United States Patent [19]

Quehen

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[54] **ROLL CHANGING DEVICE FOR A MILL OR A SIMILAR MACHINE**

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[30] **Foreign Application Priority Data**

Feb. 22, 1973 France 73.06229

[52] **U.S. Cl.** **72/239**

[51] **Int. Cl.** **B21b 31/08**

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

[56] **References Cited**

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Attorney, Agent, or Firm—Daniel Patch; Henry C. Westin

[57] **ABSTRACT**

A roll changing device for a rolling mill in which the assemblies of roll chocks include traverse components, such as a pair of longitudinally extending bars. The device includes symmetrically on the entry side and delivery side of the mill a rail matched with the traverse components. Each rail is displaced by an hydraulic cylinder and lifts the assemblies of roll chocks as a unit until the rails align with tracks arranged externally of the mill.

1 Claim, 2 Drawing Figures

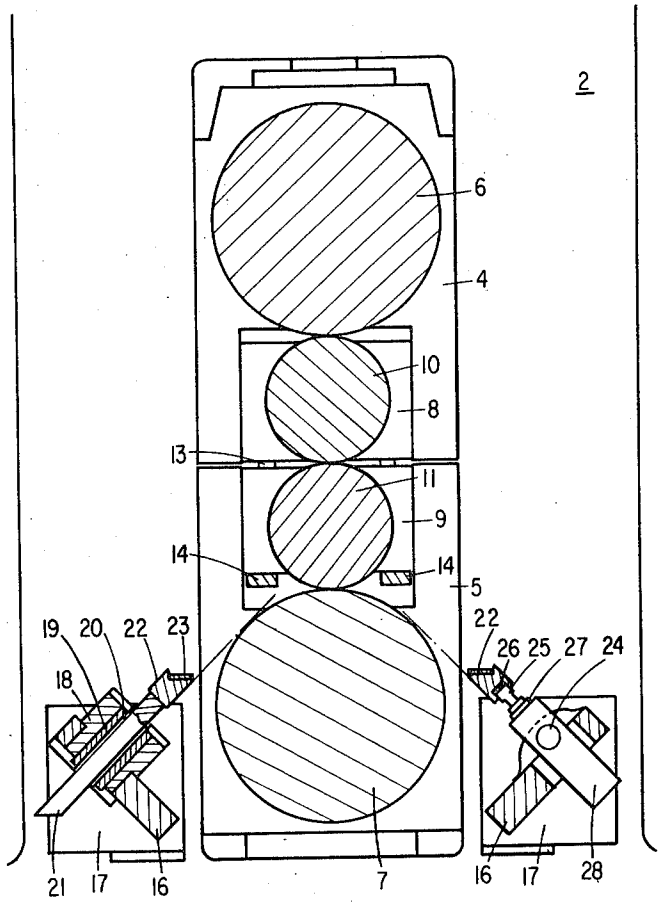


FIG. 1

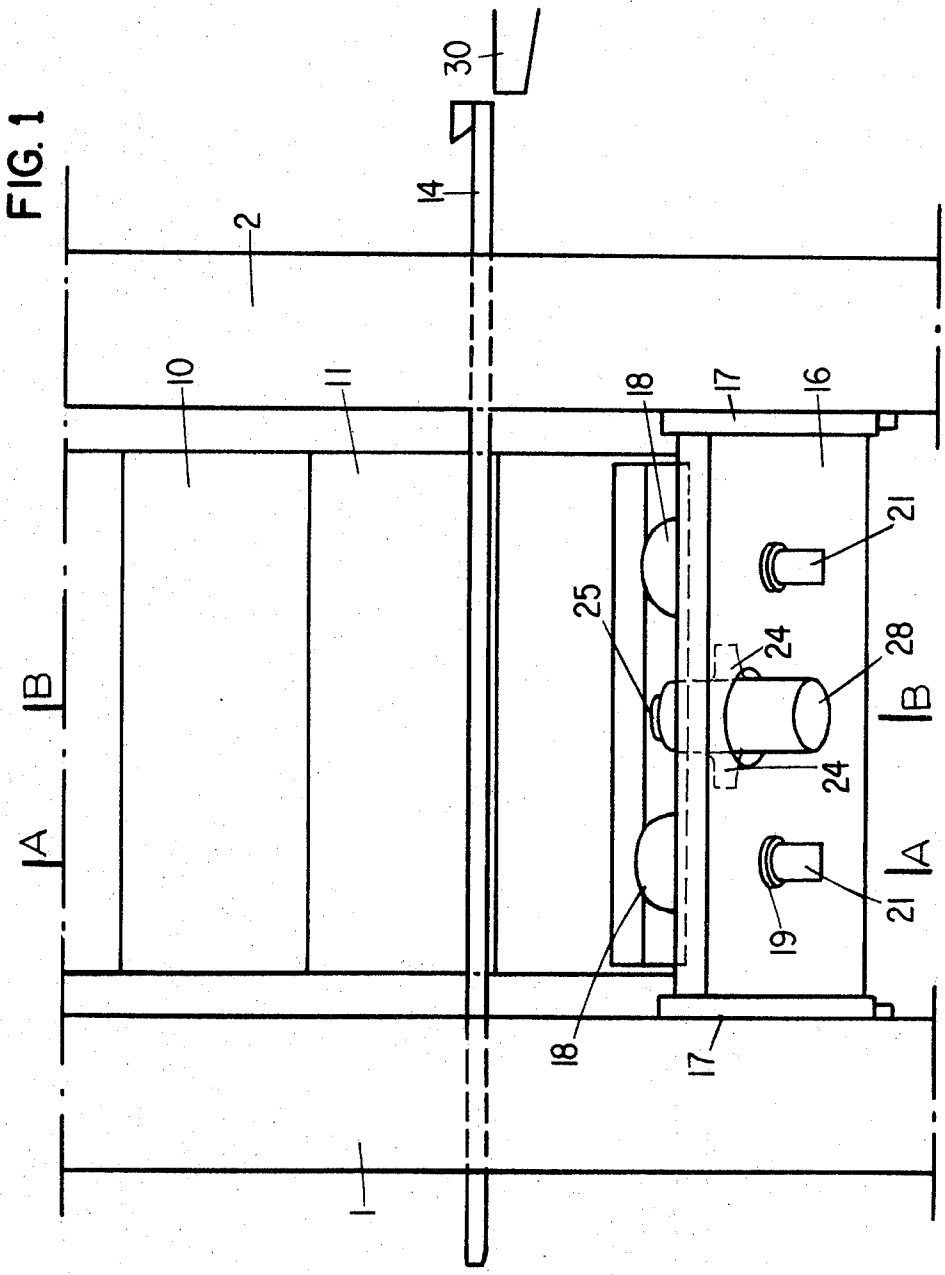
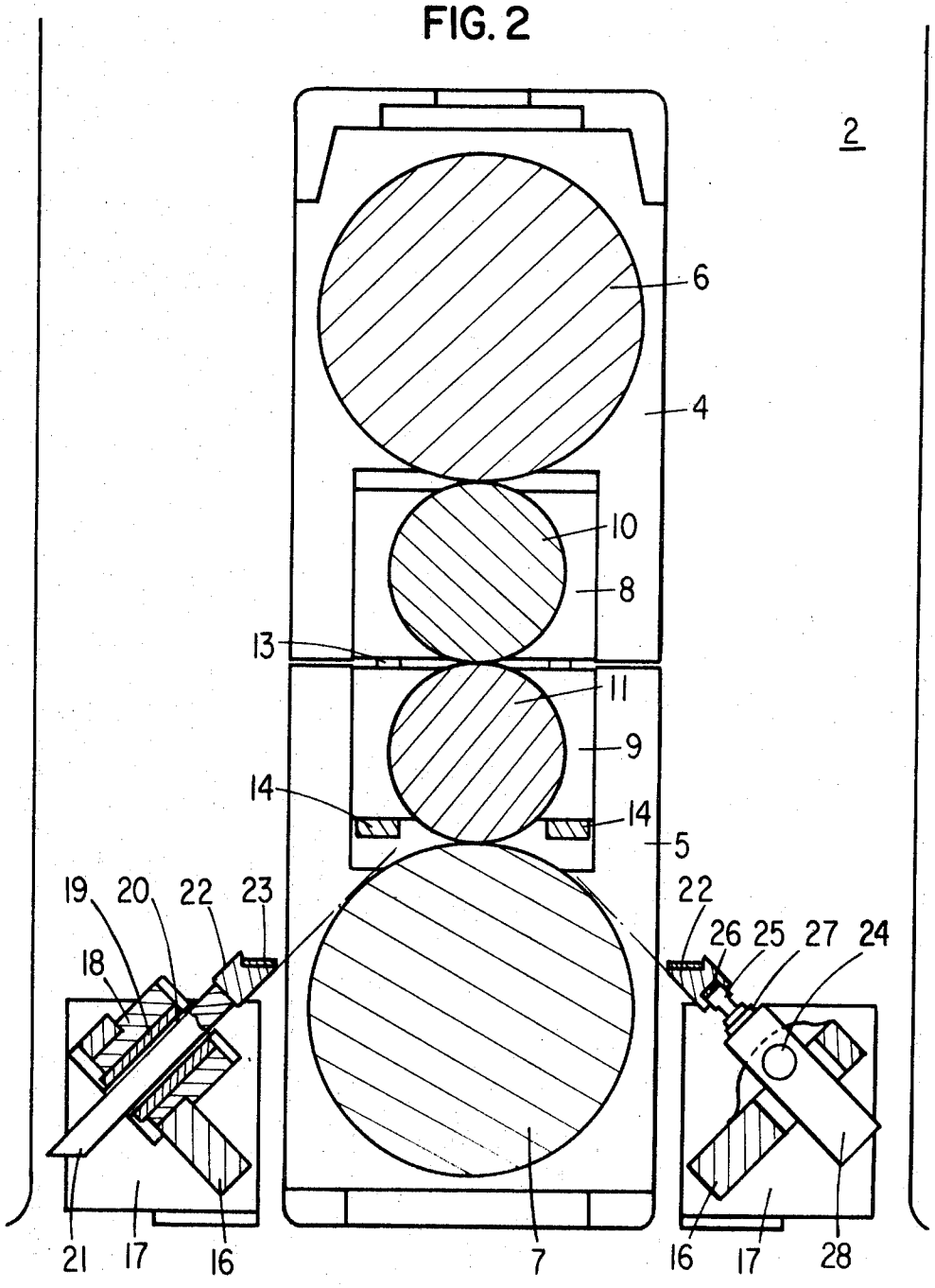


