

[54] **DEVICE FOR AN AUTOMATIC EXCHANGE OF ROLLERS IN ROLLER POLISHING MACHINES AND THE LIKE**

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[56]

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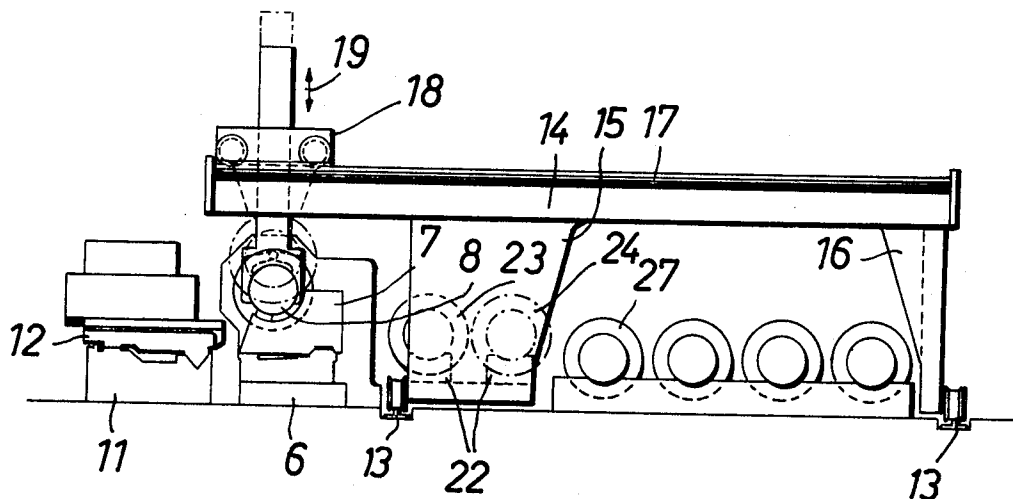
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**ABSTRACT**

A device for the automatic exchange of rollers in roller polishing machines and the like is characterized by a movable frame located preferably outside of the plane of the machines and having a gripping device movable upon a fixed track for gripping and raising rollers from a stack, inserting a roller in the holders of a roller polishing machine and also for carrying out a reverse procedure. There is also provided a guide and/or an arresting device for making the gripping device axially parallel to the polishing machine, particularly as far as holders or drivers for roller pins at the mandrel stock are concerned.

