

[54] **DEVICE FOR STORING PAPER SUPPLY ROLLS IN COPYING APPARATUSES**

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[58] **Field of Search** 242/55, 58, 58.6, 55.53, 242/110, 188, 116; 312/39, 40, 41; 226/110

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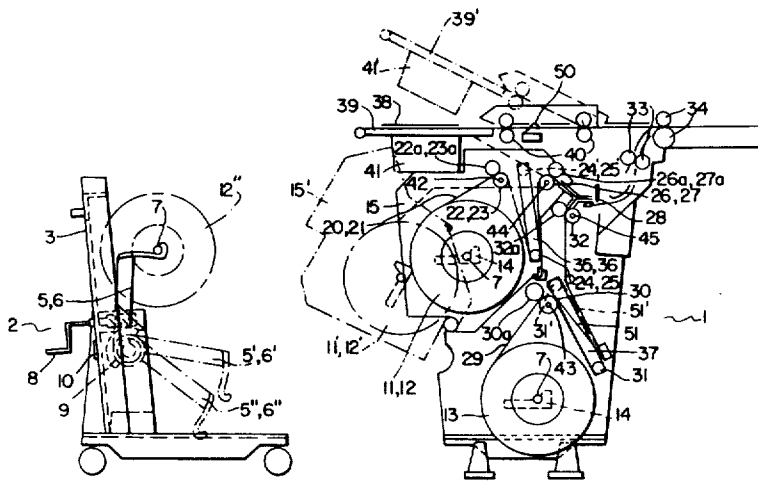
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[57] **ABSTRACT**

This invention relates to a storage device for rolls of reproduction material of different widths comprising at least three supply rolls with two of said rolls being narrower than the third, means mounting said narrower rolls with their axes substantially in alignment with each other, and means mounting the third and widest roll parallel to the two narrower rolls.

