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J. F. ALSOP ETAL

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ROLL CHANGING ARRANGEMENT FOR ROLLING MILLS

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2 Sheets-Sheet 1

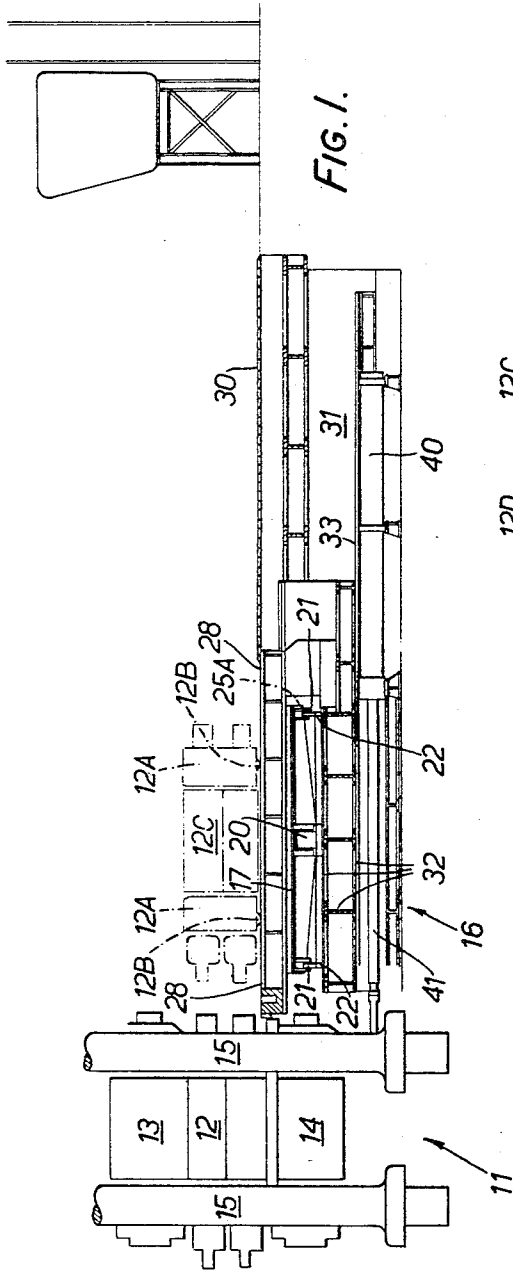


FIG. 1.

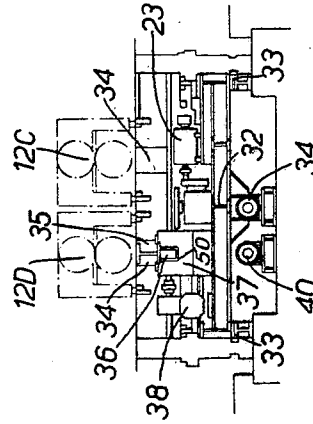


FIG. 3.

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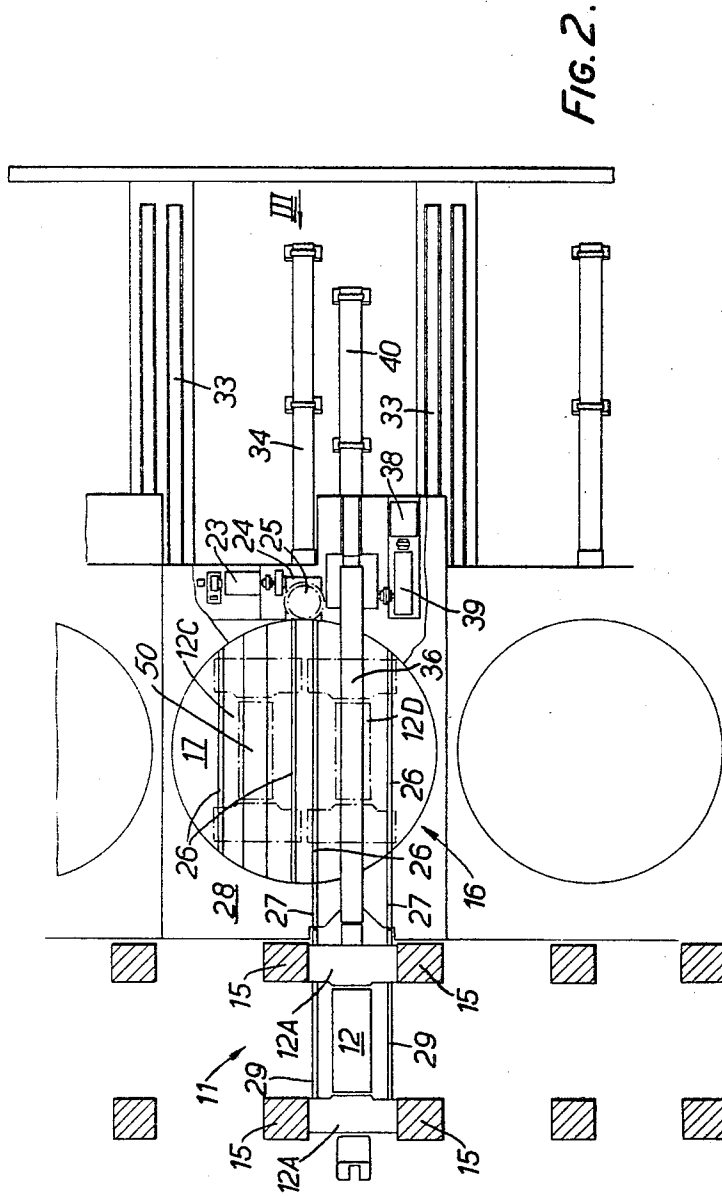
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3,396,566  
**ROLL CHANGING ARRANGEMENT FOR  
 ROLLING MILLS**

