 1½ inches from the setting illustrated in FIG. **1**. The drawings, in this regard, depict a setting of 1¼ inches, as determined by the employment of the first steps **19** and **21** of the bars **17** and **18**, in which step **19** provides a ¼ inch displacement and step **21** a 1 inch displacement for a total displacement of 1¼ inches.

Before an adjustment of the roll position can be made a clearance must be established between the steps **19** and the bottom of the housing **16** of the load cell assembly and also between the top of the spacer block **15** and the steps **21**, the extent of the clearances being equal to the highest step of each of the bars **17** and **18**. These clearances are accomplished by the roll **11** being lowered so that the guide members **28** and **29** are permitted to lower until they engage the enlarged heads of the guiding pins **34** and a space is created between the steps **19** and housing **16**. At the same time the spacer block **15** is allowed to lower until the enlarged head of the guide pins **41** contact the brackets **42**, creating a space between thee top of the block **15** and the steps **21**.

At this point one or the other of the piston cylinder assemblies **61** or **62** will be operated to place one of the pins **54** or **55** into one of the openings **57** or **58**, respectively, which will be aligned directly below the pins. The piston cylinder assembly **63** will be then operated to bring the next horizontal step, for example, the steps **21** under bearing chock **12**. This will effect a compensation of an additional inch given a total displacement of 2¼ inches. To obtain the additional ¼ inch displacement to obtain the desired 2½ inches displacement, the piston cylinder assembly **62** is operated to remove the pin **55** from engagement with the plate **24** and the piston cylinder assembly **61** will be operated to place its pin **54** into locking engagement the plate **23**. The piston cylinder assembly **63** will then be operated to bring the next horizontal step **19** into position under the bearing chock **12**, which since the steps **19** are graduated in ¼ inch integrals, will add one-quarter inch to the total displacement and give the desired 2½ inch displacement. As noted before, the positioning of the steps **19** and **21** for each side of the mill is accomplished at the same time by the operation of the piston cylinder assembly **63**. If in a given case it is necessary to move two steps of one of the bars **17** and **18**, the piston cylinder assembly **63** will be operated twice, between which operations the pins **54** or **55** will have been removed and replaced in a new hole **57** or **58**.

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.

I claim:

1. In a rolling mill, a housing having a window for receiving a pair of rolls,

bearing chocks mounted on the ends of said rolls,

means for incrementally adjusting one of said rolls relative to the other roll,

said means including a first member having at least two steps of a first depth range and a second member having at least two steps of a second depth range, and wherein the two ranges are different,

means for supporting said members between the housing and the bearing chocks of said one roll in a manner that the steps of said members can be brought into and out of operative cooperative positions, and

means for selectively positioning said steps of said members to vary the space between said housing and said bearing chocks of said one roll.

2. In a rolling mill according to claim **1** wherein said members are so arranged and include flat surfaces that engage each other to transfer the rolling load from one member to the other member, and wherein

said steps of each member include flat surfaces, the flat surfaces of one member arranged to receive the rolling load of said mill from the bearing chocks of said one roll and the flat surfaces of the other member arranged to transfer the rolling load from one of said members to the housing.

3. In a rolling mill according to claim **1**, including supporting means secured to said housing in a manner to permit said means for incrementally adjusting said one roll to move towards and away from the supporting portion of the housing,

said movement away from the housing being sufficient to allow the thickest combination of steps to freely move between the bearing chocks of said one roll and said housing.

4. In a rolling mill according to claim **1** wherein said steps of each member are formed on the opposite ends of each member in a manner to maintain a variable, but equal space between the housing and a different one of said bearing chocks of said one roll,

the series of steps on each end of said members being reversed so that one series faces towards the housing and the other series faces towards a bearing chock.

5. In a rolling mill according to claim **1**, including a first rectangularly box-shaped member supported by said housing and enclosing a portion of said means for incrementally adjusting said one roll,

a second rectangularly box-shaped member secured to said housing enclosing a remaining portion of said means for incrementally adjusting said one roll,

the relative size of said two box-shaped members being such that one of them fits within the other and is movable towards and away from the other in a manner to protect said adjusting means from contaminants.

6. In a rolling mill according to claim **1**, wherein depths of the steps of said first member are the same and the depths of the steps of said second member are the same, and

wherein said depths of the steps of the first member are appreciably smaller than the depths of the second member.

7. In a rolling mill according to claim **6**, wherein the steps of one member progressively increase in relationship to one direction and the steps of the other member progressively decrease in relationship to said one direction.

8. In a rolling mill according to claim **1**, including a guiding means arranged to guide the movement of said members in a direction axially of said rolls,

means secured to said housing for supporting said guiding means in a manner to allow the guide means to move away from said housing an amount sufficient to allow the highest step of said first member to be freely positioned above a bearing chock,

other means secured to said housing for supporting a filler block arranged to be engaged by the steps of said second member and in a manner to allow the filler block to move away from said second member an amount sufficient to allow the highest step off said second member to be freely positioned above a bearing chock.

9. In a rolling mill according to claim **8,** wherein said guiding means is adapted to support a power means, a locking means connected to said power means,

said members having portions engageable by said locking means.

10. In a rolling mill according to claim **9,** wherein said power means includes a first piston cylinder assembly,

said locking means including separate locking pins,

a separate second piston cylinder assembly for each of said locking pins,

spaced openings in said members for receiving a different one of locking pins,

said openings being spaced so that one of each of said steps of said members can be positioned above a bearing chock on the operation of said first piston cylinder assembly.

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