1 Claim, 4 Drawing Figures



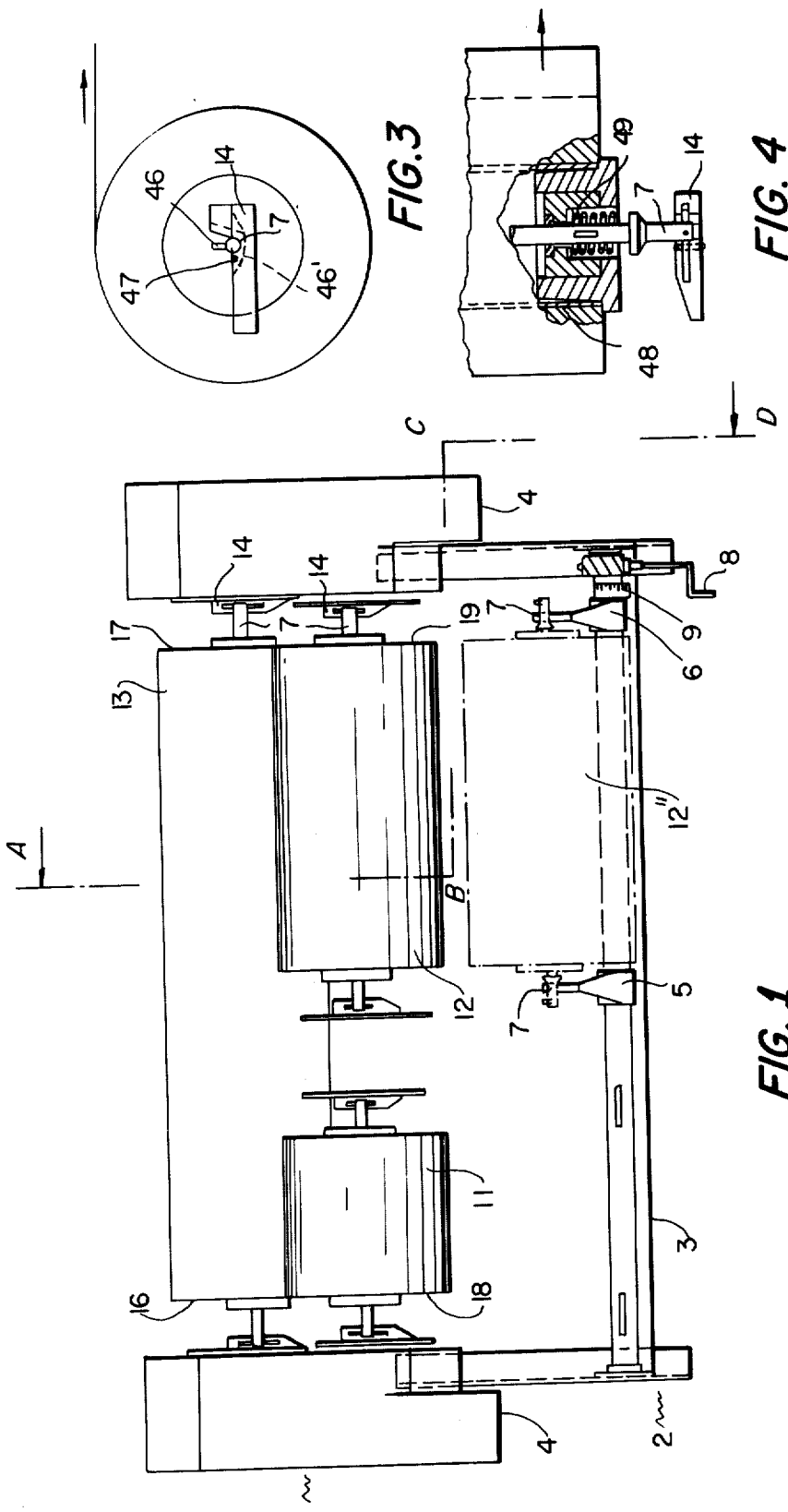


FIG. 3

FIG. 4

FIG. 1

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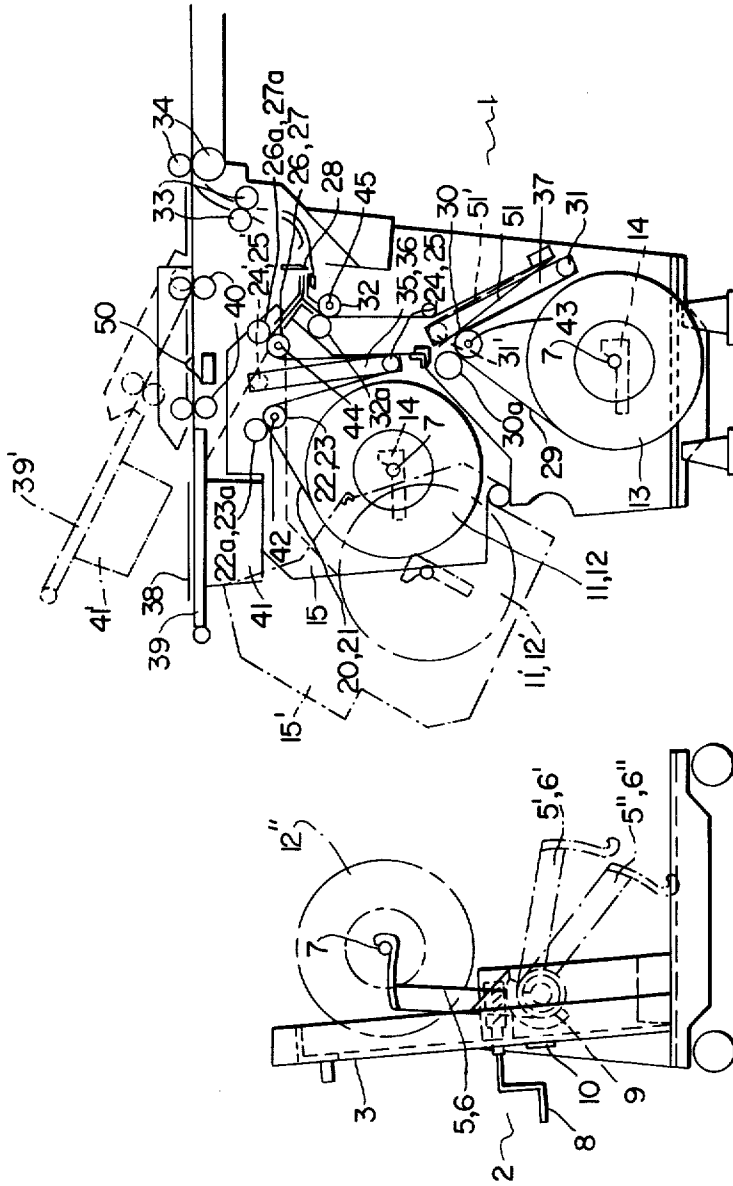


FIG. 2

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DEVICE FOR STORING PAPER SUPPLY ROLLS IN COPYING APPARATUSES

This invention relates to a storing device for rolls of reproduction material of different widths. The device is part of an automatic reproduction apparatus. It is particularly suitable as a component of a photoprinting apparatus in which diazotype materials of different widths, which depend upon the size of the original, are withdrawn from a roll and fed to a cutting device.

