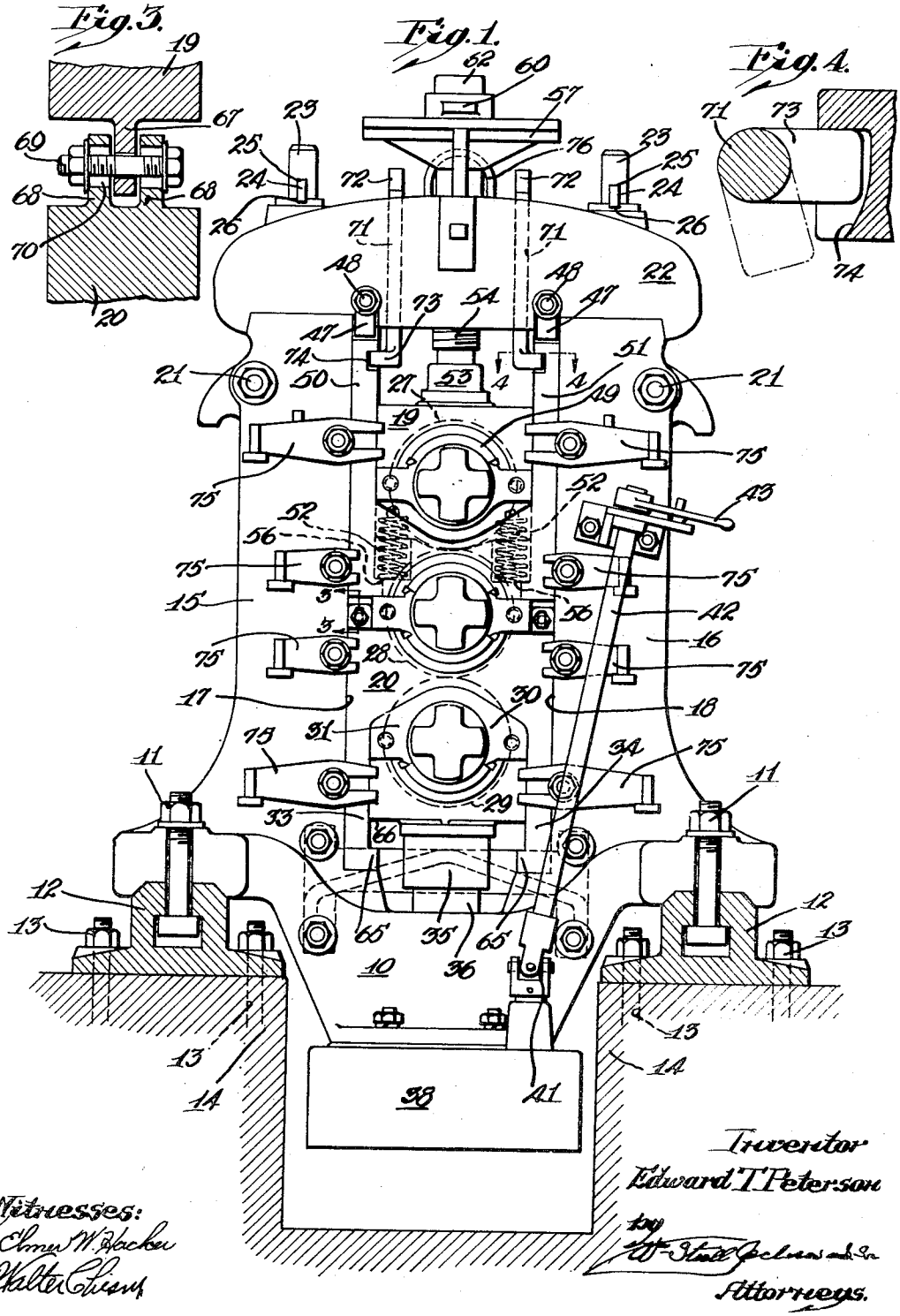
April 1, 1941. E. T. PETERSON 2,237,040

THREE-HIGH MILL HOUSING

Filed June 8, 1939 2 Sheets-Sheet 1




Witnesses:
Elmer W. Hacker
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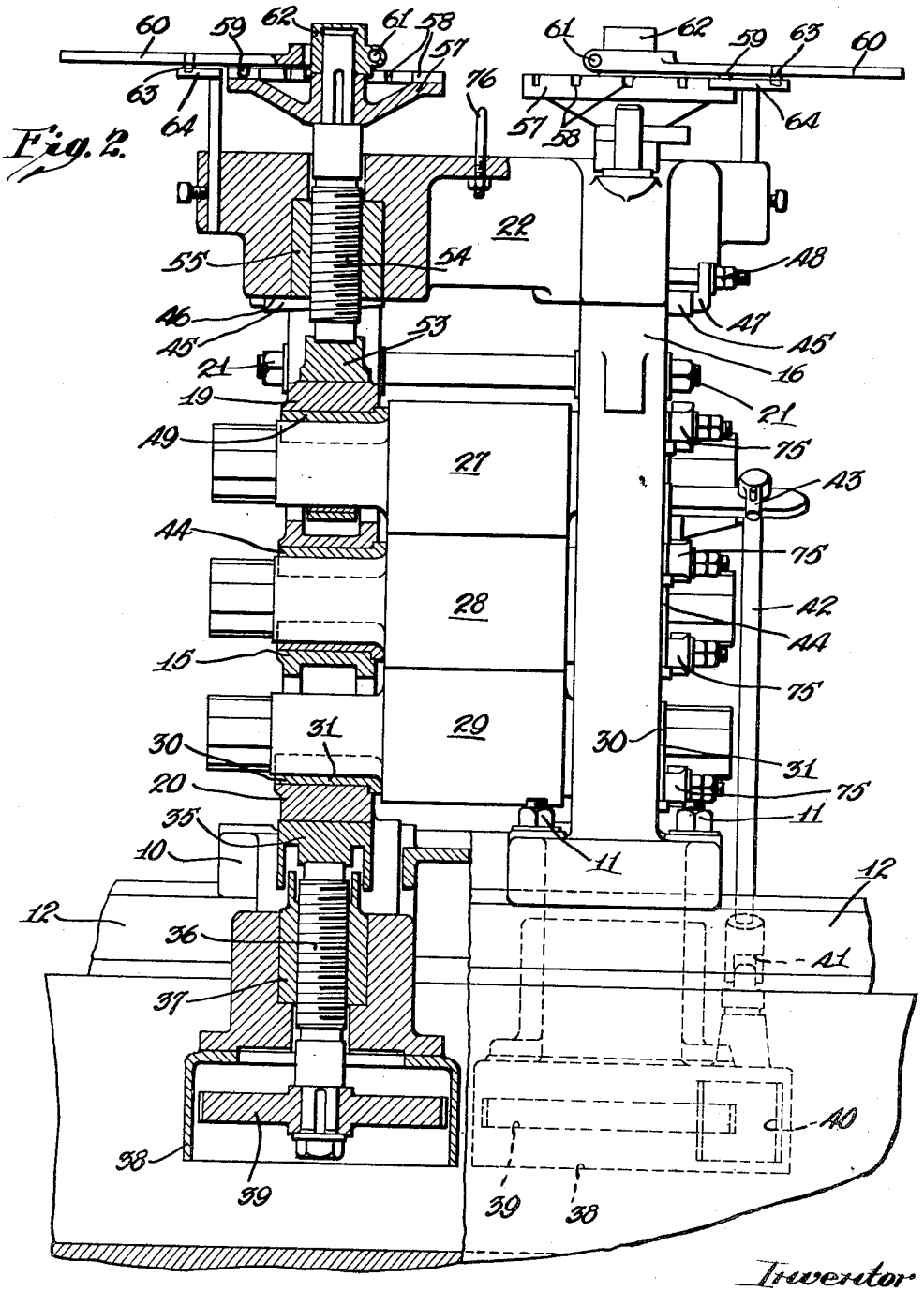
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Fig. 2.




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# UNITED STATES PATENT OFFICE

2,237,040

## THREE-HIGH MILL HOUSING

Edward T. Peterson, Reading, Pa.

Application June 8, 1939, Serial No. 277,999

10 Claims. (Cl. 80—55)

The present invention relates to rolling mill equipment and particularly to a structural arrangement permitting the rolls easily to be placed and withdrawn in or from their housings.

A purpose of the invention is to interconnect chucks and rolls of a three-high mill in such manner that they may be handled together, as a unit, when placing them in or in taking them out of their housings.

A further purpose is removably to connect the supporting chucks of adjacent rolls to one another and the upper chuck to the removable housing cap, using the cap to handle the depending chucks and rolls when placing them in or removing them from the housings of the mill.

A further purpose is to support the bearings of the middle roll of a three-high mill against downward and upward movements respectively by lower chucks and upper chucks, to support the lower and upper chucks from respectively downward and upward movements by seating the lower chucks on the base and by providing the upper chucks with wedge connections with the mill cap.