7 Claims, 3 Drawing Figures



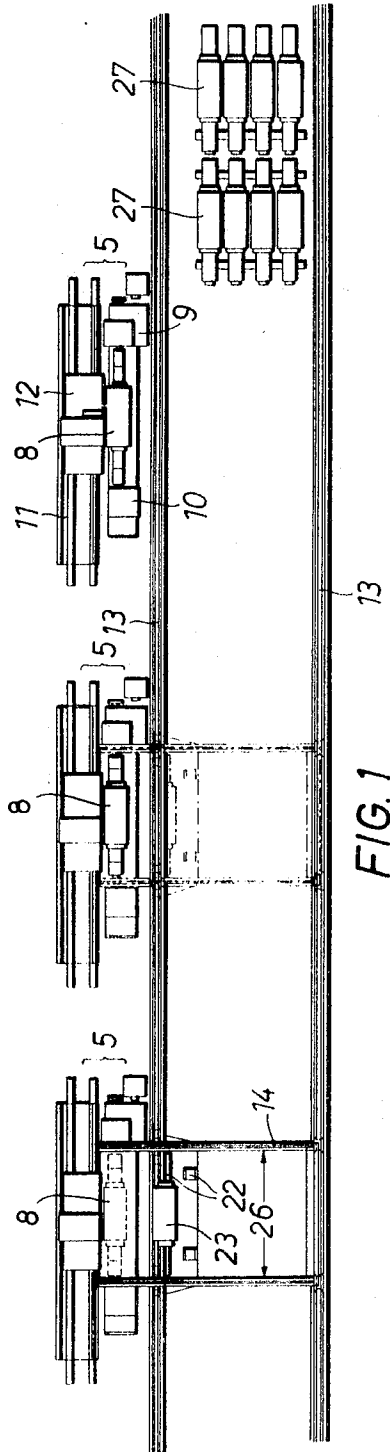


FIG. 1

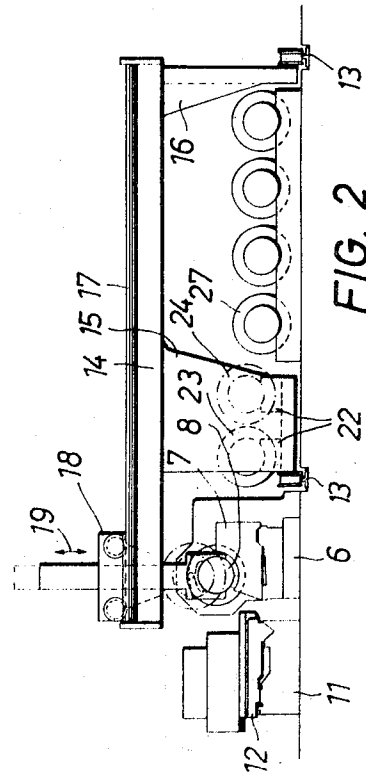


FIG. 2

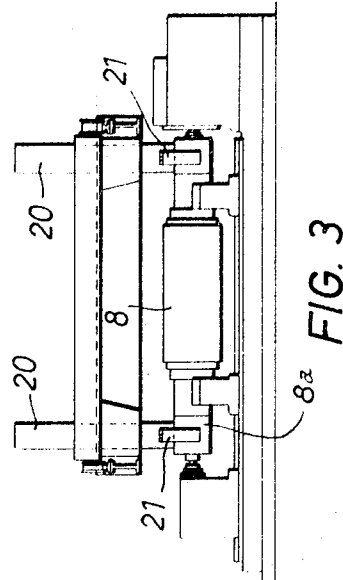


FIG. 3

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# **DEVICE FOR AN AUTOMATIC EXCHANGE OF ROLLERS IN ROLLER POLISHING MACHINES AND THE LIKE**

This invention relates to a device for the automatic roller exchange in roller polishing machines. However, the device of the present invention is equally well applicable to other similar machines, such as roller lathes, roller pin cutters and the like.

Up to now the exchange of rollers has taken place by the use of the usual cranes provided with carriages and winches. Such an exchange of rollers which is carried out by hand has several drawbacks:

On the one hand special safety measures are necessary due to the construction of these cranes and the hanging of the rollers upon crane hooks with rope hoists and the resulting inaccurate guiding of the rollers relatively to the polishing machines. Beside the person guiding the crane, the polisher and another worker must take care of a careful and precise handling of the roller during its movements. This work requires practice and attention on the part of the workers. On the other hand, the resulting drawback is that the operation can take place only very slowly and thus consumes a great deal of time.

Since machine tools, such as roller polishing machines, are quite expensive, such unused time periods should be made as short as possible. A third drawback is that damages to the machines cannot be avoided even if the greatest attention is exerted.

An object of the present invention is to eliminate these drawbacks.

Another object is to diminish the working time period, to provide a precise guiding for the roller during its insertion and furthermore, to provide a reversible movement of the roller into the holder of the machine and back again which is automatically operated to the greatest possible extent.

Other objects of the present invention will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention, it was found desirable to provide a frame movable outside of the plane of the machine, and having a gripping device movable on fixed tracks relatively to the frame and adapted to grip and raise the rollers from a stack, to insert a roller into the holders of a roller polishing machine and also to carry out a reverse operation. There is also provided a guide and/or arresting device to arrange the gripping device in axial parallel relationship relatively to the polishing machine, particularly as far as holders or drivers for roller pins at the mandrel stock are concerned.

