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STRAIGHTENING MACHINE PROVIDED WITH ROLLS

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Fig. 1

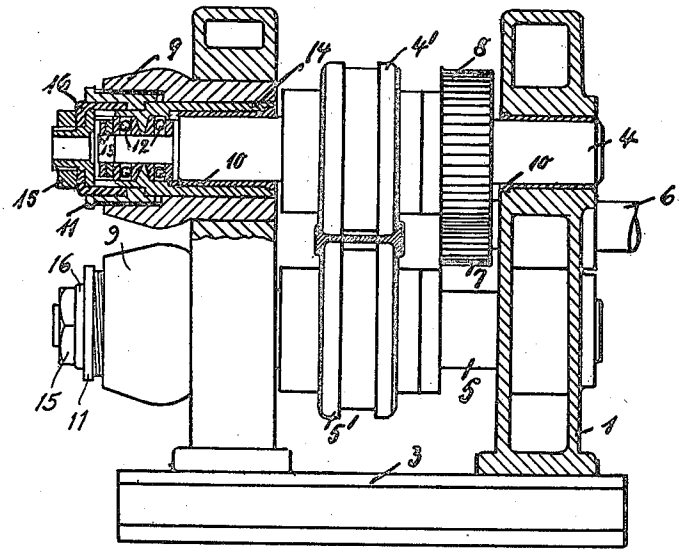
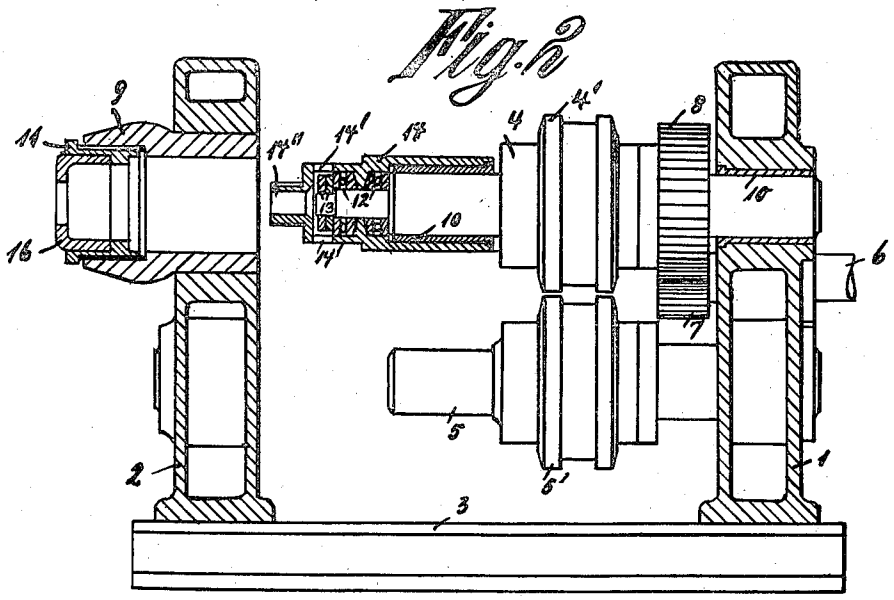


Fig. 2



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STRAIGHTENING MACHINE PROVIDED WITH ROLLS.

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The present invention relates to straightening machines provided with rolls, of the kind that are used in rolling mills for straightening rails and profile bars of iron, and in which in contradistinction to straightening machines with flying rolls, the headstock, which is distant from the roll driving mechanism, is made movable for the purpose of permitting the withdrawal of the rolls in the axial direction.

There are various disadvantages attached to these known forms of construction, the chief of which is the comparatively great waste of time involved in the changing of the rolls, which is constantly necessary, with its consequent interruption of the output of the rolling mill.

To facilitate rapid changing of the rolls it has been the custom to stock a set of reserve shafts for each machine and to mount the rolls or profiled straightening tools upon the shafts away from the straightening machine, so that, if a change in the program of work mapped out for the machine requires to be effected, the shafts provided with rolls may be mounted immediately and readily on the machine.

In order, however, to avoid the necessity for the driving wheels being keyed upon and removed from the shafts on every occasion, it is necessary for the driving mechanism of the straightening rolls to be provided within the main standard or frame. Latterly, therefore, these machines have usually been constructed with internally arranged driving gear.

It is known that, during the straightening operation, axial stresses, which are received by thrust bearings mounted in the standards, are continuously imposed. As, however, the shafts must be adjusted axially according to the form of the profile bars to be straightened, the necessity arises of also moving the thrust bearings and locking them when the shaft is in the adjusted position.