Reproduction material may be stored in a copying apparatus either in the form of pre-cut sheets, or as a supply roll. When an accurate size of the copies is essential, the first version is normally preferred. In most cases, however, this degree of accuracy is not required. In these cases, and when originals of unusual size are to be copied, it is much more advantageous to use supply rolls. Accordingly, practically used modern photoprinting apparatuses frequently use the reproduction material in the form of an endless web which is wound upon a supply roll and severed by a cutting device in accordance with the length of the original.

Many copying apparatuses use only one supply roll. With these apparatuses, the maximum width of the original normally determines the width of the reproduction material stored on the roll. When originals of narrower width are to be copied, the copying material must be cut to size after development. This causes an increase of work and undue waste of paper.

Recently, copying apparatuses have become known in which several rolls of reproduction material are stored in a suitable location; cf. German utility Patent No. 1,984,436. Depending upon the width of the original, reproduction material is withdrawn from one of the rolls and fed to the cutting device. In most cases, such copying apparatuses contain two supply rolls arranged one below the other. Further, an apparatus is known which contains three such rolls, so that three different widths of reproduction material are available. In this case, also, the rolls are arranged one above the other. This arrangement has the disadvantage that rolls of relatively small diameters must be used; otherwise, either the machines would become too large, or, when the size of the machines remains the same, it would be practically impossible to accommodate the rolls. The use of rolls of small diameter has the disadvantage that the rolls must be frequently replaced.

The present invention provides a compact storage device accommodating three supply rolls of different widths with large diameters.

The present invention provides a storage device for rolls of reproduction material of different widths, which device is part of an automatic copying apparatus and contains three supply rolls of large diameter, of which the two narrower rolls are arranged with their axes substantially in alignment with each other, whereas the third and widest roll is mounted to parallel to the two narrower rolls.

The device according to the invention is part of an automatic copying apparatus, in particular a photoprinting apparatus. Alternatively, the device may be used in electrophotographic or thermographic copying apparatuses. The reproduction material, e.g. photoprinting paper, is withdrawn from one of the rolls and fed by means of a conveyor system to a cutting station where the paper is cut to the desired length and then combined with the original at the entrance of the actual photoprinting apparatus.

The device according to the invention contains three rolls of reproduction material of different widths, in particular photoprinting paper. The reproduction material may also differ in other properties, such as its color. Preferably, the different widths are at a ratio of 1 : 2 : 4, so that reproduction materials of 297 mm, 594 mm, and 1188 mm width may be used. The outer front ends of the two narrower rolls are preferably in the same planes with the front ends of the widest roll. Rolls of these widths are suitable for copying originals whose size ranges from size DIN A 4 to size 2 DIN A 0 (DIN = Deutsche Industrie-norm = German Industrial Standard). In the case of originals of German Industrial Standard size, with or without margins, the copies obtained correspond in their length and width to the DIN size, without margin, whereas copies produced from originals not corresponding to the DIN sizes are cut according to the size of the original.

For special requirements, e.g. for making copies on special paper, two additional rolls may be provided which normally will be of smaller diameter. These rolls may be stored either in the conventional manner, in a paper supply box of the feed table, and the desired length may be cut therefrom by means of a cutting wire, or they may be stored in a suitable location in the device on axes which are arranged parallel to the axes of the aforementioned three supply rolls.

In order to avoid a frequent replacing of the supply rolls, normally several hundred meters of photoprinting paper are wound on each roll. The length of the paper wound up depends upon its thickness and its weight per unit area. Of photoprinting paper of a weight of 80 g per square meter, for example, about 600 meters may be wound upon a roll without making the roll too heavy for practical use. The upper limit is determined by the fact that the lower roll or the lower rolls must still be accessible after the upper roll has been placed in position, to facilitate threading of a web or webs of material. Advantageously, the diameters of the rolls range from 150 to 350 mm.

