May 3, 1966 E. C. HEWITT ETAL 3,248,919

UNIVERSAL ROLLING MILLS

Filed May 29, 1963 4 Sheets-Sheet 1

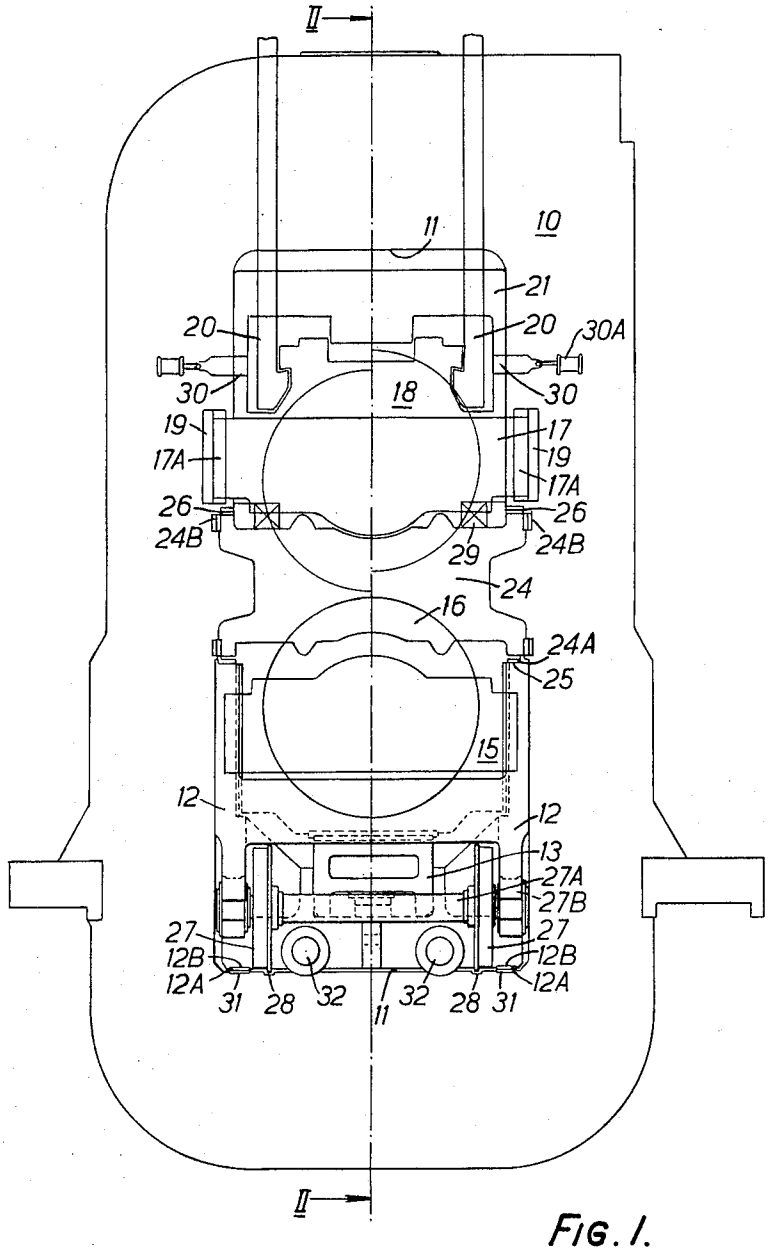


FIG. 1.