In the known types of machine, which are provided with a thrust bearing in each standard, it is necessary, when adjusting a shaft, to release the thrust bearing on one side of each shaft and the thrust bearing upon the other side is then adjusted in position. Not only is there a considerable amount of time wasted in attending to the machine, but much work is involved and great difficulty is experienced in securing accurate adjustment. The question of rapidly and accurately setting the machine is, however, of very special importance with respect to the straightening operation, as the work to be straightened varies very considerably in formation and in certain circumstances adjustment must be effected afresh for every new bar that is passed through the straightening machine.

When the shafts are withdrawn, there are inconveniences by reason of the fact that the bearings that are freed by the withdrawal of the shaft get exceedingly dirty from the mill dust flying about. The very high pressures involved, however, demand especial care in connection with these bearings. Thus the very careful attendance and more particularly the very thorough cleaning up necessary after each change resulted in great loss of time.

The present invention has for its object to avoid these disadvantages.

According to the invention double acting thrust bearings are firmly mounted upon the bearing part of the shafts and they remain upon the shafts when the movable headstock is removed for the purpose of changing rolls when all the shafts are removed bodily from the machine. In changing the rolls these are withdrawn over the bearing and removed from the shaft.

In this way the withdrawal of the shafts can be completed without difficulty in the shortest possible time. Furthermore, the interchanging of the straightening rolls themselves requires but a very short time. The reassembling is effected in very simple manner but, notwithstanding this, the machine is enabled to run in proper order. As the bearings are constructed closed and are continuously supplied with lubricant it is not possible for the actual bearing surfaces to become dirty on the straightening shaft being interchanged.

The machine according to the invention is illustrated, by way of example, in the accompanying diagrammatic drawings:—

Figure 1 illustrates, in longitudinal section, the arrangement of the bearings and the shafts in the working position of the machine in which double acting thrust bearings provided according to the invention are shown applied to two of the roll shafts, and

Figure 2 illustrates in section the same construction as in Figure 1 in which however one of the standards is disposed in extended position and the double acting thrust bearing is applied on only one of the roll shafts.

1 represents the stationary standard or frame and 2 the movable standard of the straightening machine, which is adjustably mounted upon the base plate 3. The lower shafts 5 and the upper shafts 4 with their straightening rolls 5^1 and 4^1 respectively are carried in the two standards. The upper shafts 4 are driven by the intermediary of the shaft 6, pinions 7, and large toothed wheels 8 keyed upon shafts 4. 10 represents the bearing liners for the shaft journals, while 9 is the journal box fitted into the movable standard. The threaded bush 11 engages with the threads in the journal box 9, and it provides for the axial movements and the adjustments of the whole bearing mechanism. Double acting thrust bearings 12 are provided upon the shafts themselves and they are permanently secured to the shafts by means of the nuts 13. In making changes, the bearings and the sleeves 14 which completely enclose them remain upon the shafts.

To allow of the nuts 13 being applied in position the sleeve 14 is, when required, provided with slots 14^1 and at its reduced end has a screw-thread 14^{11} with which the nut 15 engages and in the working position of the machine, secures it to the standard 2 by binding upon the closing cap 16 screwed into the threaded bush 11.

The operation of the mechanism will be readily understood.

In the first place to exchange rolls the nut 15 is loosened. This releases the sleeve 14 from the cap 16 and the standard 2 can then be run out. The double acting thrust bearings and the sleeves 14 remain as an integral unit upon the separate shafts. The rolls 4^1 can be loosened and removed by being simply drawn over the whole bearing mechanism. If the standard is moved out a little further still, the shafts can be easily removed completely from the machine. The separate shafts are fixed in the position necessitated by the particular shape of the rods or bars to be straightened, by rotating the threaded bush 11, which thereby moves the straightening shaft axially in one direction or the other, without interfering with the double acting thrust bearings.

The invention is not limited to the construction hereinbefore described, for example, the bearing described, instead of being provided in the travelling standard, may be provided in the stationary standard of the roll straightening machine.

I claim:

1. In a roll straightening machine with relatively adjustable standards and roll shafts supported therein, journals upon said roll shafts, double-acting thrust bearings secured in position upon said roll shafts in proximity to said journals, non-rotatable sleeve enclosing and engaging said thrust bearings, and bearing liners in said sleeves for reception of the roll shaft journals, said sleeves fitting into said standards.

2. In a roll straightening machine with relatively adjustable standards and roll shafts supported therein, double-acting thrust bearings secured in position upon said roll shafts, non-rotatable bearing sleeves engaging said thrust bearings and surrounding said roll shafts, journal boxes in said standards for reception of said bearing sleeves, and adjustable bushes in said journal boxes for determining the position of the bearing sleeves.