A further purpose is to spring-press the bearings of the upper roll upwardly from surfaces of the upper chuck and adjustably to limit the upward movement of these bearings by screws passing through the mill cap and adjustably vertically to position and to limit downwardly the downward movement of the bearings of the lower roll by screws threading through the base.

A further purpose is to provide loose hook connections between the lower chucks and the bearings of the roll, loose bolt connections between the upper and lower chucks and hook support between the housing cap and upper chucks.

Further purposes will appear in the specification and in the claims.

I have elected to show one only of the many different forms of my invention, selecting a form however that is practical and efficient in operation and which well illustrates the principles involved.

Fig. 1 is an end elevation showing a three-high finished mill embodying a desirable form of my invention.

Figure 2 is a front view, in part in vertical section, of Figure 1.

Figures 3 and 4 are fragmentary enlarged sections, taken upon the lines **3—3** and **4—4**, respectively, of Figure 1 and to illustrate respectively a loose coupling between the parts.

Like numerals refer to like parts in all figures.

Describing in illustration and not in limitation and referring to the drawings:

In the illustrated mill the heavy stationary housings and bed include counterpart ends, suitably integral castings and in each of which a heavy base **10** bolts at **11** to base rails **12** which rails, along opposite sides of the mill are bolted at **13** to the concrete floor **14**. Housings **15** and **16**, suitably integral with the base **10** present opposing vertical faces **17** and **18** that together laterally receive at each end of the mill upper and lower chucks **19** and **20**, respectively.

The housings at each end are bolted at **21** to the corresponding housings of the other end and a removable cap **22**, suitably an integral casting, unites the upper ends of the housings. The parts are held together by tension rods **23** which are fastened by wedges **24** passing through slots **25** in the tension rods **23**.

The rods **23** thread into the tops of the respective housings and pass upwardly through perforations in the cap, and the wedges **24** engage between upwardly presented pad surfaces **26** of the cap and downwardly presented surfaces of the tension rods at the tops of the slots **25**. The tension rods therefore not only support the cap against upward movement but the wedges tighten up the connection and hold the rolls from spreading when in use.

The rolls **27**, **28** and **29** are intended to be indicated conventionally.

It will be understood that actually these rolls are adjustably spaced from one another and instead of having plain surfaces may be provided with mating contours, such as are not shown in the drawings but are or may be required by their intended service and the size and shape of the merchant bar or the like to be rolled.

At intervals of service these rolls usually must be taken out and replaced by others, at times to permit the rolling of different sizes of stock and at other times in order that the removed rolls may be dressed. Subsequent to each dressing there will be ordinarily somewhat diminished roll diameters and therefore somewhat reduced spacings between the roll axes, and important features of the present invention are for the easy and rapid handling of the rolls when removing them from the housings, as for the purpose of dressing the rolls, and when replacing them in the mill, as for re-use after each dressing.

The lower roll **29** journals at **30** in vertically adjustably movable bearings **31** which bearings are laterally enclosed by opposite arms **33** and **34** of the lower clutch **20** and are adjustably supported from below by a bearing base **35**.

The bearing base **35** is shown supported upon the end of a screw **36**, which screw threads

through a nut 37 recessed downwardly into the base 10.

At its lower end, beneath the base 10 and within auxiliary casing 38 the screw is splined to a gear 39. The gear 39 meshes with a long gear 40 upon a stub shaft connected through universal joint 41 and shaft 42 with a handle 43 so that, by turning the handle 43 height adjustmtents of the support for the bearings of the lower roll are made whenever it is desired to change the vertical height or setting of the lower roll. Suitable supports for the shafts are shown in Figure 1. The construction is duplicated at one end and at the other end of the rolls, but it has not been considered necessary to repeat for the other end the construction seen in Figure 1 by which the handle shafts and universal joint operate the second long gear, none of which parts are shown in the figures for this other end of the rolls.

The bearings 44 journaling the middle roll seat upon the tops of the lower chucks 20, and are blocked from upward or lateral movement by the lower surfaces of the upper chucks which in turn are blocked from any upward yielding by wedges 45 between the tops of the upper chucks and downwardly presented surfaces 46 of the cap 22, shown locked in their holding positions by clamps 47 bolted to the cap at 48.

It will be seen that the bearings of the middle roll are shown nonadjustable, being intended to be located axially always in the same one position where they are to be definitely blocked between the upper and lower chucks from movement up or down or laterally.

