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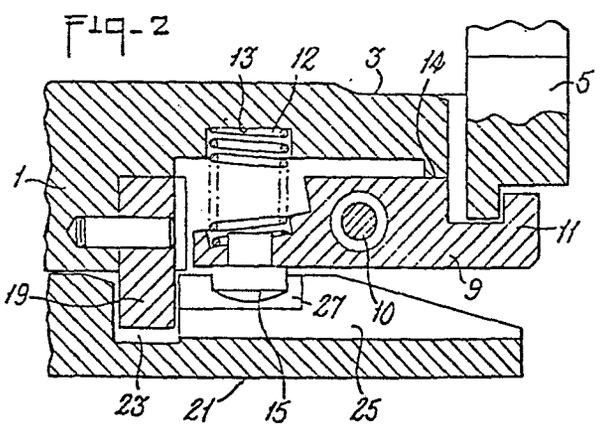
(54) Improvements relating to rolling mills.

(57) A coupling box for fitting to one end of a rolling mill roll has a pivoted latch for retaining the roll end. A support carrier for supporting the coupling box when the roll is removed therefrom has provision for releasing the latch when the carrier supports the coupling box and there is relative movement between them.

Fig-2



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IMPROVEMENTS RELATING TO ROLLING MILLS

This invention relates to rolling mills and, in particular, to the couplings by which the drive spindles are releasably connected to the ends of the driven rolls of the mill.

It is well known that each driven roll of a rolling mill is connected at one end to its drive spindle by way of a coupling box which is connected through a joint to the spindle. The joint permits the spindles to be inclined to each other as the rolls are moved towards and away from each other and also permit rolls of different diameters to be employed. Clearly, when the mill is in use, care has to be taken that the roll end does not become withdrawn from the coupling box. At roll change time, however, the roll end has to be withdrawn from the coupling box and, in order to reduce the roll change time as much as possible, it is desirable that the withdrawal of the roll end from the coupling box should be accomplished quickly.

It is an object of the present invention to provide means by which a coupling box can readily and rapidly release the end of the roll.

The present invention resides in the combination of a drive spindle having a coupling box at one end, the box being arranged to receive one end of a

rolling mill roll and having a latch which serves to prevent withdrawal of a roll end inserted in the coupling box and a displaceable support carrier having provision for releasing the latch to enable the roll end to be withdrawn from the coupling box when the coupling box is supported on the support carrier.

The coupling box is latched on to the roll end and this serves to prevent axial withdrawal of the roll end from the coupling box. When, however, it is desirable to withdraw the roll end from the coupling box, as at roll changing time, the displaceable support carrier is displaced to a position where it supports the coupling box and, in this position, relative movement between the coupling box and the support carrier releases the latch to enable to roll end to be withdrawn from the coupling box. The carrier supports the coupling box until another roll end is introduced into the coupling box and, thereafter, the latch is re-engaged on to the roll end to prevent withdrawal of the roll end from the coupling box.

Conveniently, the latch is pivotally mounted on the coupling box and it is biased to its latching position. The latch remains biased into its latching position while the support carrier is moved into a position where it can support the coupling box and then engagement between a part of the latch and the support

carrier causes the latch to pivot against the bias to release the roll end.

Conveniently, it is a relative angular rotation between the coupling box and the support carrier which causes a cam surface on the coupling box to progressively engage said part of the latch to displace the latch to the position in which the roll end is released. Furthermore, a part of the coupling box is held fast relative to the carrier so that withdrawal of the spindle causes the coupling box to be displaced away from the end of the roll.

In order that the invention may be more readily understood, it will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is an end view of part of a spindle support carrier;

Figure 2 is a sectional view of part of the spindle support carrier and part of the coupling box provided with a latch for latching a roll in the coupling box; and

Figure 3 is a scrap view showing part of the coupling box and the support carrier.

Referring to Figure 2, reference 1 indicates part of a generally cylindrical coupling box having a central opening 3 for receiving an end of a rolling

mill roll. The coupling box is mounted through a flexible joint to one end of a telescopic drive spindle (not shown). When the roll end is firmly located in the central opening in the coupling box, a drive pertains between the spindle and the roll. Reference 5 indicates a ring fitted around and projecting radially outwardly of the periphery of the roll end.