3. In a roll straightening machine with relatively adjustable standards and roll shafts supported therein, double-acting thrust bearings secured in position upon said roll shafts, non-rotatable bearing sleeves engaging said thrust bearings and surrounding said roll shafts, journal boxes in said standards for reception of said bearing sleeves, adjustable bushes in the said journal boxes for determining the position of the bearing sleeves and means upon the said bearing sleeves to secure them within the journal boxes and the adjustable bushes.

4. In a roll straightening machine with relatively adjustable standards and roll shafts supported therein, double-acting thrust bearings secured in position upon said roll shafts, non-rotatable bearing sleeves engaging said thrust bearings and surrounding said roll shafts, journal boxes in said standards for reception of said bearing sleeves, adjustable bushes in said journal boxes for determining the position of the bearing sleeves, open-ended caps fitted within the said adjustable bushes, extensions upon the said bearing sleeves to protrude through the said caps and means to engage the said extensions and to maintain the bearing bushes fixedly in position within the journal boxes and the adjustable bushes.

5. In a roll straightening machine with relatively adjustable standards and roll shafts supported therein, double-acting thrust bearings mounted in position upon said roll shafts, nuts for engagement with the said shafts to secure said thrust bearings in position, non-rotatable bearing sleeves engaging said thrust bearings and surrounding said roll shafts, openings in said bearing sleeves through which the nuts may be introduced, journal boxes in the said standards for the reception of said bearing sleeves, and adjustable bushes in said journal boxes for determining the position of the bearing sleeves.

6. A roll shaft for a roll straightening machine of the type having a pair of relatively adjustable standards within which the journals of the roll shafts are respec-

tively mounted, comprising in combination a double acting thrust bearing secured upon one of the journals of the said roll shaft, said bearing being adapted to be moved with the said roll shaft from one of the said standards, and means comprising a sleeve enclosing the said double acting thrust bearing to render the said double acting thrust bearing axially immovable with reference to the said standard.

7. A roll shaft for a roll straightening machine of the type having a pair of relatively adjustable standards within which the journals of the roll shafts are respectively mounted, comprising in combination a double acting thrust bearing secured upon one of the journals of the said roll shaft, said bearing being adapted to be moved with the said roll shaft from one of the said standards, a non-rotatable sleeve enclosing the said double acting thrust bearing and means comprising a journal box mounted within the said standard by which the said sleeve and double acting thrust bearing are held within the said journal box so as to be axially immovable with reference to the said journal box.

8. A roll shaft for a roll straightening machine of the type having a pair of relatively adjustable standards within which the journals of the roll sharts are respectively mounted, comprising in combination a double acting thrust bearing secured upon one of the journals of the said roll shaft, said bearing being adapted to be moved with the said roll shaft from one of the said standards, a non-rotatable sleeve enclosing the said double acting thrust bearing and means comprising a journal box mounted within the said standard by which the said sleeve and double acting thrust bearing are held within the said journal box so as to be axially immovable with reference to the said journal box, and means comprising an adjustable bush by which the said sleeve and the said double acting thrust bearing may be axially adjusted within the said journal box.

9. A roll shaft for a roll straightening machine of the type having a pair of relatively adjustable standards within which the journals of the roll shafts are respectively mounted, comprising in combination a double acting thrust bearing secured upon one of the journals of the said roll shaft, a journal box in one of said standards to receive said bearing, a sleeve mounted upon the same journal and enclosing the said double acting thrust bearing, means by which the sleeve is held axially immovable upon the journal, the said sleeve having a reduced outer end, and means by which the said sleeve is held axially immovable with reference to the journal box within one of the said standards, the said means engaging the reduced end of the said sleeve.

10. A roll shaft for a roll straightening machine of the type having a pair of relatively adjustable standards within which the journals of the roll shafts are respectively mounted, comprising in combination a double acting thrust bearing secured upon one of the journals of the said roll shaft, a journal box in one of said standards to receive said bearing, a sleeve surrounding the said double acting thrust bearing, means by which the said sleeve is rendered axially immovable upon the said journal, the said sleeve having a reduced screw-threaded outer end, and means by which the said double acting thrust bearing and the said sleeve are rendered axially immovable with reference to the journal box mounted within one of the said standards consisting of a threaded bush on the outer end of the said journal box, a closing cap mounted within the said bush and a nut mounted against the said closing cap and engaging the screw-threaded outer end of the said sleeve on its insertion within the said journal box.

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