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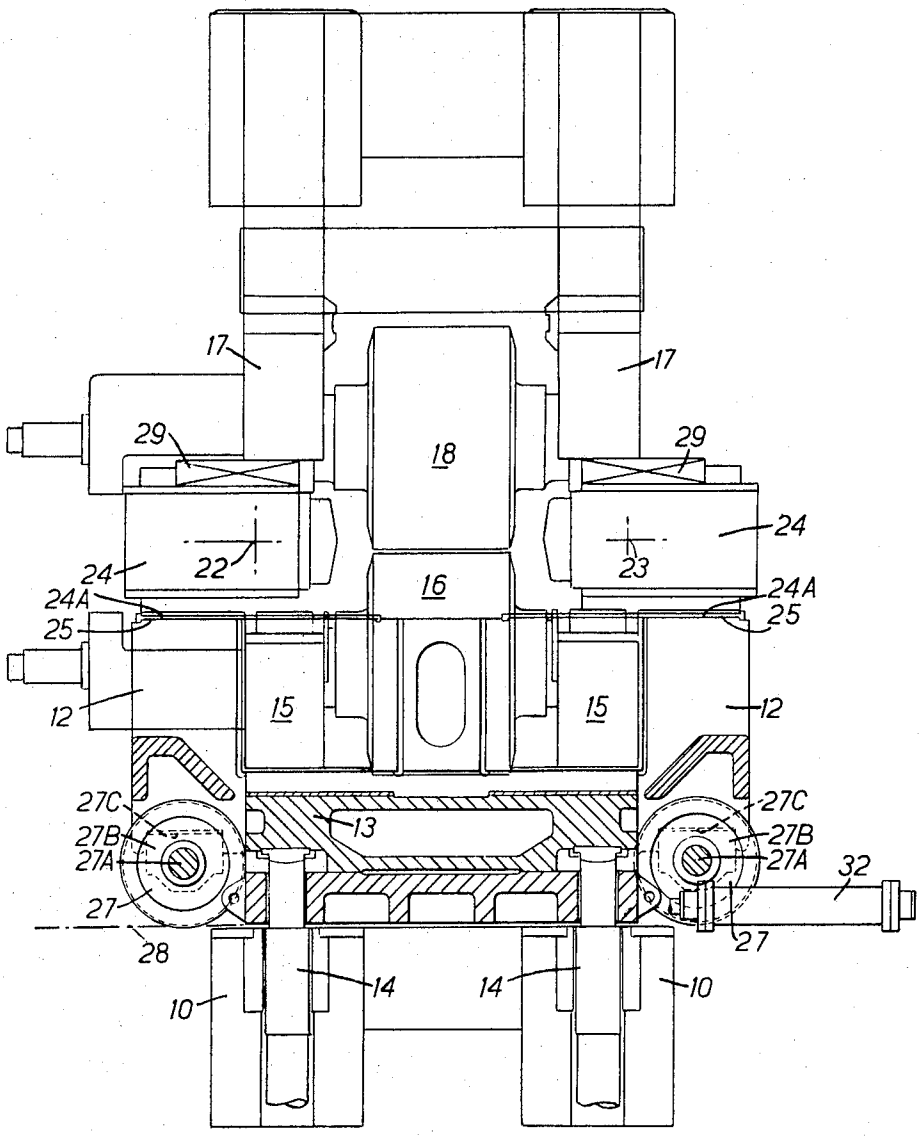


FIG. 2.

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Filed May 29, 1963 4 Sheets-Sheet 3

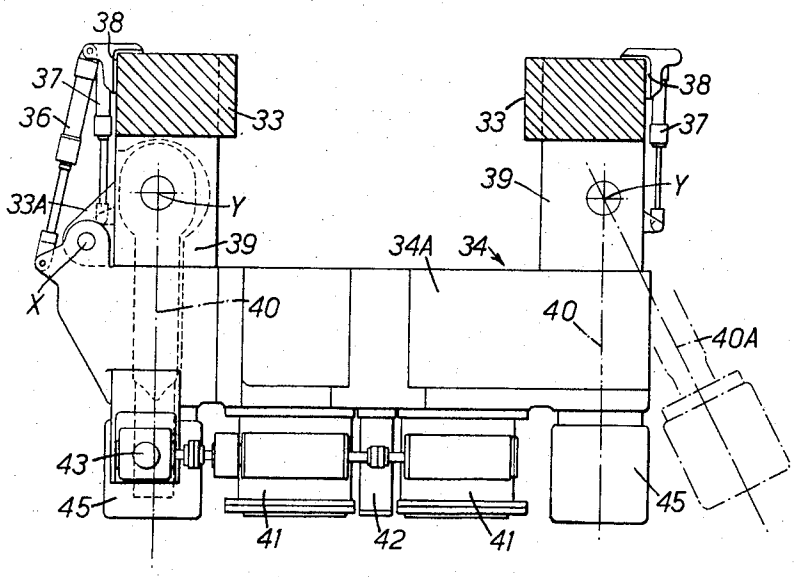


FIG. 3.