The bearings 49 journaling the upper rolls 27 are vertically adjustable between the opposing arms 50 and 51 of the upper chuck 19 and are resiliently pressed upward by springs 52 to present blocks 53 against the bottoms of screws 54. A separate block and screw is located above each of the two bearings 49.

Each screw 54 adjustably threads downwardly through a stationary nut 55 that is recessed upwardly into the bottom of the cap.

The springs 52 seat upon suitable upwardly presented surfaces 56 of the upper chuck 19.

Provision is preferably made for easy definite fine adjustment of each screw 54 and therefore of each bearing 49 of the upper roll 27. As illustrated each screw 54 carries an operating wheel 57 that presents uniformly spaced radial slots 58 to the selective engagement of suitable downward lugs 59 to opposite sides of a handle 60. The handle 60 is horizontally pivoted at 61 upon a cap 62 that losely journals on the end of the screw 54. The handle at its suitably laterally spaced lugs 59 locks selectively with any of the slots 58 and while thus locking with the wheel 57 may itself be locked angularly by pin and hole connection at 63 with a suitable stationary plate 64.

I loosely and removably couple the lower chuck 20 to the bearings of the lower roll, loosely and removably couple the upper and lower chucks 19 and 20 together and loosely and removably couple the cap to the upper chuck 19 so that these members may be taken out and put back as a unit.

I provide the opposite arms 33 and 34 of the lower chuck with inward shoulders 65 that underlap the lower roll bearings 31 at 66 and I provide, as best seen in Figures 1 and 3, a loose bolt connection between the corresponding sides of the upper and lower chucks. As illustrated on each side of the upper and lower chucks, a downward flange 67 from the upper chuck extends between upwardly directed flanges 68 from the lower chuck and the two chucks are bolted together loosely at these flanges, a bolt 69 loosely fastening the chucks together at elongated holes 70 of the lower chuck as seen best in Figure 3.

In the removable coupling between the cap and upper chuck 19, hook bolts 71, illustrated as upwardly threading through the cap are provided with squared ends at 72 for wrench engagement and at their lower ends with hook-ends 73 adapted to enter suitable lateral recesses 74 in the opposite arms of the upper chuck 19.

When it is desired to remove the rolls, as for dressing the rolls, or to change the rolls to operate on different stock, the hook bolts are turned to lock the cap to the upper chucks, the clamps 75 which normally hold the chucks and bearings from movements in a direction lengthwise of the roll, are loosened, the wedges 24 in the tension rod 23 removed, after which a suitable hoist (not shown) connecting with the cap at an eye 76, lifts the cap, upper and lower chucks, roll bearings and rolls out vertically as a unit.

After lowering the unit to a suitable car the cap may be disconnected from the parts which have been suspended from it during removal, by relaxing and quarter turning the hook bolts 71 preferably for immediate re-connection of the cap with a replacement unit for the mill, which replacement unit will include other upper and lower chucks, roll bearings and rolls, to be connected to the same cap 22 by the hook ends 71 entering recesses 74 of the uper chucks of the replacement members. Alternatively, the rolls of the unit may be removed and other rolls substituted to make what is effectively a replacement unit.

The cap carrying the replacement unit is lowered to place, the replacement members sliding vertically to position in the same housings. Of course needed vertical adjustment will be made as needed of either or both of the screws or posts 36 and 54, respectively setting the positions of the bearings of the rolls. The cap 22 is then fastened to place by knocking in the wedges 24, the clamps 75 are tightened and the mill is ready to operate with the new set of rolls.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain part or all of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a three high merchant mill comprising rolls, bearings, bearing chucks, a base and housings extending upwardly from the base, the combination of spaced pairs of separable connected upper and lower chucks united for common vertical movement for the rolls and a cap slidable in the housing, the lower pair at each end of the housings connected to the upper chucks and adapted with removal to carry with it the upper chucks only when the upper and lower chucks are disconnected and both chucks when the upper and lower chucks are connected; along with the bearings and rolls.

2. In a merchant mill, a plurality of rolls, one above the other, bearings therefor, spaced pairs of separable chucks, one pair above another, a base, upwardly supported lower bearings, housings extending upwardly from the base and slidably mounting both pairs of chucks, fastenings between the chucks to cause both pairs of chucks to move vertically together, releasable at will to permit the pairs to be lifted separately and means adapted to connect with the chucks of one pair for removal of all of the chucks.

