

[54] **HOISTING ARRANGEMENT FOR ROLLERS**

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[22] Filed: **Aug. 20, 1973**

[21] Appl. No.: **389,593**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 188,309, Oct. 12, 1971, abandoned.

[30] **Foreign Application Priority Data**

Oct. 10, 1970 Germany..... 2049874

[52] U.S. Cl..... **100/162, 100/168**

[51] Int. Cl..... **B30b 3/04**

[58] Field of Search 100/161, 162, 168, 155; 72/138, 148; 425/183, 186, 194

[56] **References Cited**

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[57] **ABSTRACT**

The mounting of normally superimposed rollers in a roller stand, according to which each bearing housing for each roller has two outwardly extending arms extending in opposite directions with regard to each other, and in which the outer end portions of said arms are each provided with a cut-out for respectively receiving a threaded spindle and allowing the same to pass therethrough. Each of said arms has associated therewith a nut below the respective arm and adjustably mounted on the pertaining spindle, the distance between two spindles which are adjacent to each other being such as to permit withdrawal and insertion of said rollers in the direction of the longitudinal axis of said rollers and together with the pertaining bearing means for the rollers between the last mentioned two spindles.

2 Claims, 5 Drawing Figures

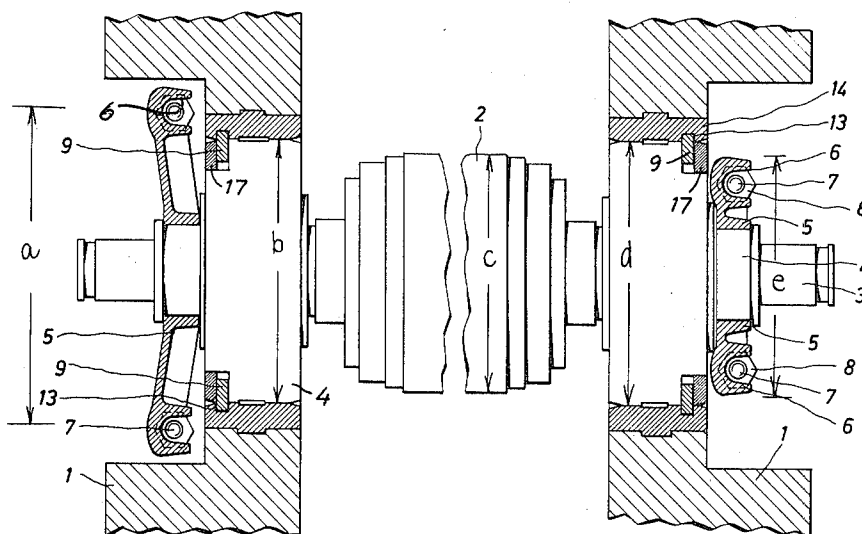
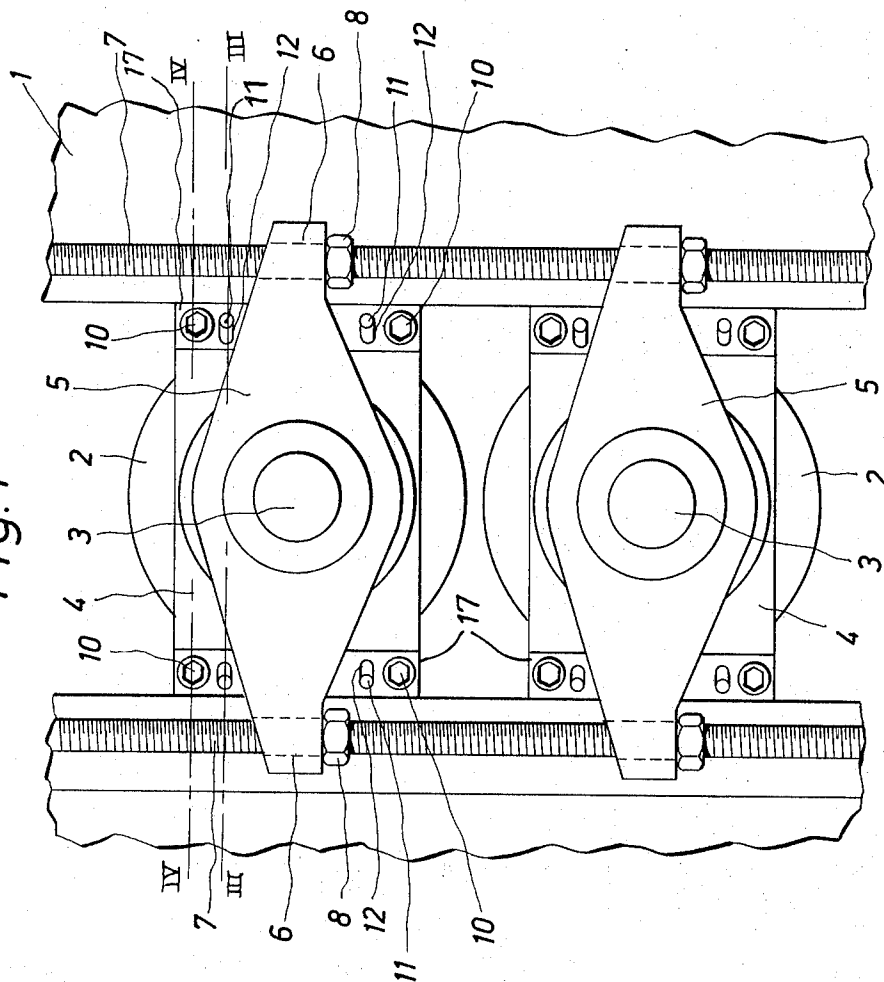