The two narrower rolls are arranged with their axes substantially in alignment with each other. Their axes may lie either on an imaginary common center line, or they may be slightly displaced relative to each other. The axis of the widest roll is arranged parallel to the axes of the two narrower rolls. The wide roll may be positioned below the two smaller rolls as shown in the embodiment illustrated by the drawings, or it may be placed above the two narrower rolls.

In a further development of the invention, the apparatus consists of a stationary and a movable component. The moveable component may be inserted into the stationary component and, in this position, forms the front cover of the apparatus. Due to their large diameters, the rolls are very heavy and can be manually handled or replaced only with difficulty. Therefore, one component of the apparatus is in the form of a movable carriage for conveying the rolls. It is provided with rocker arms by which the rolls can be lifted from the bottom by their axle ends and inserted into the holders in the stationary component of the apparatus. The movable component is provided with a scale from which the elevation of the rocker arms can be read. The insertion of the rolls into the holders is thus further facilitated.

By means of several pairs of draw-off rollers and feed rollers, the paper webs are conveyed to the cutting sta-

tion. Each pair of draw-off rollers consists of a draw-off roller and a back-up roller, and each pair of feed rollers consists of a feed roller and a back-up roller. A displaceable roller is provided between the pair of draw-off rollers and the pair of feed rollers in each case. Such displaceable rollers are known, for example, from British Patent Specification No. 1,014,748. They serve the purpose of providing the feed rollers with a sufficient quantity of paper from which the weight of the rolls has been lifted.

The draw-off rollers for the narrower paper rolls are in the form of hollow shafts, and a common driving shaft is constantly revolving in the centers thereof. Each of the hollow shafts may be connected with the driving shaft by means of a clutch, so that paper may be withdrawn from either one of the rolls.

The invention will be illustrated in detail, with reference to one embodiment, taken in connection with the accompanying drawings. In the drawings:

FIG. 1 is a simplified top view of the apparatus according to the invention, with the movable component partially inserted (feed table and conveyor means being omitted),

FIG. 2 is a section through the apparatus along line A-D of FIG. 1, the movable component of the apparatus being shown in a position separated from the stationary component,

FIG. 3 is a side view of a roll supported in a holder, and

FIG. 4 is a top view of this roll, with the holder and the connecting parts.

The apparatus according to the invention consists of a stationary component 1 and a movable component 2. In the operational position, the movable component 2 is inserted into the stationary component 1 in such a manner that the front wall 3 of the movable component 2 is in alignment with the walls 4 of the housing of the stationary component.

The movable component 2 is provided with two rocker arms 5 and 6. FIGS. 1 and 2 show how these rocker arms hold a roll by its axle ends 7. The rocker arms 5 and 6 may be lifted and lowered by means of a crank handle 8. This is indicated in FIG. 2 by the phantom positions 5', 6', and 5'', 6''. The movable component 2 of the apparatus is provided with a scale 9 from which the elevation of the rocker arms 5 and 6 can be read through a window 10 in the front wall 3. The distance of the rocker arms 5 and 6 can be adjusted along the front wall 3 in order to enable them to seize rolls of different width.

The stationary component 1 of the apparatus contains the two rolls 11 and 12, which are arranged with their axes substantially in alignment, and below these rolls is the wide roll 13. Roll 12 is shown in FIGS. 1 and 2 in the alternate position 12'' which it takes before being inserted into the stationary component 1. The axle ends 7 of rolls 11, 12, and 13 are supported in the holders 14. Rolls 11 and 12 are located in the compartment 15 of the apparatus which can be tilted to take position 15', with rolls 11 and 12 taking the positions 11' and 12'. In this manner, the lower roll 13 is easily accessible. The front ends 16 and 17 of the widest roll 13 are in the same planes as the front ends 18 and 19 of the two narrower rolls 11 and 12.

Paper webs 20 and 21 are drawn off of the supply rolls 11 and 12 and conveyed to the cutting station 28 over the pairs of draw-off rollers 22/22a and 23/23a,

the displaceable rollers 24 and 25, and the pairs of feed rollers 26/26a and 27/27a. Correspondingly, paper web 29 is drawn off of the supply roll 13 and conveyed to the cutting device 28 over a pair of draw-off rollers 30/30a, a displaceable roller 31, and a pair of feed rollers 32/32a. Upon leaving the cutting station 28, the paper is fed by means of rollers 33 and 34 to the exposure station (not shown).