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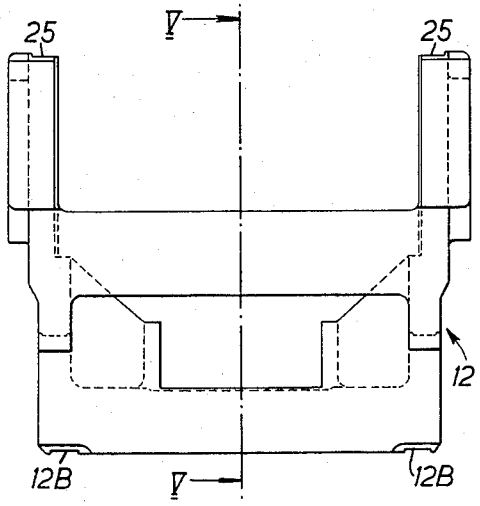


FIG. 4.

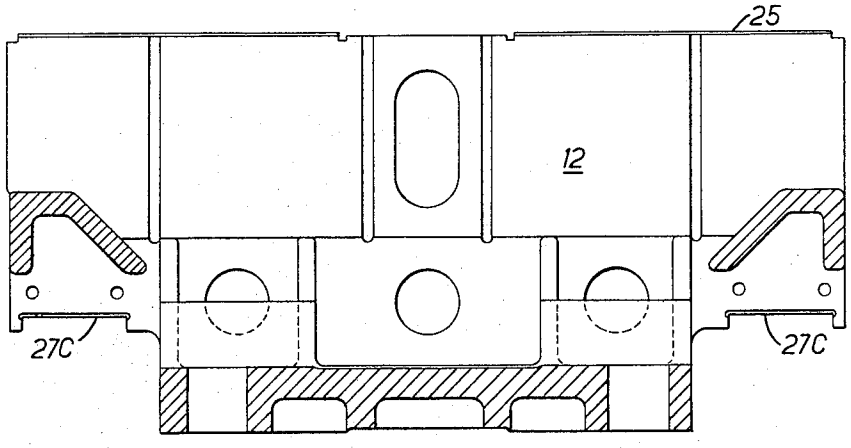


FIG. 5.

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UNIVERSAL ROLLING MILLS

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Claims priority, application Great Britain, May 30, 1962, 20,801/62

13 Claims. (Cl. 72—238)

This invention relates to rolling mill stands, particularly those having both horizontal and vertical rolls for rolling sections such as beams. An object of the invention is to enable the rolls of such a stand to be quickly and easily introduced into, and removed from, the stand to facilitate roll changing.

In accordance with the present invention, a rolling mill stand has coplanar horizontal and vertical rolls and chocks therefor, arranged for removal together through a housing window with the chocks of the upper horizontal roll resting on the chocks of the vertical rolls. Preferably there is a frame which can be located within the stand and which, when so located, supports the lower horizontal roll and the vertical rolls, but which is removable through a housing window carrying all the rolls.

In a preferred form of the invention, a rolling mill stand comprises a pair of spaced housings, at least one of which has a housing window therein, a frame which is locatable between the housings and which is movable through the housing window, a lower horizontal roll having chocks which are supported on the frame, a pair of vertical roll chocks, each having a vertical roll and each independently slidably supported on the frame, an upper horizontal roll and chocks therefor, and means for mounting the upper horizontal roll and chocks in the stand and for lowering those chocks on to the vertical roll chocks for removal of all the rolls and chocks together on the frame. The frame may be U-shaped, having a pair of upstanding arms on which the vertical roll chocks are slidably supported for vertical roll gap adjustment, and between which the lower horizontal roll is supported. For roll change, the lowering means, which preferably comprise roll-balance links are operated to lower the upper horizontal roll chocks on to the vertical roll chocks below; all four rolls are now carried by the frame which may be moved, with the rolls, through the housing window. Introduction of a new set of rolls is similarly effected and it will be appreciated that not only the transfer of the rolls but also the proper positioning of the rolls in the stand for rolling may be effected with the minimum of difficulty.

The invention will be more readily understood from the following description of a beam mill stand, given by way of example only, with reference to the accompanying drawings of which:

FIGURE 1 is a side elevation of a universal beam mill stand,

FIGURE 2 is a sectional elevation on the line II—II of FIGURE 1,

FIGURE 3 is a plan view of a yoke which is part of the mill, but which is omitted from FIGURES 1 and 2 for clarity,

FIGURE 4 is an enlarged view of the U-section frame, and

FIGURE 5 is a section on the line V—V of FIGURE 4.