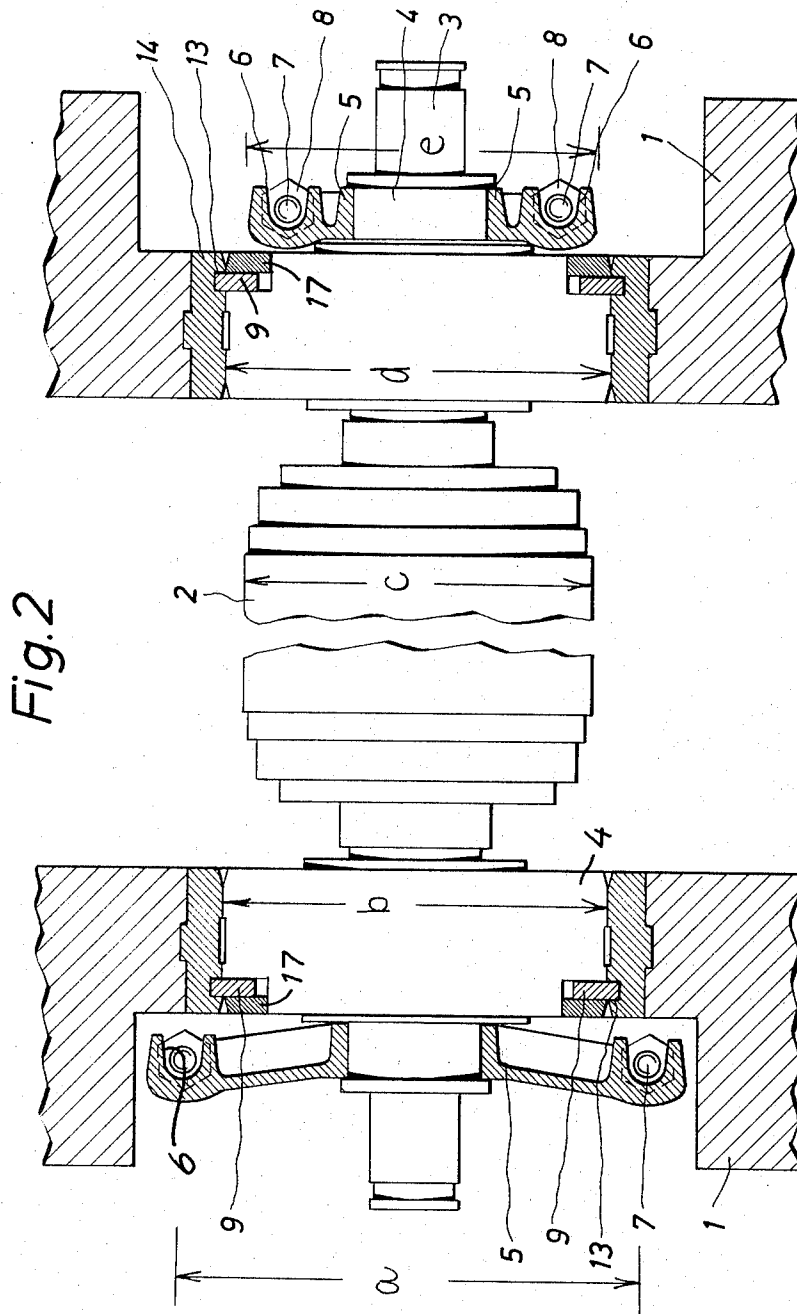
Fig. 1



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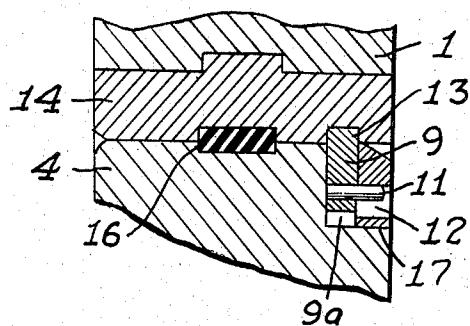


FIG. 3

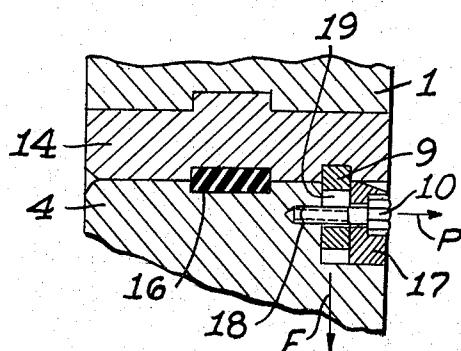


FIG. 4

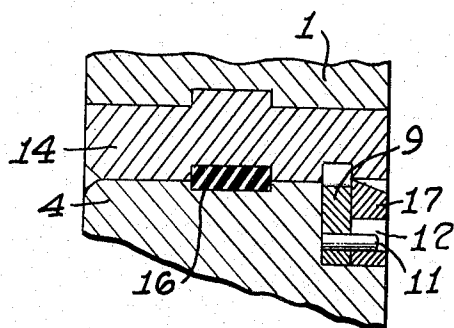


FIG. 5

HOISTING ARRANGEMENT FOR ROLLERS

This is a continuation-in-part of co-pending application Ser. No. 188309 - Schlunke et al., filed Oct. 12, 1971, now abandoned.

The present invention relates to a mounting of rollers, which in a calender stand of a closed construction type are arranged vertically one above the other. In operation, the rollers are located one above the other along a mantle line and at their ends are journaled in calender stands from which they must be removable or into which they must be insertable in the direction of their longitudinal axis. The rollers are adapted to be raised and lowered by control spindles, which are adapted to be driven mechanically, hydraulically or pneumatically. The control spindles have nuts screwed thereon which are adapted to be adjusted into a position which corresponds to a predetermined distance of the rollers lifted off each other.

With calenders of the open construction type, the removing and installing of calender rollers will not cause any material difficulties. During the roller exchange, the journalling at both ends of the roller is disengaged and the roller is moved out horizontally in a direction perpendicular to its longitudinal axis and is deposited wherever desired.

On the other hand, the exchange of a calender roller with stands of the closed construction type causes considerably greater difficulties. Customarily, in a routine manner, all rollers are successively removed and installed while during the removal always the uppermost roller is pulled out of the calender stand after the connecting elements to the respective lower roller have been disengaged, and the installation of the rollers is effected in the reverse sequence in the upward direction. If, however, in view of damage or for other reasons, it is necessary to exchange a roller from the calender stand, with heretofore known calenders, the rollers below the rollers to be exchanged will lie upon each other for a longer period of time and as a result thereof, if relatively soft roller covers are involved, may be subjected to damage.

It is, therefore, an object of the invention to provide calender stands of the closed construction type with means which will make it possible to remove any desired roller individually when the rollers are raised or cleared off each other. This object and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 is a side view of a portion of a calender equipped with the mounting, according to the invention, of the calender rollers.

FIG. 2 is a top view partially in section showing the most essential features of the calender roller mounting according to the invention.

FIGS. 3, 4 and 5 are fragmentary cross sectional views taken along lines III—III and IV—IV in FIG. 1 and showing further details of features in FIGS. 1 and 2.