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**ABSTRACT OF THE DISCLOSURE**

The disclosure of this invention relates to a turntable for use in rapidly changing the work rolls of a 4-high mill. The disclosure provides a means on the same side of the mill that the turntable is located for retracting the turntable with its drive means away from the mill so as to allow sufficient space to remove the backup rolls. The disclosure also provides two passages in the turntable; one of which passages on the rotation of the turntable is adapted to align itself with a ram employed to withdraw the work rolls from the mill and which passages slidably guide the ram in its movement towards and away from the mill.

This invention relates to roll change arrangements for rolling mills and is particularly concerned with reducing the space currently required by such arrangements and also with reducing the time required to carry out the roll changing operation.

It is known to use a turntable adjacent a rolling mill, upon one side of which turntable a replacement set of roll assemblies is located, the old set of roll assemblies being slid from the mill on to the other side of the turntable, the turntable being rotated through 180°, and the replacement set of roll assemblies being slid into position in the mill. With this previous arrangement, the turntable itself is located on one side of the mill, whilst the roll assembly removal mechanism is located on the opposite side of the mill, so that it is necessary for the removal mechanisms to be capable of extending between the mill columns to reach a roll assembly located on the turntable.

The present invention provides a roll change arrangement for a rolling mill stand, which arrangement includes a turntable arranged on the same side of the stand as means to withdraw the roll assemblies from the stand onto the turntable. With this arrangement, the roll change facilities are located entirely on one side of the mill, and the other side of the mill is free to accommodate the roll driving mechanisms.

Preferably, the turntable is arranged to support two sets of roll assemblies one on each side of the axis of rotation of the turntable and the roll assembly withdrawal means is arranged in line with a roll assembly position on the turntable and the roll assembly position in the stand.

The assembly withdrawal means may include a rack slidably guided in suitable guides aligned with passages in the turntable when the turntable is in a roll change position, the rack being operated by a pinion driven through a gear box by an electric motor.

When the above arrangement is used for changing the work rolls of a 4-high mill, the turntable and its associated mechanisms can be supported on guides in a manner so that they may be withdrawn from adjacent the mill stand to facilitate removal of the back-up rolls.

The following description relates to the accompanying diagrammatic drawings which show, by way of example only, a roll change arrangement according to the invention for a 4-high mill.

In the drawings:

FIGURE 1 is a side elevation,

FIGURE 2 is a plan with a floor plate removed, and FIGURE 3 is a view in the direction of the arrow III in FIGURE 2.

In the drawings a 4-high rolling mill 11 has a pair of work roll assemblies 12 and upper and lower back-up roll assemblies 13 and 14 respectively, each of which can be withdrawn to the right (in the drawing) from between mill housing columns 15 in a conventional manner. The lower of the chocks 12A of the assemblies 12 are provided with wheels 12B.

A circular turntable 16 fabricated from structural steel and having a platform 17 at floor level, is rotatable about a pintle 20 and is supported by wheels 21 running on a circular track 22 all arranged on the operating side of the mill and opposite the drive side thereof. The turntable 16 is driven around the pintle 20 by an electric motor 23 driving a pinion 25 through a gear box 24. The pinion 25 engages a ring gear 25A surrounding the turntable.

The platform 17 is provided with two pairs of rails 26 arranged one on each side of the axis of rotation of the turntable, and by rotation of the turntable either pair of rails can be aligned with co-operating rails 27 on a non-rotating platform 28 between the turntable and the mill. Further co-operating rails 29 are arranged within the mill. The non-rotating platform 28 surrounds the turntable 16 and extends on the side remote from the mill to meet a removable floor plate 30 over a pit 31.