Referring to FIGURES 1 and 2, the rolling mill stand has two housings **10**, each having a window **11**. Extending through the lower ends of the windows **11**, and across the width of the mill is a U-section frame **12**, a longitudinal section of which is best seen from FIGURE 5. This frame is shaped to receive a lower spreader beam **13** which, during operation of the mill, is supported on screws

14 mounted in the housings **10**. The spreader beam **13** supports, in turn, chocks **15** of a lower horizontal roll **16**.

Chock assemblies **17** for an upper horizontal roll **18** are supported on roll-balance links **20** and are prevented from moving laterally by being provided with extending portions **17A**, which are interposed between the housing **10** and brackets **19** secured to the housing **10**. A very small clearance is left between the brackets **19** and the housing **10** to permit vertical adjustment of the chock assemblies **17**, and hence the upper horizontal roll **18**. The assembly **17** is backed up by an upper spreader beam **21**, upon which bears a conventional screwdown apparatus, not shown.

In FIGURE 1 the upper horizontal roll **18** is shown in two halves; the left half of the roll and the upper chock assembly being shown in the bottom and roll-change positions, and the right half of the roll **18** being shown in its operating position.

Latches **30** secured at one end to piston-and-cylinder arrangements **30A** are provided to retain the spreader beam **21** in its uppermost position during roll-changing.

Vertical rolls, whose axes of rotation are shown at **22**, **23** in FIGURE 2, are mounted in roll chocks **24**. The chocks **24** are supported underneath by resting upon wearing plates **24A** on the top edges **25** of the arms of the U-section frame **12**, and are located at their upper sides against wearing plates **24B** on portions **26** of the housings **10**.

The U-section frame **12** is mounted on four wheels **27** on axles **27A** having bearing blocks **27B** located in recesses **27C**. The wheels **27** run on rails **28**. When the U-section frame **12** is not in its correct position for operation of the mill the frame is entirely supported on these wheels. To correctly locate the U-section frame **12** within the housings **10**, recesses (not shown) are provided in the rails **28**, so that when the wheels **27** are in these recesses wearing plates **12A** in slots **12B** of the U-section frame **12** rest upon slideways **31** located at the bottom of the housing windows **11**.

Piston-and-cylinder arrangements **32** are provided for pushing the U-section frame **12** so that the wheels **27** leave the recesses in the rails **28** and the U-section frame is lifted off the slideways **31**, when it is required to effect a roll change.

Each of the housings **10** has a U-section yoke, one of which is indicated at **34** in FIGURE 3, and which is attached to the two housing posts **33** of the housing. These yokes are located immediately behind the vertical roll-chocks **24**.

The U-section yoke **34** comprises two horizontally and outwardly projecting arms **39** which are integral with the housing posts **33**, and a gate **34A** pivotally supported at one end by a bracket **33A** secured to the left-hand arm **39**, so that the gate **34A** of the yoke **34** can pivot about vertical axis X. A piston-and-cylinder arrangement **36** is provided to pivot the gate **34A** about the vertical axis X.

Bolts, whose axes are shown at **40**, having nuts **45**, are located in slots (not shown) in the yoke **34** and are provided to maintain the gate **34A** in the correct position during operation of the mill as shown in full line in FIGURE 3. The bolts **40** are pivotally secured in the arms **39** for rotation about axes Y, and piston-and-cylinder arrangements **37**, mounted on brackets **38** on the housing posts **33**, are operable to swing the bolts **40** about the vertical axes Y out of engagement with the gate **34A**, to positions exemplified by position **40A** shown in chain line for the right-hand bolt.

The gate **34A** carries screws **41** driven by a motor **43**, and a pull-back ram **42**, to effect horizontal adjustment

of the vertical roll chock **24**, and so the associated vertical rolls **22** and **23**.

In operation, when it is required to remove the rolls from the mill, the spreader beam **21** is raised to its uppermost position by the roll balance links operating mechanism (not shown) and stools **29** are placed on the upper surfaces of the chocks **24** to prevent the horizontal rolls **16** and **18** contacting each other when the chocks **17** are lowered. The latches **30** are then moved outwardly by the piston-and-cylinder arrangements **30A** so that the spreader beam **21** is held in its uppermost position as shown in FIGURE 1. The roll-balance links **20** are then lowered so that the chock assemblies **17** rest upon the stools **29**.

