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REPLACEMENT OF ROLL STANDS IN ROLLING MILLS

Filed March 24, 1960

2 Sheets-Sheet 1

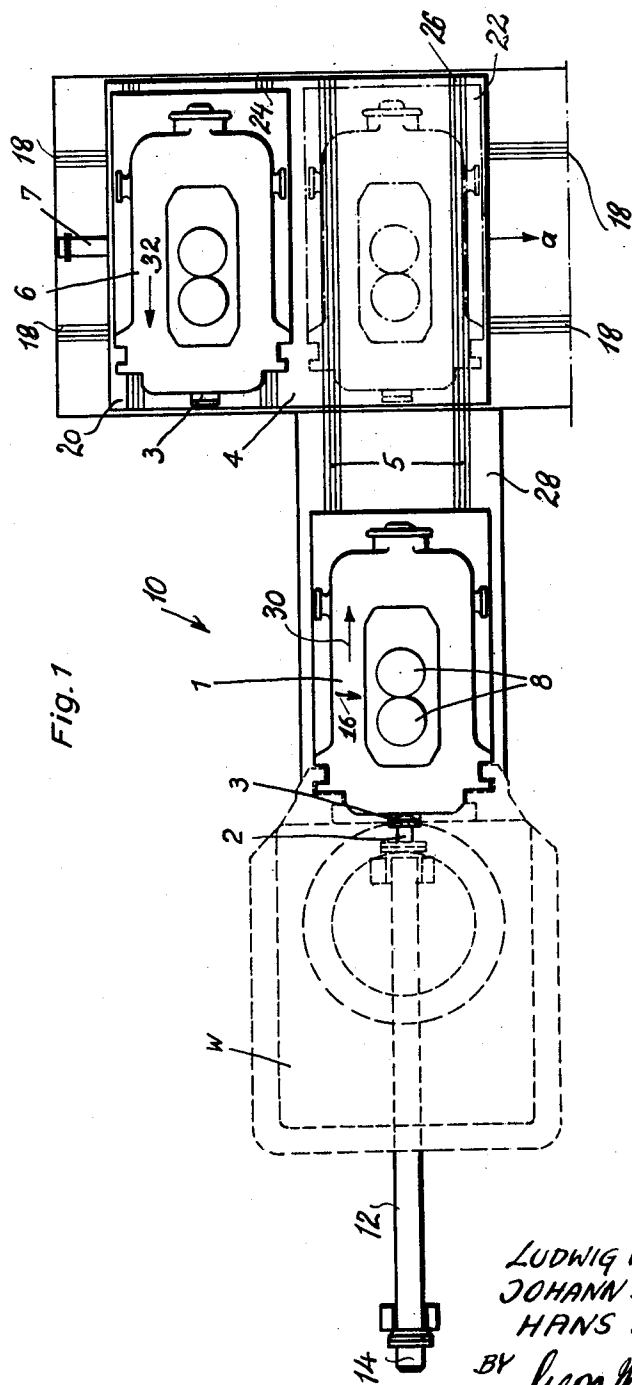


Fig. 1

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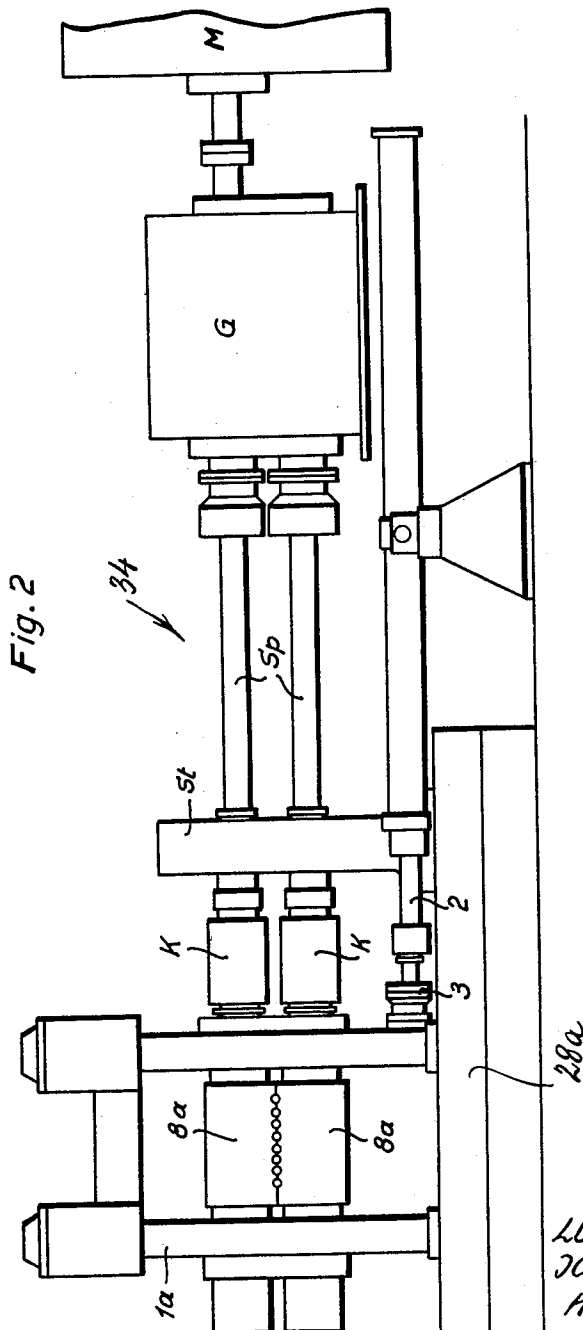
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3,136,182 REPLACEMENT OF ROLL STANDS IN ROLLING MILLS

