Jan. 23, 1968 J. F. ALSOP ETAL 3,365,174

ROLLING MILL ROLL CHANGING APPARATUS

Filed Jan. 25, 1966 2 Sheets-Sheet 1

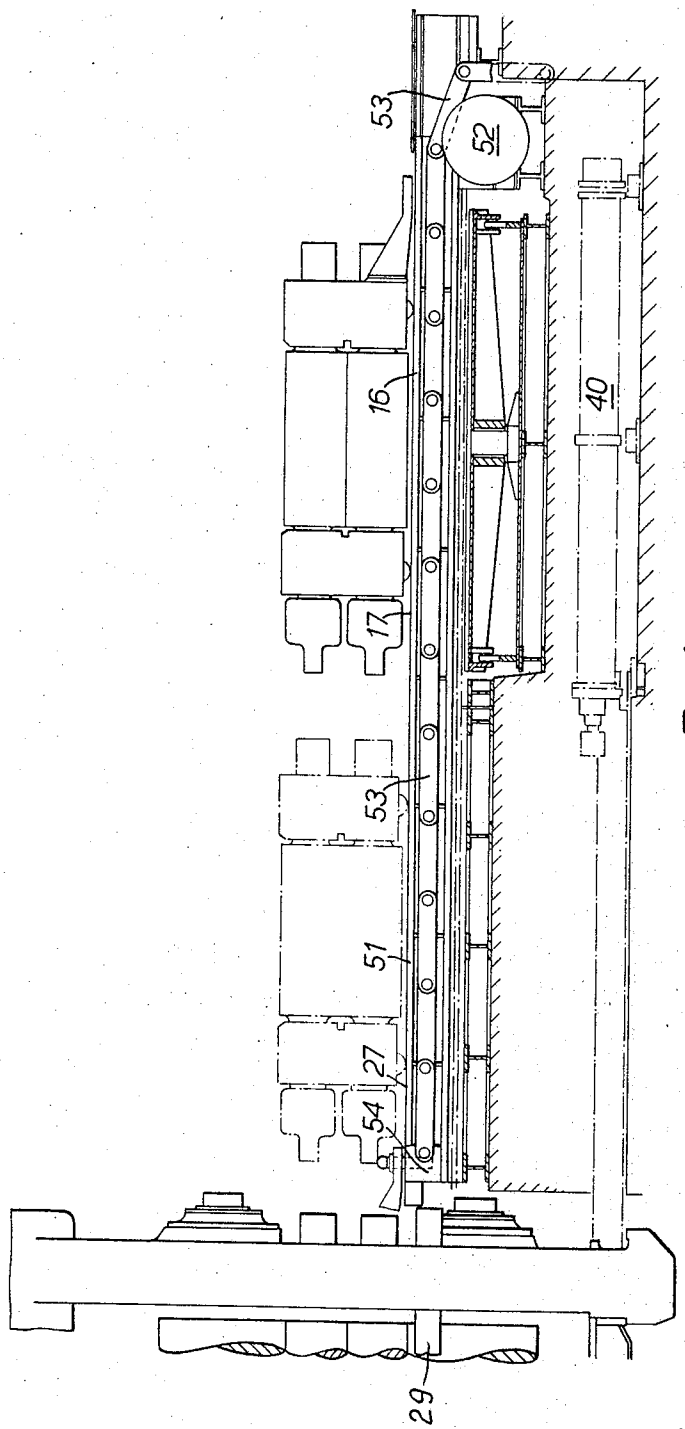


FIG. 1.

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ROLLING MILL ROLL CHANGING APPARATUS

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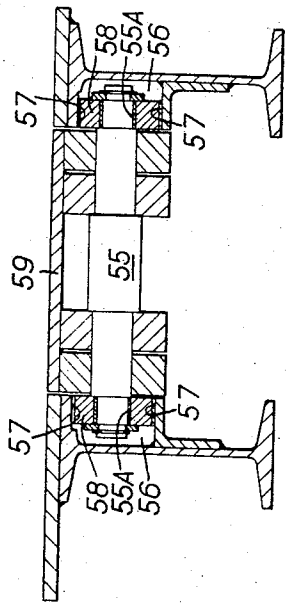


FIG. 4.