FIG. 2



ROLL CHANGING DEVICE FOR A MILL OR A SIMILAR MACHINE

The present invention relates to a roll changing device intended for rolling mills of similar machines. It applies, more particularly, to the work rolls of a 4-high mill, but may also find application for use with other machines in which the working components are rolls between which passes a product to be transformed and which rolls are subject to wear and surface deterioration requiring frequent changing.

All the devices known for quick roll change of the rolls of a rolling mill consist of the extraction or introduction in the roll stand of a complete set of rolls equipped with their bearings and their chocks; the rolls being placed one on top of the other. This moving assembly (rolls-chocks) is traversed either by rolling or sliding.

Unless the devices are very complicated in design, it is required, for instance, that the tracks on which the assembly (rolls-chocks) is traversed be located at a fixed elevation. This is the only way in which the moving equipment is connected by a simple mechanism to the extraction or introduction rig. Also, this is the only way for handling of the roll to the roll shops which would allow for continuity of the track between the part located in the stand and that located outside the stand.

In summary, therefore, the difficulty comes from the fact that roll bodies wear and that, consequently, during their use the rolls and their chocks are at variable elevations in the mill.

The present invention which allows for the solution of these difficulties applies to a mill or a similar machine including in a stand at least two rolls mounted in their chocks, the rolls and chocks being a moving assembly to be changed and being designed with traverse components for sliding or rolling capable of supporting the assembly and provided with means for maintaining a fixed distance between the centerlines of each roll and the traverse components, the mill or similar machine including guide components arranged parallel to the centerline of the roll and on the outside with regard to the chocks, and also including means for displacement of the moving assembly, when supported, on the fixed guide components.

According to the invention, the device, more particularly, includes symmetrically on the entry and delivery sides of the stand: a track movable parallel to the centerline of the rolls and having a form similar to that of the traverse components of the moving assembly, guides of the movable track in which said tracks are arranged parallel to themselves adapted to move from a resting position where they are completely retracted and a work position where they become the extension of the fixed guide components outside the chocks; the track adapted to come into contact with the traverse components of the moving equipment at an intermediate position between its resting position and work position, and means for displacing the movable tracks between their two extreme positions, these means being capable of supplying enough force to lift the moving assembly when the guides come into contact with the traverse components of the assembly.

According to a special form of the invention the tracks and the means of displacement of each movable track are tied to a separator support located at the bottom part between the housing posts of the mill or similar machine.

According to another special form of the invention applied to a 4-high mill, the plane of displacement of each movable track is arranged on an angle with regard to the plane of the centerlines of the rolls; each movable track, therefore, passing above the bottom backup roll.

The invention will be, therefore, described with more details referring to a particular design given as an example and represented by the accompanying drawings of which:

FIG. **1** is a simplified elevational view of a 4-high mill equipped with a device according to the invention; and

FIG. **2** is a longitudinal section through the mill shown in FIG. **1** in which the left part of the figure is a section A—A of FIG. 1; the right part of the figure is a section B—B of FIG. **1.**

Referring to these drawings, the mill consists of two housings **1** and **2** in the windows of which are arranged, on one hand, a pair of chocks **4** and **5** of the top and bottom backup rolls **6** and **7**; on the other hand, a pair of chocks **8** and **9** of the top and bottom work rolls **10** and **11.** The chocks **8** and **9** of the work rolls are displaceable inside the openings of the corresponding chocks **4** and **5** of the backup rolls. Roll balance cylinders **13** are located between each cooperative pair of the chocks **8** and **9.** The drive and operation side bottom chocks **9** are connected at the bottom by two sleds **14** extended laterally beyond each of the housings **1** and **2** as best seen in FIG. **2.**

On the entry and delivery sides of the mill, separator supports **16** are fitted at the bottom part of the housing posts to which they are fixed by means of the bearing plates **17.** As best shown in FIG. **2,** the separator supports **16** each support two guide boxes **18** arranged symmetrically about the centerline of the mill. Each box **18** includes a sleeve **19** fitted with a bushing **20** in which slides a cylindrical post **21.** On each side of the mill, the two heads of the posts **21** are secured to a track or rail **22** fitted with a liner **12.** The **23.** and post assembly forms a sliding assembly allowing for a parallel displacement of the rail **22.** It should, particularly in FIG. **2,** be noted that the plane of displacement of the rail **22** is arranged on an angle with regard to the plane of the centerlines of the rolls, but the liner **23** remains always in the horizontal position. The moving assembly, thus composed, passes slightly above the bottom backup roll **7** as depicted by the dot-dash lines associated therewith in FIG. **2.**

In the centerline of the mill, each support **16** includes an opening in which an hydraulic cylinder **28** is mounted and pivoted on the support **16** on trunnions **24** fitted in well-known type bearings and represented on the drawings in a simplified way. The rod **25** of the cylinder **28** is connected to the rail **22** by means of bearing plate **26** in which a nut **27** allows for the adjustment of the cylinder rod length.

When not employed for roll changing, the assemblies described above are completely retracted, as shown in the drawings. It is to be noted that these assemblies do not affect the normal operation of the mill.