The mounting, according to the invention, of the rollers in the calender stand is characterized primarily in that each housing of the roller mounting or bearings is provided with two oppositely directed arms which are provided with horizontal cutouts for the passage of the control spindles from the respective same side, and is furthermore characterized in that the distance between the control spindles on one side of the calender is greater than the diameter of the roller body or the

width of the bearing or of the arms on the other side of the calender depending on which measure is greater. This feature makes it possible to remove and install any desired roller individually in the direction of its longitudinal axis. The removal and insertion is effected in raised condition of the rollers by suspending the roller to be exchanged on a crane, slightly lifting the roller so that it is lifted off from the normal supporting areas at the control spindles, and laterally moving the roller in the direction of its longitudinal axis out of the calender stand.

Referring now to the drawings in detail, the portion of the side view of the calender illustrated in FIG. 1 shows two rollers 2 which are arranged in the calender stand 1 one above the other and have their trunnions 3 shown in raised or lifted-off condition. The rollers 2 are, by means of their trunnions 3, on both sides journaled in bearings 4 in the calender stand 1. The housing of the bearing 4 is provided with arms 5 which extend toward opposite sides. The arms 5 are on each side provided with horizontal cutouts 6 through which the control spindles 7 are passed when the rollers 2 are in their built-in condition. Screwed onto the control spindles 7 are adjustable nuts 8, which may be adjusted in conformity with the height of the distance desired between the rollers 2 when said rollers 2 are in their raised or lifted-off condition.

There are to be noted in FIG. 2 of the drawings the following reference designations:

- a the spacing of the spindles of the first beam arm;
- b is the width of the bearing corresponding to the foregoing spacing a;
- c is the width of the roller ball or body;
- d is the width of the second bearing; and
- e is the width of the second beam arm

Taking into consideration the foregoing reference designations, then the following requirements defined mathematically must be fulfilled apparently for attaining the object of the present invention:

- I $a > \max(b, c, d, e)$
- II $b > \max(c, d, e)$
- III $d > e$

Simultaneously, there should be considered that subject to the following modified requirements mathematically there can be stated as follows:

- I' $a > \max(b, c, e)$
- II' $b > \max(c, e)$
- III' $d > e$

Taking into consideration the immediately preceding mathematical considerations, then the solution of the noted goal would be possible when the second bearing consists of two shells whereby the outer shell itself consists of two half shells.

In operation, the superimposed calender rollers 2 are arranged one above each other along a mantle line. For raising or lifting off the calender rollers, the control spindles are mechanically, hydraulically or pneumatically (in a non-illustrated manner) moved upwardly, two control spindles 7 being arranged on each side of the calender. The nuts 8 are so arranged on the control spindles 7 that during the upward movement of the control spindles 7, first the nuts engage the arms 5 of the bearing 4 of the uppermost roller 2 in the calender stand 1 and lift the uppermost roller. The nuts 8 for the next successive lower roller 2 and successively the nuts for the next rollers 2 will engage the arms 5 for lifting the respective roller 2 when the predetermined distance between the rollers 2 has been reached. It is to

this predetermined distance that the nuts 8 are initially adjusted on the control spindle 7.

In the raised or lifted condition illustrated in FIG. 1, the rollers may now in the direction of their longitudinal axis be moved out laterally from the calender stand 1 and may be exchanged. To this end, the respective roller 2, which is to be exchanged and is in its raised or lifted-off condition, is suspended on a cable or a suspension device on one or more cranes. The strips 9 provided for safety purposes on one or both bearing areas of the roller 2 may, after loosening the screws 10 by means of pins 11 and along the oblong holes 12, be moved perpendicularly to and toward the longitudinal axis of roller 2 and out of the groove 13 provided in the bearing guiding means 14.

After the roller 2 has been lifted by the crane, the roller may, in the direction of its longitudinal axis, be moved out at one side of the calender stand 1 and a replacement roller may be inserted in the reverse direction.

The type of mounting or journalling of the calender rollers 2 in the manner according to the invention is particularly well evident from FIG. 2. By means of the cutouts 6 in the arms 5 provided on the housing of the bearing 4, the roller 2 is horizontally displaced in the direction of its longitudinal axis during its installation and placed over the control spindles 7, which are respectively located on opposite sides of the bearing 4 on both bearing areas. On both bearing areas, the strips 9 are laterally moved into grooves 13 and are tightened by means of screws 10. During the subsequent lowering of the roller 2 by means of a crane, the arms 5 will come to rest onto the nuts 8 screwed onto the control spindles 7 and will thus support the rollers 2 on four supporting points.