An important improvement of the device of the present invention as compared to prior art devices consists in the provision of a gripping device movable on fixed tracks which eliminates the rope hoists of known carriages of cranes. It is advisable, although not absolutely necessary, that the frame be guided outside of the plane of the machine, since crane tracks extending over the machines, which are usual and can be used, disturb the machines which are being operated and which are not involved in the exchange; therefore, the usual procedure is to place these tracks so high above these machines, that the disturbance is lessened. However, then the paths become so long and the size of the gripping device guided on fixed tracks so great, that the gripping device must have particularly great rigidity or that special measures must be carried out to make secure the required precision of the exchange procedure which should be as automatic as possible.

Thus the preferred embodiment of the present invention which includes a frame movable outside of the plane of the machine involves a large variety of possible arrangements, including the use of known freely movable frames, such as lifting chargers, which, for example, can be so moved against stops of the machine that the roller can be inserted in a very short time and with precise guiding into the holders or can be removed from the holders.

On the other hand, it is advisable to guide the frame upon tracks fixed in the ground and extending parallel to the axis of the machine, particularly when the greatest possible auto-

matic operation is to be provided. Then a special worker for the operation of the frame is not required any more.

In that case, but also if the exchange is not completely automatic and the presence of a workman is necessary, it is advisable to so arrange the setting devices, such as feelers, switch stops, etc. that the gripping device is precisely set upon the front surface of the roller pin which is removed from a roller bearing or is raised from the machine. Corresponding setting devices are provided for the precise placing of the gripper upon the mandrel stock driver or the jig pieces or other suitable machine parts.

To avoid an arrangement wherein in case the exchange device of the present invention is used in conjunction with a large number of alined machines, the exchange device will return to the same roller storage place after each exchange, it is advisable to provide upon the frame a device receiving the finished roller removed from the machine and at least one roller to be treated. This avoids substantial travel for the exchange device.

As already stated, the frame can be used with a larger number of alined machines. In that case it is advisable to construct the frame as a portal crane with four posts which can be moved parallel to the longitudinal axis of the polishing machine and which carries a carriage movable thereon at right angles to the longitudinal axis of the machine. The carriage contains a lifting device secured against turning at the end of which a gripping device is arranged having, for example, the shape of claws. The clear span of the posts in the longitudinal direction must be greater than the longest length of the roller and, preferably, the clear span of the posts in the transverse direction must be greater than the width of the roller support. Here also deviations are possible. Thus the portal crane which in any case must overlap jib-like the machines, can be made to engage the machines on both sides if this is necessary, although then the construction is made unnecessarily complicated. Furthermore it is not necessary to set the stands relatively to the roller carriers in the direction transverse to the axis of the machine, in fact, other means can be provided, for example, the portal crane can move close to the roller carrier upon frames which move transversely, or it can be moved upon corresponding transverse tracks by angularly adjustable guide wheels or by a second set of transverse wheels. It is advisable in this portal crane construction to provide the device receiving the finished roller and the rollers to be treated between the two stands directed toward the machine and, preferably, to place it so deeply that the removed rollers are located at only a small distance from the floor, so that the roller located in the machine does not have to be raised, or must be raised only to a small extent in order to be moved over the removed rollers.

A construction which is basically different from the portal crane embodiment of the exchange device of the present invention, comprises a frame provided for each individual polishing machine and movable at right angles to the longitudinal axis of the machine, particularly upon ground tracks. This construction is particularly simple, but it requires a roller carrier for each machine which can be supplied by a usual crane. This simple construction also fully provides all the advantages attained by the present invention.

In this case a particularly simple and safe gripping device can be provided by the use of two swinging arms engaging the roller pivots from below which obviously must be adjustable as far as their distance from each other is concerned to correspond to the length of the roller. In that case it is advisable to make the arm carrying the testing and feeling devices so that it cannot be shifted in the direction of its swinging axis, so that only the other arm is adjustable.