During roll change, the top backup roll **6** is first raised by means of its balance cylinder, not shown. Then, the roll balance cylinders **13** between the chocks **8** and **9** of the work rolls **10** and **11** are used to bring the center distance of the work rolls to a predetermined

distance which may, for instance, be that of the corresponding center distance of a pair of new rolls while the rolls are continued to be so maintained. The cylinders **28** are pressurized, which raises the rails **22** towards the vertical centerline of the mill. The rails will first touch by their liners **23** the bottom faces of the sleds **14**, which elevation depends upon the wear of the bottom work roll **11**. As the strokes of the cylinders **28** continue, the rail assembly and the work rolls-chock assemblies **8** and **9** are raised. At the end of the stroke of the cylinders **28**, the sleds **14** fixed on the chocks are exactly in line with the fixed track **30** located outside the mill, as shown in FIG. **1**, while the bottom work roll **11** is raised out of contact with the bottom backup roll **7**.

In this position the centerlines of the two work rolls will be at a fixed predetermined distance with regard to the fixed track **30**. It is then easy to hook the rolls to the extraction and introduction rig which may be of any well-known type, for instance, by hydraulic or air cylinder or by a cable and drum arrangement in which the extraction and introduction mechanism may be located on either the drive side or the operating side of the mill.

When, after extraction of the work rolls, it is required also to extract the backup rolls, the assembly of the equipment described above is retracted to its resting position as shown in the drawings. It is to be noted that none of the components of that assembly will have to be disconnected since it is completely independent of the backup roll-chock assembly. It is also to be noted that during the lifting stroke of the roll-chock assembly, the mountings of the cylinders **28** on the trunnions permits it to avoid carrying the shear load generated by the weight of the rail and the roll-chock assembly.

It is obvious that the invention is not limited to the example described above, but it may also apply to other designs which will only differ in detail or the use of equivalent means. Therefore, the invention may be applied with any method of extraction of the rolls and the sliding tracks described may be replaced by rolling tracks if the moving assembly were equipped with wheels as known. Also, the sleds **14** do not necessarily have to be fixed to the bottom work roll chocks. In other mill designs such a sled may be located at the bottom of the legs of the top work roll chocks; the bottom chocks are then allowed to slide between these legs and remain suspended during roll changing. This would be another method of keeping the center distance between work rolls at a fixed predetermined distance during the roll change operations. Finally, devices other than hydraulic cylinders and other arrangements than guide boxes can be employed, which arrangements will have the essential function of providing for parallel displacement of the rails **22** by providing a vertical force sufficient to lift the movable assembly of the work rolls and its chocks.

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. A roll changing device for a rolling mill,

a housing having a window for receiving at least two rolls mounted in chocks, said rolls and chocks constituting an assembly unit to be removed from said housing,

said assembly unit including means for transferring said two rolls and their chocks out of said stand and also including means for maintaining fixed distances between the axes of rotation of said rolls and said transferring means,

means arranged externally of said window for guiding said assembly unit into and out of said window,

rail means movable parallel to the axes of rotation of said rolls, so constructed and arranged that their planes of displacements are set at an angle with respect to a plane passing through the axes of rotation of rolls such that the rail means are passable above the lowermost roll of said mill and in which said rail means have support means for supporting and guiding said transferring means while said assembly unit is within said window,

means for guiding said rail means parallel to themselves between an inoperative position where the rail means are retracted and an operative position where the rail means assume a predetermined supporting and guiding relationship with said transferring means, the construction being such that the rail means are brought into contact with said transferring means of said assembly unit at an intermediate position between their inoperative and operative positions, and

means for displacing said rail means between said inoperative and operative positions,

said displacing means capable of carrying said roll assembly unit when said rail means are brought into a supporting relationship with said transferring means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,869,898 Dated March 11, 1975

Inventor(s) Andre Quehen

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

Column 21, line 41, after the word "liner" the numeral "12" should be deleted and -- 23 -- should be be inserted.

same line, after "The" the numeral "23" should be deleted and the word -- rail -- inserted.

Signed and sealed this 27th day of May 1975.

(SEAL)
Attest:

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Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks

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