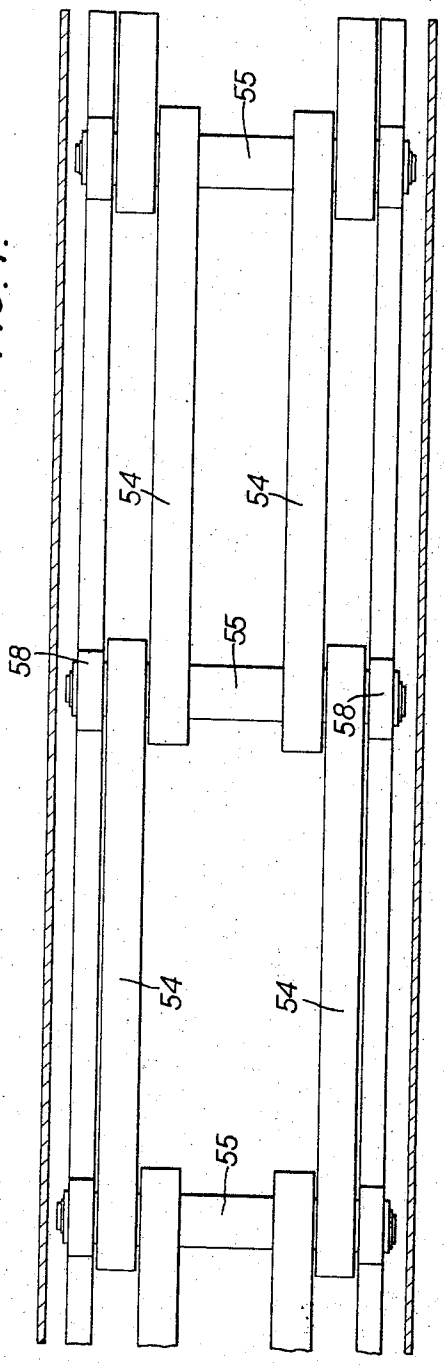


FIG. 3.

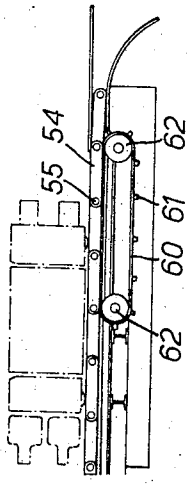


FIG. 2.

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United States Patent Office 3,365,174 Patented Jan. 23, 1968

3,365,174

ROLLING MILL ROLL CHANGING APPARATUS

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Filed Jan. 25, 1966, Ser. No. 522,907
Claims priority, application Great Britain, Feb. 4, 1965, 4,824/65
7 Claims. (Cl. 254—95)

ABSTRACT OF THE DISCLOSURE

The invention relates to a chain-like apparatus for use in combination with a rolling mill wherein the chain constitutes the means for advancing to and retracting from the mills the rolls thereof. A drive is provided for the chain for advancing it towards and away from the rolling mill and between a chain storage area in which the links that make up the chain can be folded. A track is provided which extends between the chain storage area and the mill is constructed to confine the links to travel in a substantially horizontal plane and prevent folding of the links when they are moved out of the storage area.

This invention relates to roll change arrangements for a rolling mill.

In our copending application U.S. Ser. No. 522,740 filed Jan. 24, 1966 there is shown and described a work roll change arrangement including a turntable located closely adjacent the mill stand, the turntable structure being withdrawable from the mill to facilitate removal of the back-up roll assemblies by withdrawing them upon a sled. Although this arrangement requires guide supports and withdrawal mechanisms for the turntable structure, it is to be preferred over an arrangement in which the turntable is permanently located sufficiently far from the mill to allow changing of the back-up rolls in the manner described. This is because, with this latter arrangement a greatly extended rigid roll-withdrawal rack is required in order that the rack can reach from the turntable to the mill. When this extended rack is withdrawn from the turntable in order to permit rotation thereof, accommodation has to be provided in adjacent space for it to be withdrawn into.

When a turntable is not provided, so that the rapid interchange of position of the old and replacement roll assemblies cannot be carried out, it is desirable that the replacement roll assembly should be in position on the rails adjacent the mill before the old roll assembly is withdrawn from the mill. This desideratum reduces the time required for roll changing because, when the old roll assembly is withdrawn from the mill it need only be lifted clear of the rails by crane and the replacement assembly can be immediately rolled into the mill. This method, however, also requires that the rigid rack of the roll withdrawal mechanism must extend at least the length of two roll assemblies from the mill, so that again accommodation has to be provided for the rack beam when it is in the position remote from the mill. This is clearly undesirable for the usual reasons of space limitation.

In one aspect the present invention provides a device comprising a series of links secured one to another to form an elongate chain-like arrangement, and means to confine each end of each of the links to travel substantially in a given plane. When this arrangement is used in place of the rack referred to above, the means to confine the ends of the links to travel substantially in a given plane will permit the chain-like arrangement to be used for pushing as well as pulling, whereas it can be allowed

to collapse into a relatively small space for storage purposes when removed from the said means.

Each link may comprise a strip-like member pivotally secured at each end to a pin to which an adjacent strip-like member is also pivotally secured.

Preferably, each link comprises two such strip-like members.

The outer ends of the pins may be slidably guided in channels arranged to confine the pins to travel in the said plane.