The coupling box has at least one, and preferably of pair of, latches 9 which are pivotally mounted on the outside of the coupling box. Each latch is pivotally mounted on the coupling box by way of a pivot 10 intermediate the ends of the latch. At one end of the latch there is a hook 11 which enables the latch to fit around the outer edge of the ring 5 on the roll and thus prevent the roll from being withdrawn from the coupling box. At the opposite, inner, end of the latch there is a recess which receives one end of a coil spring 12 while the other end of the spring is located in a recess 13 formed in the wall of the coupling box. The spring is arranged to bias the latch in the anticlockwise direction, shown in Figure 2, against a stop 14. On the outside of the latch, at the end to which the spring is attached, there is a button 15. Also on the coupling box, adjacent the button 15, there is an outwardly extending peg 19 which is aligned with the button 15. When the coupling box is provided

with a pair of latches, it is convenient for there also to be a pair of pegs 19 and they are arranged to lie diametrically opposite to each other.

At roll changing time, it is necessary to support the coupling box, and hence the end of the drive spindle, while the roll end is withdrawn from the coupling box. To this end, a spindle support carrier is employed. The support carrier is indicated generally by reference 7 in Figure 1. The carrier is displaceable on a frame structure 8 in the direction of the axial length of the rolls. The support carrier has a saddle 20 which is capable of receiving and supporting the coupling box 1. In addition to being displaceable in the direction of the length of the rolls, hydraulic cylinders are provided for displacing the saddle vertically perpendicular to the axial length of the rolls. In this way, the saddle supporting a coupling box can be aligned with the end of a roll. The saddle has a forwardly projecting portion 2' and internally of this portion there is a groove 23 which extends around most of the internal periphery of the saddle. There is also a slot 25 which leads from the forward end of the projecting portion of the saddle to the recess 23.

When the mill is in use, and the rolls are being rotated, the carrier 7 is withdrawn away from the

coupling box so as not to interfere with the coupling box or its spindle. When, at roll changing time, the roll is to be removed from the coupling box, it is necessary to support the coupling box and, hence, the drive spindle, while the roll end is withdrawn from the coupling box. When the roll is to be withdrawn from the coupling box, the spindles are indexed into a predetermined angular position and, at this position, the spindle support carrier 7 is moved forwards towards the roll so that, as it moves towards the roll, the peg 19 enters into, and moves along, the slot 25 into the recess 23. At this time the button 15 is positioned in the slot 25. The spring 12 is urging the button outwardly and the roll end is still latched in the coupling box. The spindle is then rotated relative to the support carrier so that the button 15 moves along an inclined surface 27 on the slot 25 of the carrier and this inclined surface forces the button to move inwardly against the action of the spring thus pivoting the latch about its pivot 10 to a position where the hook portion 11 of the latch is disconnected from the ring 5 at the roll end. In this position, the rotation of the coupling box is stopped and, with the coupling box supported on the support carrier, the spindle is retracted causing the carrier to be retracted due to the action of the peg 19 in the groove 23. The

coupling box is drawn away from the roll end. A pair of support carriers are conveniently provided, one for each coupling of the two drive rolls. When a new roll has been fitted into the mill, the coupling box, while still supported on the support carrier, is accurately aligned with the roll end. The coupling box is then moved forwards on to the end of the roll and, thereafter, the coupling box is rotated to allow the button 15 to move down the inclined surface, thus allowing the latch 9 to pivot into the position where it hooks over the ring 5 on the roll to retain the roll in the coupling box.

Claims:

1. The combination of

a drive spindle having a coupling box (1) at one end, the box being arranged to receive one end of a rolling mill roll and having a latch (9) which serves to prevent withdrawal of a roll end inserted in the coupling box; and

a displaceable support carrier (7) having provision (27) for releasing the latch to enable the roll end to be withdrawn from the coupling box when the coupling box is supported on the support carrier.

2. The combination claimed in claim 1, in which the latch is pivotally mounted on the coupling box and is biased to its latching position and engagement between a part of the latch and the support carrier causes the latch to pivot against the bias to release the roll end.