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1 Claim. (Cl. 80—1)

The present invention relates, in general, to rolling mills of the type having a train of rolls and, in particular, to such mills in which previously assembled roll stands are freely interchangeable with those in the train.

Heretofore, in order to interchange or replace roll stands in the train with assembled replacements, it was necessary to use cranes or other lifting devices to remove the roll stand to be taken out of the rolling line or train and to insert a new roll stand on the base plate of the rolling mill.

The roll stands are relatively heavy and can be moved at relatively low speeds, so that the interchange thereof is relatively time consuming. In addition, the exchange of roll stands is dependent upon the availability of lifting devices having the necessary lift capacity. Further, it is always hazardous to remove roll stands from the train thereof and to insert replacements by lifting operations, since mill hands are always in close proximity to the scene of operation, so that they may be injured in the event of any mishap.

In view of the foregoing, it is an object of the present invention to provide means obviating the aforesaid and other disadvantages of the prior art.

It is another object of the present invention to provide means and method effectuating a highly efficient and time saving interchange of the roll stands in a rolling mill or the like.

Another object of the invention resides in the provision of means facilitating replacement and interchange of one or more roll stands simultaneously and/or selectively.

These and other objects of the present invention will become further apparent from the following detailed description, reference being made to the accompanying drawings, showing preferred embodiments of the invention.

In the drawings which illustrate the best modes presently contemplated for carrying out the invention:

FIG. 1 illustrates an apparatus for practicing the present invention in a rolling mill provided with vertical roll stands; and

FIG. 2 illustrates a rolling mill provided with a movable horizontal roll stand for the practice of the present invention.

Briefly described the present invention provides for a method and means for moving roll stands into and out of the roll train of the rolling mill in a direction away from the drive end of the mill. Provision is made at the drive end of the mill for a roll stand moving or shift device which operates in a direction transverse to the direction in which the rolling operation is effected.

The roll stand shift mechanism receives the roll stands which are to be moved into and out of the roll train. In addition, provision is made for a suitable roll stand conveyor, such as a truck or carriage, which can accommodate at least two roll stands and which moves in a direction parallel to the direction of the rolling operation.

A roll stand replacement, which is to be inserted into the line or train of rolls in the rolling mill, is placed on the truck or carriage, which is then moved up to the line. The roll stand, which is to be removed from the line, is then removed therefrom by the shift mechanism and is moved onto the conveyor device adjacent to the roll stand replacement.

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The conveyor is then moved in a direction transversely of the rolling direction for a distance substantially equal to the width of a roll stand, and the replacement roll stand is then moved into the rolling line.

Referring now to the drawings in detail:

FIG. 1 illustrates a rolling mill 10 which utilizes vertical roll stands in the rolling line or train thereof. For purposes of clarity in the drawing, certain portions only of the mill 10 are illustrated. As here shown, the mill 10 is provided with a housing W for the rolls and with a drive for the rolls (not shown). The drive end of the mill is generally indicated by the reference numeral 14.

A vertical roll stand 1 is shown in position in the roll line, said stand being coupled to a drive 12 by means of a quick-coupling device 3 which couples the roll stand 1 to a hydraulically operated piston or shift device 2.