The described embodiments can be provided with further improvements within the scope of the present invention. Thus preselection systems and sequence switches can be provided so that the entire exchange program will take place when a button is pressed by the operator of the polishing machine.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings showing by way of example only, preferred embodiments of the inventive idea.

#### IN THE DRAWINGS

FIG. 1 is a top view of a group of roller polishing machines provided with a roller exchange device of the present invention.

FIG. 2 is a side view on a larger scale of one of the polishing machines and the device of the present invention.

FIG. 3 is a rear view of the polishing machine shown in FIG. 2 with the exchange device.

Roller polishing machines 5 shown in FIGS. 1, 2 and 3 include a tool bed 6 with steady rests 7 receiving the rollers 8, a mandrel stock 9 and a tailstock 10 as well as a bed 11 for the grinding support 12. These parts do not belong to the present invention.

In accordance with the present invention tracks 13 embedded in the ground are provided in front of the three polishing machines shown in FIG. 1; they are used for a portal crane 14 consisting of two front stands 15, two rear stands 16, a track 17 extending above and beyond the front stands and up to the rear stands and a crane carriage 18. In accordance with the present invention the crane carriage contains only a gripping device movable in the direction of the double arrow 19 and consisting of two gripping arms 20 and two gripping pincers 21 carried by the lower ends of the arms. As best shown in FIG. 3 the pincers 21 engage around the pins 8a of the rollers 8. The front stands 15 are made particularly wide and are provided with brackets 22 which have space for a roller 23 which is to be treated and also a space 24 for a roller 8 which has been polished. As shown in FIG. 2 the roller 8 located in the machine must be raised only until the roller pins are freed from the collar plates and then it can be actually moved over the untreated roller 23 into the position 24. Then the untreated roller 23 is grasped and moved into the machine.

As shown in FIG. 1 the operative distance 26 between the stands is greater than the greatest length of the rollers. As shown in FIG. 2 the operative distance in the transverse direction is greater than the roller stack 27 which is shown in its entirety on the right hand side of FIG. 1.

During the operation of the device a roller is removed from

the stack and moved into a holder. However, a treated roller can be also moved from the holder into a stack. Any suitable means (not shown) can be used for adjusting the gripping device relatively to the rollers and the holders for the rollers.

As best shown in FIG. 2, the gripping device can easily remove a roller from the stack 27 and place it upon the brackets 22 in the position of the roller 23. Any suitable means, such as another crane (not shown) can be used for removing the finished rollers. The gripping device is movable on tracks 17 to facilitate the transportation of the rollers. Usually a separate gripping device is provided for each station.

We claim:

1. A device for the automatic exchange of rollers in roller polishing machines and the like having holders for rollers to be treated and a roller stack, said device comprising a movable frame, tracks carried by said frame, a gripping device movable upon said tracks and having means raising rollers from said stack and placing them into said holders and also removing rollers from holders, and a track for said movable frame, the last-mentioned track maintaining said gripping device axially parallel to the machine.

2. A device in accordance with claim 1, wherein the last-mentioned track is located outside of the machine and is fixed upon the ground parallel to the axis of the machine.

3. A device in accordance with claim 1, comprising means carried by said frame for receiving a polished roller and at least one roller which is to be polished.

4. A device in accordance with claim 1, wherein a plurality of roller polishing machines extend in alignment, said frame being movable parallel to the longitudinal axis of the machines and having four stands, said gripping device comprising a crane carriage movable perpendicularly to said longitudinal axis, pincer-like gripping arms and means securing said gripping arms against turning, the distance of said stands from each other in the longitudinal direction being greater than the length of the rollers.

5. A device in accordance with claim 4, comprising means located between the stands facing the machine for receiving the rollers.

6. A device in accordance with claim 4, comprising separate frame tracks extending perpendicularly to each machine.

7. A device in accordance with claim 6, wherein said gripping arms are shaped to engage rollers from below.

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