3. The combination claimed in claim 2, in which angular rotation of the coupling box relative to the support carrier causes a cam surface on the carrier to progressively engage said part of the latch to displace the latch to the position to release the roll end.

4. The combination claimed in claim 3, in which the support carrier has a saddle which fits around the coupling box and the saddle has an elongate slot extending rearwardly from the forward end thereof, and said part of the latch projects outwardly of the coupling box, the slot permitting said part of the latch to enter therein without releasing the latch but angular rotation of the coupling box relative to the saddle causes said part of the latch to engage the cam surface to displace the latch.

5. The combination claimed in claim 4, in which said elongate slot extends to an annular groove in the saddle and the coupling box has an outwardly projecting peg aligned with said part of the latch and which extends into the groove as the coupling box is rotated with respect to the saddle to provide a connection between the coupling box and the saddle.

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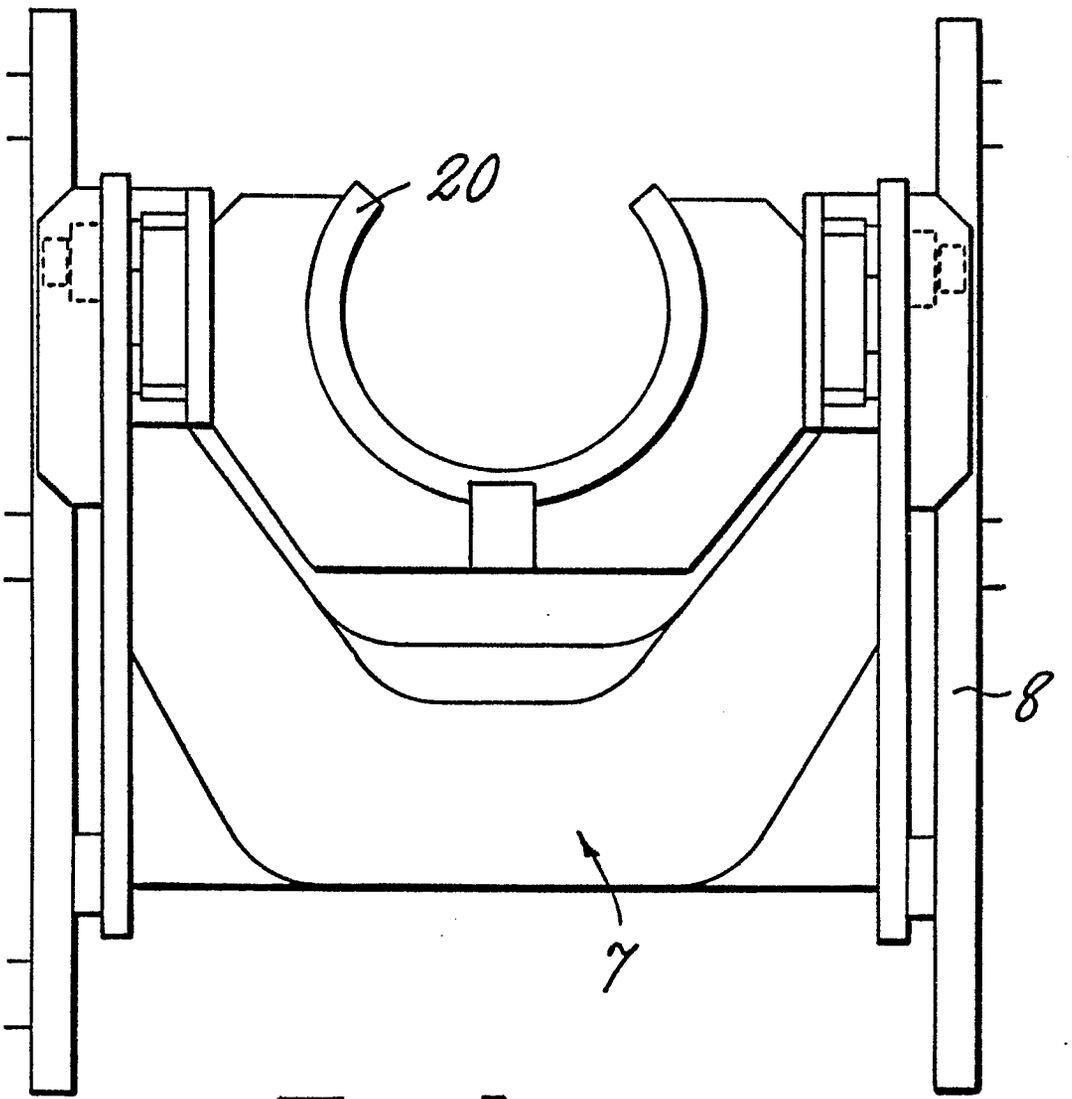