The removal of a roller 2 from the calender stand 1 is effected as described above in a reverse sequence. In order to permit the installation and removal of the roller 2 with the bearing or mounting system, according to the present invention, by means of arms 5, it is necessary that the control spindles 7 on that side of the calenders where the roller is moved out or in, are spaced from each other by a distance which is greater than the diameter of the roller body or the bearing, depending on which one is greater, so as to assure an unimpeded passage of the roller 2 to be exchanged with the bearing 4.

As will be evident from the above, the mounting or journalling of rollers in a closed calender stand in conformity with the invention is rather simple and permits a fast exchange of any desired roller of the calender.

There results the object or goal of the teaching of the present invention to the effect that means are provided with calender frames of close construction type in order to be able to disassemble the rollers in aired or clear condition as to each suitable roller individually. This clearing is necessary on the one hand in order to lift the rollers from each other for the disassembly and on the other hand to be able to thread the product or material path between the rollers (respectively to protect rollers during fold formation in the product path).

The solution of the object of the teaching of the present invention in the principle is seen therein that the rollers after the clearing which means when the rollers have been brought into a space in which they have a nominal spacing from each other (approximately 5 through 10 mm) the same can be taken away from the

roller stand in the longitudinal direction thereof. This has the advantage that every suitable roller can be taken out of the calender without need for disassembling the adjoining or neighboring rollers which until now was generally necessary.

For solution of this goal or object the following features are used:

- a. The arms (5) possess cut outs (6) for the handing control spindle (7) whereby the cut outs (6) of both arms (5) open toward the same direction, which means all four slits are open in one direction. In FIG. 2 all four slits are open toward the right so that the roller can be taken out of the calender toward the left;
- b. The spacing of the control or hanging spindles of one calender side is greater than the roller diameter;
- c. The boom arm (5) (in FIG. 2 of the drawings the right boom arm) with cut outs directed away from the roller is always smaller (shorter) than the width of the roller bearing means (4) and the spacing of both remote control or hanging spindles (7).

The features that the cuts or slits all are open in one direction is, however, the precondition for the solution of the object or goal of the present invention.

The further features of the teaching of the present invention according to which the control or hanging spindles of the one calender side have a greater spacing than the roller diameter and that the length of the boom arm extending therefrom provides a special embodiment.

As can be correctly recognized from FIG. 1 of the patent drawings, roller bearing means are indicated by reference numeral 4. In FIG. 2 the lead line of the reference numeral should be lengthened as far as to the large white rectangle which represents the planar view upon the roller bearing means 4. These roller bearing means are guided directly on the stand 1 or on the guide pieces or means 14. Strips 16 that either can be taken out of the stand serve for this purpose or, however, in still more advantageous manner the strips 9 serve exclusively for this purpose. Upon utilization of the strips 9 in the illustrated type and manner, there can be omitted the strips 16.

The strips 9 are each provided with two pins 11 as can be recognized from views of FIGS. 3-5; the pins 9 each project into an oblong hole 12 of a cover strip. The strips without considering the subsequent fastening can be shifted within the recess 9a and the groove 13. Hereby the same can be brought into a position according to FIG. 5 as to the strip 9 out of the groove 13 of the bearing guide 14 from the guide position for the roller bearing means 4 reproduced in FIG. 4; this means the strip 9 can be shifted on the roller axis in the direction of the arrow F so that the roller bearing means with the strip 9 and the cover strip 17 can be taken out of the roller guide means 14 toward the right or toward the left.

For this purpose, however, it is necessary to loosen slightly the screws 10 which with their base or foot portion would be insertable or threaded into the threaded bore 18 of the roller bearing means 4 and passing through an oblong hole 19 of the strip 9 as well as finding receipt thereof with the upper shaft section and head in the strip 17. When as illustrated in FIG. 4 the screw 10 is loosened in the direction of an arrow P, so with the aid of the pin 11 accessible from the outside

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of the roller bearing means there can be shifting of the strip 9 into the position reproduced in FIG. 5 in the direction of the arrow F.

From the foregoing, it will be apparent that the strips 16 also can be omitted since the strip 9 holds the bearing 4 in its position.

During installation of the bearing 4 in the bearing guide means 14 the same occupy the position illustrated in FIG. 5; with the aid of the pins 11 each strip 9 is brought into the position reproduced in FIG. 3 and hereafter the screw 10 is tightened against the direction of the arrow P so that the strip 9 now is clamped between the cover strip 17 and the roller bearing 4. In this manner the strip 9 accordingly can be fastened very readily with the aid of the screws 10 and can be loosened and hereby can be brought into a position in which the bearing 4 becomes free or is released.