The pintle 20, the circular track 22, and the platform 28, are carried in a framework 32 which is slidably supported on guides 33, so that the turntable and its supporting structure may be withdrawn by a piston and cylinder arrangement 34, away from the mill and into the pit 31.

The platform 17 includes two passages such as 50 (FIGURE 3) through which can pass a chock engaging means 35 secured to a rack beam 36 slidably guided in a structure 37, the rack being driven by a pinion (not shown) itself driven from an electric motor 38 via a gear box. The rack guide structure 37 extends far enough to the right in the drawing so that the rack beam can be completely withdrawn from the turntable 16 to permit it to be rotated.

A back-up roll change piston and cylinder arrangement 40 has a piston rod 41 which reaches to engage the lower right-hand back-up roll chock.

In operation when the mill is shut down to change the work roll assemblies 12, the turntable is already in position adjacent the mill with a replacement set of work roll assemblies 12C thereon as indicated in chain line in the drawings. When means securing the work roll assemblies in the mill have been released, the work roll assemblies 12 have been arranged to be supported one upon the other, and upon the rails 29 by the wheels 12B, the rack beam motor 38 is operated to drive the rack beam and the chock engaging means through the turntable, and the chock engaging means is latched on to the lower right-hand chock 12A. The motor 38 is then operated in reverse to withdraw the roll assemblies onto the turntable as indicated at 12D in the drawings. The rack beam is then unlatched from the chock and is driven to the right out of the turntable which is then rotated through 180° by the motor 23 so that the position of the assemblies 12C and 12D are interchanged. The motor 38 is again operated to bring the rack 36 in to push the replacement assembly 12C into the mill, and the rack is unlatched. The normal position of the rack beam 36 is across the turntable with the upper flange of the beam bridging the top of the associated passage 50. This obviates the hazard of an open slot in the mill floor. The other passage 50 has in association with it a dummy beam (not shown) which can be driven using an hydraulic or air cylinder or can be lifted in and out of the passage by the shop crane.

When it is required to change the back-up roll assem-

blies, the work roll assemblies will first have been removed onto the turntable as described above, and then the floor plate 30 is removed and the cylinder 34 is actuated to withdraw the turntable structure into the pit 31. The back-up roll change cylinder 40 will then be used to withdraw the back-up roll assemblies upon a sled in known manner.

With the roll change arrangement described it will be seen that changing of either the work roll assemblies alone, or of these assemblies and also the back-up roll assemblies is greatly facilitated, and further, the roll change arrangements being located on one side of the mill stand, do not interfere with the roll drive mechanisms of the mill.

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 roll changing arrangement for a rolling mill stand having a pair of work roll assemblies and a pair of back-up roll assemblies, said stand having a drive side and an operating side, opposite the drive side, said arrangement including a turntable having two distinct supporting surfaces for two distinct pairs of work roll assemblies and being located on said operating side, means for rotating said turntable to move said support surfaces into and out of a position to receive a pair of work roll assemblies withdrawn from said stand, means for supporting said turntable and said means for rotating said turntable, said supporting means being constructed and arranged so that said turntable and said means for rotating the turntable can be withdrawn away from the mill stand to facilitate removal of said back-up roll assemblies, and

means arranged on said operating side for withdrawing a pair of work roll assemblies from said stand onto said turntable and said supporting means away from said mill stand.

2. A roll changing arrangement according to claim 1, wherein said means to withdraw the work roll assemblies, including a rack,

means for operatively connecting said rack to one of said work roll assemblies,

said turntable having passages for slidably guiding said rack when the turntable is in its roll changing position, and

a drive pinion arranged to move said rack.

3. In a roll changing arrangement for a rolling mill stand having a pair of work roll assemblies, said arrangement including a turntable having two distinct support surfaces for two different pairs of work roll assemblies,

means for rotating said turntable to alternately position said support surfaces to receive a pair of withdrawn work rolls,

a rack for withdrawing a pair of work roll assemblies from the stand onto one of said support surfaces of said turntable,

means for operatively connecting said rack to one of said work roll assemblies,

said turntable having a passage for each support surface for slidably guiding said rack when the said surfaces are positioned to support a roll being withdrawn from said mill, and

drive pinion arranged to move said rack.

#### References Cited

#### UNITED STATES PATENTS

|           |        |               |        |
|-----------|--------|---------------|--------|
| 749,745   | 1/1904 | Von Philp     | 72-239 |
| 3,208,260 | 9/1965 | Sieger et al. | 72-239 |

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