Fig-1

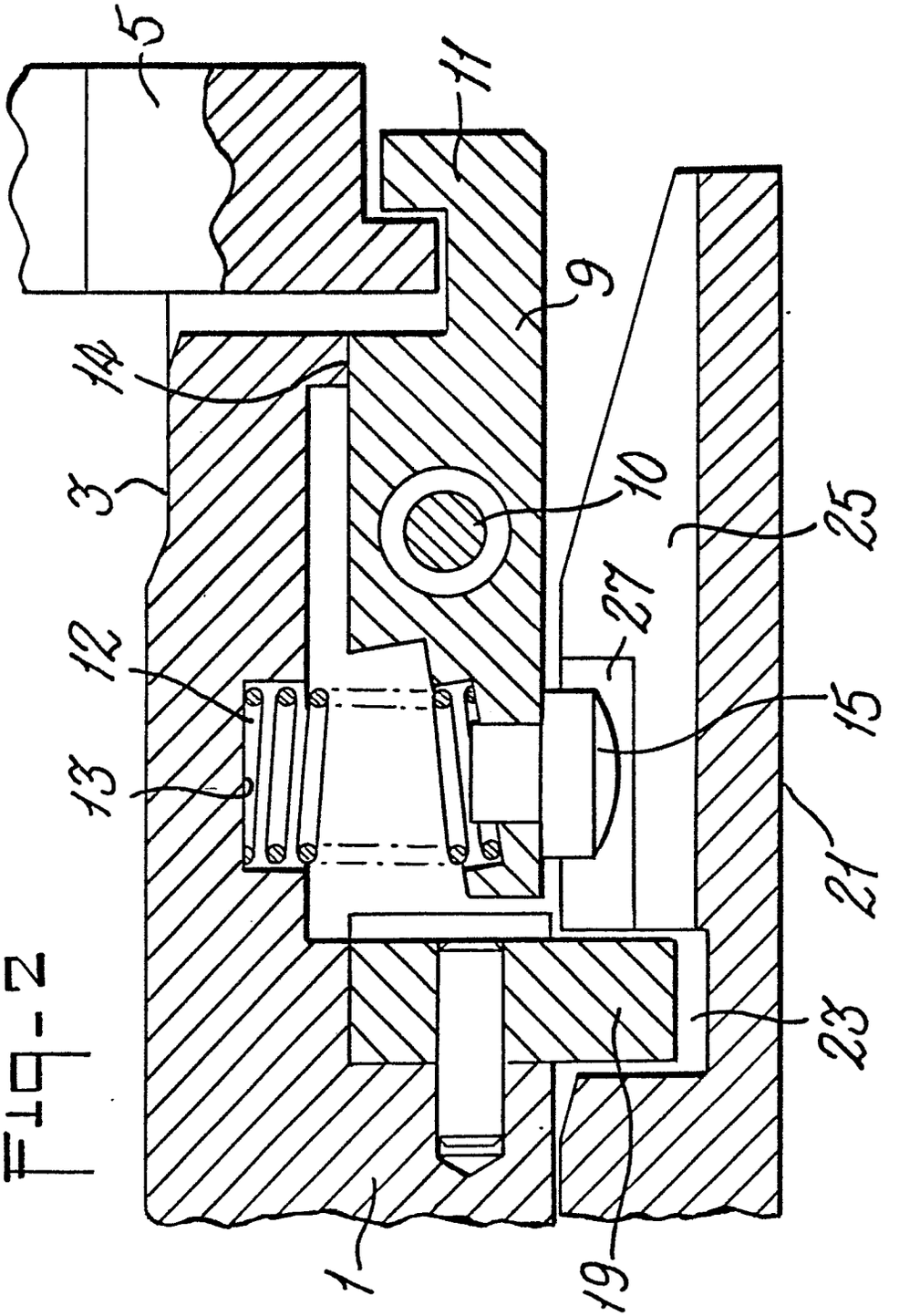

FIG-2