After the chock assemblies **17** come to rest upon the stools **29**, the links **20** continue to move downwardly thus leaving a small clearance between the links **20** and chock assemblies **17**, and enabling the assemblies **17** to be movved outwardly from the mill.

The nuts **45** (FIGURE 3) are loosened and the bolts **40** are swung about the vertical axes Y, to the positions **40A**, out of engagement with the gate **34A**, by the piston-and-cylinder arrangements **37**, whereafter the gate **34A** is pivoted about the vertical axis X by operation of the piston-and-cylinder arrangement **36**.

The screws **14** are then fully retracted so that the spreader beam **13** is supported by the U-frame **12**; both the horizontal and vertical rolls with their chocks are now supported by frame **12**. The piston-and-cylinder arrangements **32** are operated so that the wheels **27** engage with the track **28**, whereafter the rolls **16**, **17**, **22** and **23**, and their associated chock assemblies, together with the spreader beam **13**, pass outwardly through the housing window **11** as one unit.

The introduction of a new set of rolls into the mill on the frame **12** and the proper location of the upper horizontal roll are effected by the same but reverse procedure. It will therefore be appreciated that, by virtue of the construction of the stand, and in particular of the particular form of the frame **12** which performs the dual function of supporting the vertical rolls and the lower horizontal roll during mill operation and of carrying all the rolls during transfer of the rolls out of or into the stand, a roll change may be effected quickly and easily.

It will be understood that instead of employing the piston-and-cylinder arrangements **36** to remove the U-section frame **12** from the housings **10** a rack-and-pinion arrangement may be employed.

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. A rolling mill stand having coplanar horizontal and vertical rolls and chocks therefor, the chocks of the upper horizontal roll being normally spaced above the chocks of the vertical rolls, and means for lowering the chocks of the upper horizontal roll to permit removal of the horizontal and vertical rolls together through a housing window with the chocks of the upper horizontal roll resting on the chocks of the vertical rolls.

2. A rolling mill stand having coplanar horizontal and vertical rolls and chocks therefor, and a frame arranged to support all the rolls and chocks and to be removed from the stand through a housing window with those rolls and chocks.

3. A rolling mill stand having coplanar horizontal and vertical rolls and chocks therefor, and a frame which is arranged to be located within the stand and to support the lower horizontal roll and the vertical rolls during operation of the mill, and which is removable through a housing window with all the rolls.

4. A rolling mill stand comprising a pair of spaced housings, at least one of which has a housing window therein, a frame which is locatable between the housings and which is movable through the housing window, a lower horizontal roll having chocks which are supported on the frame, a pair of vertical roll chocks, each having a vertical roll and each independently and slidably supported on the frame, an upper horizontal roll and chocks therefor, and means for mounting the upper horizontal roll and chocks in the stand and for lowering those chocks on to the vertical roll chocks, for removal of all the rolls and chocks together on the frame.

5. A rolling mill stand according to claim **4** in which there is a spreader beam seated on the frame between the housings and supporting the lower horizontal roll chocks.

6. A rolling mill stand according to claim **4** in which the frame is U-shaped having a pair of upwardly extending arms which support the vertical roll chocks, the horizontal roll and chocks being located between the arms.

7. A rolling mill stand according to claim **6** in which there is a spreader beam seated on the frame between the arms and supporting the lower horizontal roll chocks.

8. A rolling mill stand according to claim **6** in which each vertical roll chock is located vertically between the arms of the frame and projecting parts of the housings.

9. A rolling mill stand according to claim **4** in which the frame has wheels and means for moving it through the window.

10. A rolling mill stand according to claim **4** in which the mounting means are roll-balance links which are adapted to support the upper horizontal roll chocks during mill operation and which are movable downwardly to lower those chocks on to the vertical roll chocks for removal from the stand.

11. A rolling mill stand according to claim **4** in which there is an upper spreader beam interposed vertically between the housings and the upper horizontal roll chocks.

12. A rolling mill stand according to claim **4** in which each housing has secured thereto a horizontal U-shaped yoke which extends round one of the vertical roll chocks and which carries means for adjusting horizontally that chock on the frame.

13. A rolling mill stand according to claim **12** in which at least one of the yokes is removable to permit passage of the frame with the rolls and chocks through the housing window.

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