Either strip means 16 are used or, however, the apparatus comes into use with the parts 9-18. Naturally, both parts can also find utilization though applicants believe that such would not have any real reason since both parts, that is on the other hand the strip means 16 and also on the other hand the parts 9-18 have the same effect namely to hold the roller bearing means against any shifting in the bearing guide means 14.

The embodiment with the parts 9-18 is believed to be considerably more advantageous in that the parts can be actuated from the side of the calender, which means from the face side of the roller ends to be built or constructed further. For this purpose, there is required only a slight loosening of the screw means 10, (turning loose) in order to eliminate the clamping effect of the part 17 and to make possible the shifting of the strip means 9 with the aid of pins 11. Viewing the FIGS. 3 and 5 in connection with FIGS. 1 and 2, there is to be noted that the screws 10 and the elongated holes 12 with the pins 11 lie one above the other as shown in FIG. 1. If the screws 10 are slightly loosened (turned loose), so the clamping part 17 can be easily loosened. Thereupon the strip means 9 can be adjusted inwardly with the aid of the pins 11; this means in the direction of the longitudinal axis of the elongated hole 12. There could be possible misunderstanding and inaccuracy in stating that such occurs in the direction upon the roller axis. It is much more correct to state that a horizontal adjustment can be carried out as can be recognized from FIG. 1.

There is no loosening of the screw means 10 by way of the pins 11. Both parts lie one above the other and have completely different purposes; the screw means 10 should release the part 17 or should clamp the same securely against the strip means 9 and this is to be pressed against the bearing means 4 while the pin means 11 permits a lateral guiding of the strip means 9 in the elongated hole 12 and makes possible the having of access to the strip means. Naturally, in place of the pin means 11 there could be a hole left in the strip means into which a suitable tool can be inserted and with the aid of which then the strip means 9 would be shifted in the same manner.

Both the means 16 or the parts 9-18 are usable and naturally also both parts could be used together; prefer-

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ably, however, the parts 9-18 are put to use since these as set forth by the foregoing are much easier to actuate from the face side of the roller. Both means, however, serve therefor to secure the bearing means 4 in the guide means 14 against axial displacement or shifting.

There is noted that the drawings illustrate at a time a horizontal section through a stand 1, bearing guide means 14 and the roller carrier 4 whereby FIGS. 3 and 5 provide a section defined by the line III-III (with FIG. 5 showing another positioning of parts) and FIG. 4 represents a section through line IV-IV. The drawings accordingly relate to two vertically displaced parallel planes. There is noted also that in FIG. 1 the section lines IV-IV respectively III-III, V-V have the reference numerals 9-17, for the cover strip replaced therewith.

It is to be understood, of course, that the present invention is, by no means, limited to the particular showing in the drawings but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. In combination with a closed calender stand: a plurality of rollers normally vertically superimposed upon each other so that each roller forms a bit with the respective adjacent roller, bearing means arranged at the end portions of each of said rollers for journalling the same, housing means supported by said stand and respectively supporting said bearing means, each of said housing means having two arms extending in opposite directions with regard to each other, two pairs of adjusting spindles respectively associated with opposite ends of said rollers, each of said arms of each of said housing means having its outer end portion provided with a cut-out all open toward the same direction for receiving one of said adjusting spindles and allowing the latter vertically to pass therethrough, a plurality of nuts respectively adjustably arranged on said spindles, one nut each being arranged below and being associated with one of said arms and being adjustable relative thereto, the spacing between the spindles of one of said pairs of spindles being greater than roller diameter such as clearly to permit withdrawal and insertion of said rollers individually in the direction of their longitudinal axes with the pertaining bearing means between the spindles of said last mentioned pair of spindles, one of said arms being smaller and also passing through space between the spindles along with both the roller and bearing means.

2. An arrangement in combination according to claim 1, which includes guiding means secured in said calender stand for receiving and securing the bearing means for said rollers, said guiding means being provided with groove means, and strip means arranged on said bearing means and adapted selectively to be inserted into said groove means for locking said bearing means to said guiding means, said strip means also being adapted to be withdrawn from said groove means to allow individual withdrawal of the respective roller with the bearing means pertaining thereto from said calender stand.

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