Depending upon the tension, the displaceable rollers 24 and 25 are moved in their rails 35 and 36 until they take the positions 24' and 25'. Correspondingly, the displaceable roller 31 can shift in its rails 37 to take the position 31'. The displaceable roller 31 is connected in such a manner (not shown in the drawings) to the compartment 15 of the apparatus, that it is shifted in its rails into the position 31', when compartment 15 is tilted into position 15'. In this manner, threading of the paper web 29 after replacement of roll 13 is substantially facilitated.

An original 38 is fed into the apparatus from a location on the feed table 39 which is determined by its width and is conveyed to the exposure station by the feed rollers 40 and 34. The feed table 39 can be raised on hinges to the position 39', so that the two narrower rolls 11 and 12 are easily accessible. The feed table 39 carries a box 41 for special types of paper.

The draw-off rollers 22, 23, and 30, which are associated with back-up rollers 22a, 23a, and 30a, are in the form of hollow shafts. The draw-off rollers 22 and 23 may be selectively coupled to their common driving shaft 42 which revolves in their centers. Correspondingly, the draw-off roller 30 may be connected with the constantly driven shaft 43.

The feed rollers 26, 27, and 32 are also in the form of hollow shafts and are coupled to the driving shafts 44 and 45 revolving in their centers, when desired. The feed rollers 26, 27 and 32 cooperate with back-up rollers 26a, 27a, and 32a. The feed rollers 26, 27 and 32 are provided with brakes (not shown in the drawings).

In order to avoid that the axes of rolls 11, 12, and 13 turn in their holders 14 when the paper webs 20, 21, 29 are drawn-off, each of the axle ends 7 is provided with a pin 46 which, after one revolution at the most, strikes against a retention pin 47 in the holder 14 and then assumes position 46' (see FIG. 3). One of the axle ends 7 in each case is connected over a friction brake 49 with the roll core 48 (see FIG. 4).

The brake 49 is also effective when paper is drawn-off of the roll. The brake pressure can be adjusted. Together with the tension of the displaceable rollers 24 and 25 and 31, the effect of the friction brake 49 prevents the formation of loops in the paper webs 20, 21, and 29, when the respective draw-off rollers 22, 23, and 30 have been switched off. Thus, the paper webs 20, 21 and 29 are always under tension.

The apparatus is provided with scanners 50. Depending upon which of the scanners 50 is contacted by the original 38, one of the supply rolls 11, 12, or 13 is selected. The operation will be described in the following with reference to a case in which roll 13 is selected.

When the leading edge of the original 38 actuates the scanners 50, the pair of feed rollers 32/32a begins to rotate and conveys the paper web 29 through the cutting device 28 to rollers 33 and 34 and from there to the exposure station, at a speed which corresponds to the feed speed of the original 38. During this operation, the displaceable roller 31 climbs in its guide rails 37.

Thereby, it displaces the switch 51 into the position at 51', which causes the pair of draw-off rollers 30/30a to rotate. This pair of draw-off rollers draws the paper web 29 from the roll 13 at a speed which exceeds that of the feed rollers 32/32a. Consequently, the displaceable roller 31 is lowered and disconnects the pair of draw-off rollers 30/30a. Depending on the length of the original used, this procedure may be repeated several times. The friction brake 49 and the tension of the displaceable roller 31 prevent the formation of a loop in the web 29 after the pair of draw-off rollers 30/30a has been switched off.

When the trailing edge of the original 38 passes the scanners 50, the pair of feed rollers 32/32a is switched off and the paper is severed. Original and photoprinting paper are in an overlying position when they arrive at the exposure station.

It will be obvious to those skilled in the art that many modifications may be made within the scope of the present invention without departing from the spirit thereof, and the invention includes all such modifica-

tions.

What is claimed is:

1. A storage device for rolls of reproduction material of different widths comprising at least three supply rolls with two of said rolls being narrower than the third, means mounting said narrower rolls with their axes substantially in alignment with each other, means mounting the third and widest roll parallel to the two narrower rolls, and draw-off rollers, for the two narrower supply rolls, in the form of hollow shafts having a common driving shaft constantly revolving therein, and clutch means for selectively connecting said driving shaft to either of said hollow shafts, said device including a stationary component and a movable component, the latter comprising a movable carriage means for conveying the rolls and including rocker arms for lifting and inserting the rolls into the stationary component.

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