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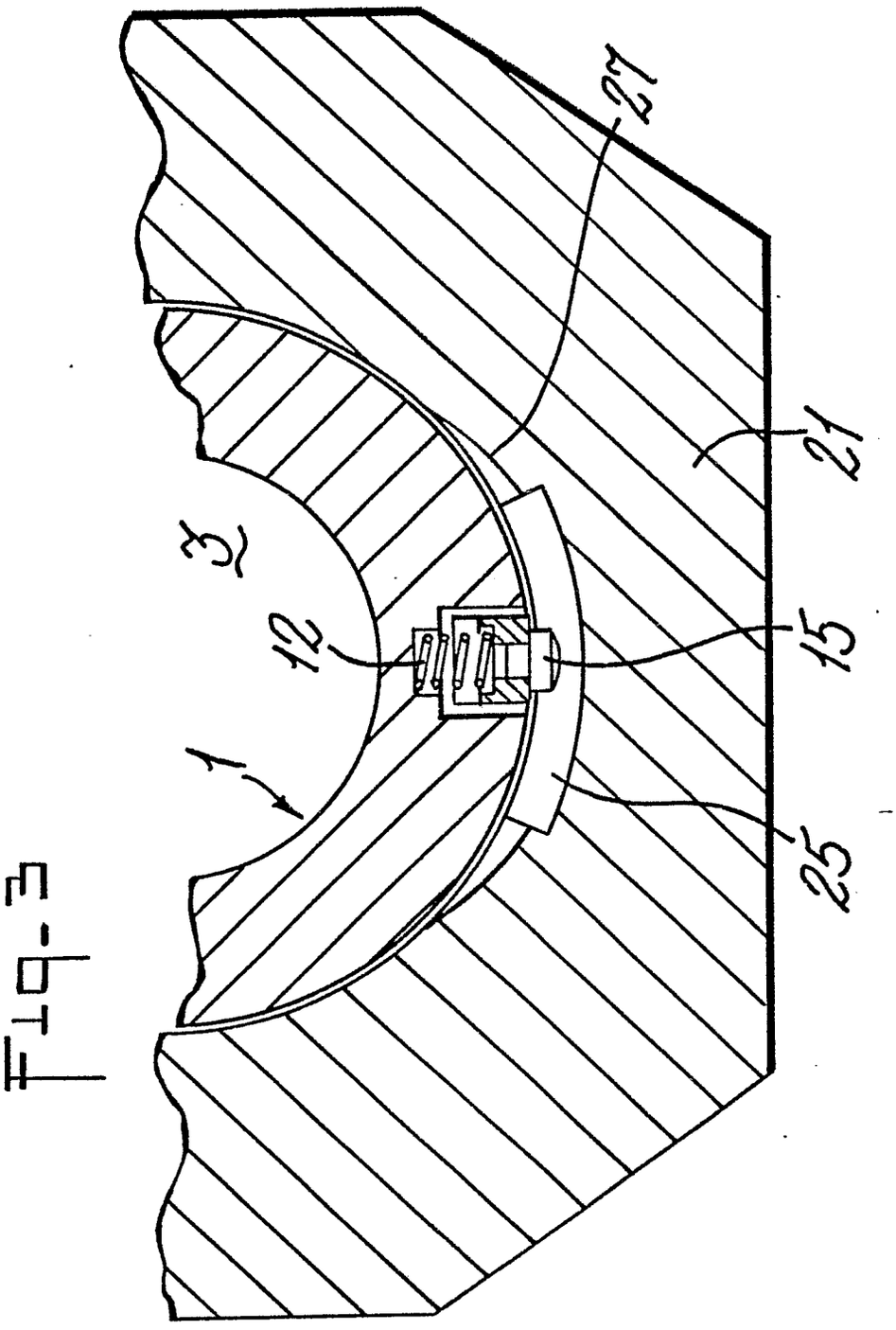

Fig. 3