3. In a three high rolling mill, housings forming guides and supports, upper and lower pairs of chucks vertically movable within the housings, upper bearings slidable within the upper chucks, middle bearings between the upper and lower chucks, lower bearings slidable within the lower chucks, upper, middle and lower rolls carried by the bearings, and releasable connectors between the upper and lower pairs of chucks uniting them to move together vertically, whereby when the connectors are engaged and the upper chucks are slid upward from the housings they carry with them from the housings the rolls, bearings and the lower chucks and when the connectors are disengaged the upper chucks can be lifted out without lifting the lower chucks.

4. In a housing mill roll set, a pair of housings, a cap for the housings, upper and lower pairs of roll supporting chucks movable in the housings, connections between the cap and the upper chucks and couplings between the upper and lower pairs of chucks united for common vertical movement whereby with the couplings uncoupled the upper roll supporting chucks only are withdrawn by lifting of the cap and with them coupled the upper and lower roll supporting chucks are withdrawn along with the cap.

5. In a three-high rolling mill set, a pair of removable housings, a cap for the housings, upper and lower pairs of roll supporting chucks fitting within the housings and adapted separately to be lifted out of the housings when the caps do not interfere with their removal and disengageable couplings between the chucks uniting them for common vertical movement whereby when they are engaged the chucks may be secured together and may both be removed together when the upper chucks are removed.

6. In a three-high roll set, a pair of housings, upper and lower chucks vertically removable in each housing, bearings for an upper roll in each upper chuck and adapted to slide upwardly therein, a spring within each upper chuck pressing the bearing of the upper roll upwardly, bearings for an intermediate roll between the lower and the upper chucks, bearings for the lower roll supported by and vertically slidable in the lower chucks, a cap for the housings, connections between the cap and the upper chucks and releasable couplings between the upper and lower chucks in each housing whereby with the chucks coupled both upper and lower chucks and all the rolls can be lifted from the housings by lifting the caps, and with the couplings uncoupled, the upper chucks and the upper roll only are withdrawn with the cap.

7. In a three-high rolling mill, upper and lower pairs of chucks, upper, middle and lower rolls and roll bearings adapted to be supported thereby, the lower pairs of chucks laterally holding and underlapping the lower bearing and upwardly seating the middle bearing and the upper chuck downwardly seating the middle bearing and laterally holding the upper bearing and a loose coupling between the upper and lower chucks to cause them to move vertically together permitting the chucks, rolls and roll bearings to be handled separately or as a unit during their placement in or removal from the mill.

8. In a three-high rolling mill, a structural frame including base, vertical housings, upper and lower chucks encased and slidable between the housings, a cap surmounting the housings, lower roll bearings located between spaced arms of the lower chucks, middle bearings located between the upper and lower chucks, upper roll bearings located between spaced arms of the upper chucks, means adjustably spacing the lower bearings from the base, means adjustably spacing the upper bearings from the cap, compressed springs upwardly supporting the upper bearings from the upper chuck and couplings between the cap and upper chuck, between the upper and lower chucks and between the lower chucks and the lower bearings adapting the cap, chucks, bearings and rolls to be handled as a unit when placing in or removing from the mill.

9. In a three-high rolling mill, a base, vertical housings, upper and lower chucks slidable within the housings, a cap surmounting the housings, lower roll bearings located between spaced arms of the lower chucks, middle bearings located between the upper and lower chucks, upper roll bearings located between spaced arms of the upper chucks, means upwardly supporting the lower bearings at adjustable heights from the base, adjustable means downwardly supporting the upper bearings from the cap, compressed springs upwardly supporting the upper bearings from the upper chucks, and releasable couplings between the cap and upper chucks, between the upper and lower chucks and between the lower chucks and the lower bearings adapting the cap, chucks, bearings and rolls to be handled as a unit when placing in or removing from the mill.

10. In a three high rolling mill, stationary frame structure comprising a base and a pair of spaced housings at each end of the mill, a cap removably cross connecting the housings, lower roll bearings, lower chucks at the ends of the mill slidably positioned between the housings, each presenting upwardly a seat for a middle roll bearing and presenting laterally spaced arms extending downwardly toward the base adapted to receive the lower roll bearing, a middle roll, middle-roll bearings, one at each end of the mill and resting in a seat presented by the lower chuck, upper chucks at the ends of the mill slidably supported between the housings presenting a downwardly directed seat to the middle roll bearing and presenting laterally spaced arms extending upwardly toward the cap, upper roll bearings, one at each end of the mill located between the said upwardly extending arms, in combination with a loose coupling between the upper and lower chucks, a loose coupling between the cap and the upper chucks permitting the upper, middle and lower rolls, the roll bearings, the upper and lower chucks and mill cap to be handled as a unit during their placement in or removal from the mill.

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