Preferably, each pin has a roller at each end rotatably supported on the pin by a self lubricating bearing and running in the channels.

In a second aspect the invention provides a rolling mill including means to withdraw the roll assemblies therefrom, the said means comprising a power source remote from the mill and a device comprising a series of links secured one to another to form an elongate chain-like arrangement, and means between the power source and the mill to confine each end of each of the links to travel substantially in a given plane.

The power source may be an electric motor driving a sprocket about which the chain links engage, or it may be a flexible track supported around driving wheels and carrying abutments to engage the chain.

The following description relates to the accompanying diagrammatic drawings which show, by way of example only, a roll change arrangement including a device according to one aspect of the invention.

Of the drawings:

FIGURE 1 is a side view of a roll change arrangement partly in section,

FIGURE 2 is a side view of an alternative arrangement,

FIGURE 3 is a plan view of part of the device according to one aspect of the invention, and

FIGURE 4 is a part-section on the line III—III of FIGURE 1.

The roll change arrangement of FIGURE 1 differs from that shown in FIGURE 1 of our co-pending application No. 3,350/65 in that the turntable **16** is located remote from the mill, and a floor plate **51** fills the space therebetween. The floor plate **51** has rails **27** co-operating with the rails **17** on the turntable and the rails **29** in the mill. With the turntable located remote from the mill, withdrawal of the back-up rolls is accomplished merely by lifting the plate **51** clear, and by conventional use of the withdrawal cylinder **40** as described in the said co-pending application.

In the arrangement shown in FIGURE 1, withdrawal of the work rolls is accomplished by an electric motor driving a sprocket generally indicated at **52** around which sprocket a chain-like arrangement **53** passes and extends to connect with the work roll chock in any known manner at **54**.

The chain **53** comprises a series of links each made up of a pair of strip-like members **54** (FIGURE 3) pivotally secured to a pivot pin **55** common to an adjacent link. It will be seen that the strips of each alternate link are spaced apart at different distances in order to accommodate four strips **54** on a common pin **55**.

Between the driving sprocket and the mill the ends of the pins **55** are slidably guided in channels **56** having opposed guide surfaces **57** arranged to co-operate with the outer surface of rollers **58** rotatably supported on each end of the pins **55** by self lubricating bushes **55A**. The channels **56** therefore confine the ends of the links to travel substantially in a given plane between the sprocket and the mill, so that the chain can be used both for pulling work roll assemblies out of the mill and pushing them back into the mill.

Each pair of strips of each link has a portion of a floor plate **59** secured thereto, substantially to complete the floor plates when the chain reaches to the mill.

When the chain is withdrawn to the right in the drawings, it passes out of the channels **56** immediately before it passes over the sprocket **52** so that when leaving the sprocket **52** it can be conveniently folded and stored in a container below the sprocket or alternatively coiled in a suitable receiver below or adjacent the sprocket. With this arrangement, there is no need to provide additional space to the right of the roll withdrawal motor to accommodate a rack or other rigid force transmitting means.

FIGURE 2 shows an alternative drive means for the chain and this includes a flexible track **60** having abutments **61** to engage the pins **55** of the chain. The flexible track **60** is supported around wheels **62** one or both of which may be driven.

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. In combination with a rolling mill wherein the rolls thereof are to be withdrawn from the mill, a roll withdrawal device comprising:

an elongated chain located on one side of said mill made up of a plurality of freely displaceable links adapted to be moved to and from a chain storage area spaced from said mill,

means for supporting a roll to be withdrawn from the mill arranged to move between said mill and said chain storage area,

means for connecting at least one of the links adapted to be brought adjacent the mill to the roll supporting means,

means for driving said chain to advance the links from the chain storage area where said links are stored in a non-extended condition to the mill where the roll supporting means is positioned to receive a roll removed from the mill, and

a track extending between said storage area and said mill and below said roll supporting means constructed to receive said links and confine their travel to a horizontal plane and prevent them from being displaced out of said plane when moved out of said storage area.

2. A device according to claim **1** wherein each link comprises a strip-like member pivotally secured at each end to a pin to which an adjacent strip-like member is also pivotally secured.

3. A device according to claim **2** wherein each link includes two said strip-like members.

4. A device according to claim **1** wherein the pins are slidably guided in channels arranged to confine the pins to travel in said plane.

5. A device according to claim **4** wherein each pin has a roller at each end rotatably supported on the pin and running the said channels.

6. A rolling mill according to claim **1** wherein the driving means for the chain comprises an electric motor and a sprocket driven thereby about which the links engage.

7. A rolling mill according to claim **1** wherein the said driving means for the chain includes a flexible track supported around driving wheels and carrying abutments to engage the links and an electrical motor driving said wheels.

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