The roll stand 1 is provided with the vertical rolls 8 and the direction of the rolling operation is indicated by the arrow 16.

It will be understood that the mill 10 is provided with suitable coupling spindles for the rolls 8, water lines, lubrication lines, clamping devices and electric cables, all of which must be uncoupled prior to removal of the roll stand 1 from the roll train.

A truck conveyor 4 is movable on rails 18, in the direction of the arrow a, by means of a hydraulically operated piston 2 and mounts the replacement roll stand 6 at one end 20 thereof, the other end 22 thereof being free.

The truck or carriage 4 is provided with sets of tracks 24 and 26, respectively, which extend transversely of the tracks 18 on which the truck rides.

In order to effect the interchange of roll stands, the truck is moved on tracks 18 to the illustrated position thereof, so that tracks 26 register with tracks 5 provided in the base plate 28 of the rolling mill, the roll stand 1 in the rolling line being mounted on tracks 5.

Piston 2 is then operated to move roll stand 1 from the full line position thereof in base plate 28 to the broken line position thereof on truck 4, said movement being in the direction of arrow 30 transversely of the direction of arrow 16.

Coupling 3 is then uncoupled from firm roll stand. Hydraulic piston 7 is now operated to move the truck on tracks 18 in the direction of arrow a, until tracks 24 register with tracks 5.

Piston 2 is then coupled by guide-coupling 3 to the replacement roll stand 6 which now is in the broken line position, and the piston then draws the replacement stand, in the direction of arrow 32, along track 5 into the housing W, whereby the replacement of roll stand 1 is effected. The replaced stand 1 can then be moved from the track at any convenient time without affecting the operation of the train of rolls from which it had been removed.

FIG. 2 illustrates a rolling mill 34 provided with a horizontal roll stand 1a which is coupled at its drive end by means of a quick coupling 3 to a hydraulic piston 2.

In FIG. 2 tracks similar to tracks 5 extend to the left of the drawing. Tracks similar to tracks 18 also extend at right angles to tracks 5 and are provided with a truck or slide similar to the slide 4 of FIG. 1.

The horizontal rolls 8a of stand 1a are driven by motor M through transmission gear means G which drives the drive spindles Sp mounted in standard St. Spindles Sp are coupled to rolls 8a by means of coupling sleeves K.

It will be apparent that the stand 1a can be uncoupled from sleeves K and various other components to which it may be coupled, and then moved by piston 2 along a pair of tracks 5 onto a pair of tracks 26 on a truck 4, whereafter piston 2 is uncoupled therefrom and, after the truck is moved on rails 18 to align tracks 24 with

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tracks 5, a replacement roll stand may be drawn onto the base plate 28a of mill 34 in the same manner as described in connection with mill 10.

It can thus be seen, that there has been provided, according to the invention, a plant with a continuously working train of rolls equipped with interchangeable roll stands and drive means therefor at one end thereof, which plant is characterized by displacement means actuatable in a direction transverse to the operational direction of the rolls and adapted to move and place a roll stand in effective position and also to remove the same into an inoperative position for replacement away from said drive means at said one end, and conveyor means in the form of a truck, slide or carriage for receiving the roll stand to be replaced and a replacement roll stand, said conveyor means being adapted to carry at least two roll stands and being constructed for movement along track means extending parallel to the direction of the rolling operation.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claim.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

In a rolling mill including at least one roll stand and disconnectible driving means for operating said roll stand, the improvement comprising a first trackway extending from said roll stand perpendicular to the direction of rolling and having one end at said roll stand, a second trackway extending parallel to the direction of rolling adjacent the other end of said first trackway, a truck movable longitudinally of said second trackway, at least a pair

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of third trackways on said truck spaced longitudinally of said second trackway and each alignable with said first trackway to form therewith a continuous trackway from said roll stand onto said truck, said roll stand being displaceable along said first trackway upon disconnection of said driving means from said roll stand, actuator means extendable longitudinally of said first trackway to displace the roll stand along said continuous trackway to and from said truck, and a second roll stand on one of said third trackways and interchangeable positionally with said first-mentioned roll stand, whereby said truck may be moved along said second trackway to align another one of said third trackways with said first trackway to form such continuous trackway, and said actuator means may be extended in engagement with said first-mentioned roll stand to displace the latter along said first trackway and onto said other third trackway, after which said truck may be moved along said second trackway to align said one third trackway with said first trackway and said actuator means operated to draw said second roll stand from said truck onto said first trackway and into the position vacated by said first-mentioned roll stand.

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