

[54] **DOCUMENT TURN-AROUND DEVICE  
FOR COPYING MACHINE**

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[51] Int. Cl. .... **B65h 29/60**

[58] Field of Search. .... **271/64, 65, 66**

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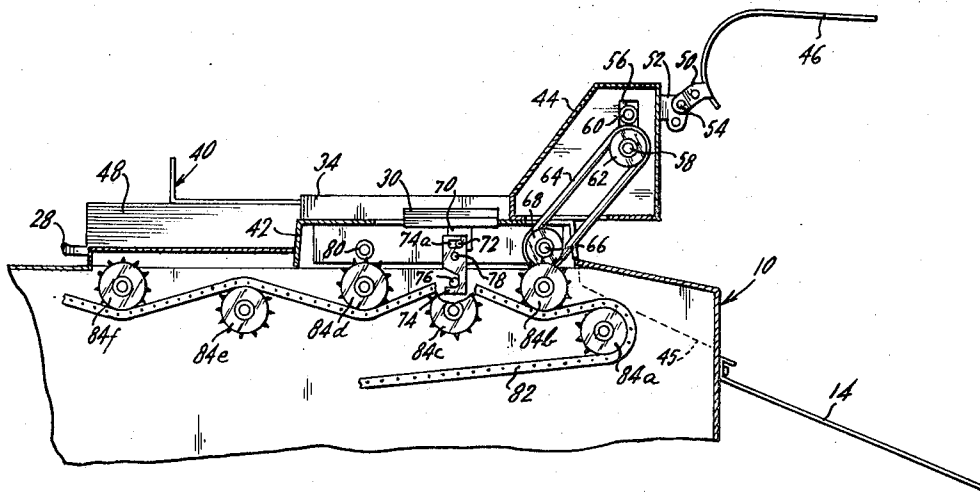
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[57] **ABSTRACT**

A bridge for placement on top of a copying machine to control the stacking of successive original documents fed through the machine in either of two orders. The attachment includes a baffle which when raised does not intercept the original documents fed through the machine and allows the documents to be stacked in a reverse order in a collecting tray as is the usual practice. However, when the baffle is lowered, it intercepts each original document and guides it so that each document is effectively flipped over. The original documents are collected in a different tray and their order is the reverse of that usually obtained. Transport rollers in the bridge are driven by a belt coupled to a pressure roller in the bridge which engages a drive roller in the machine.

**6 Claims, 6 Drawing Figures**



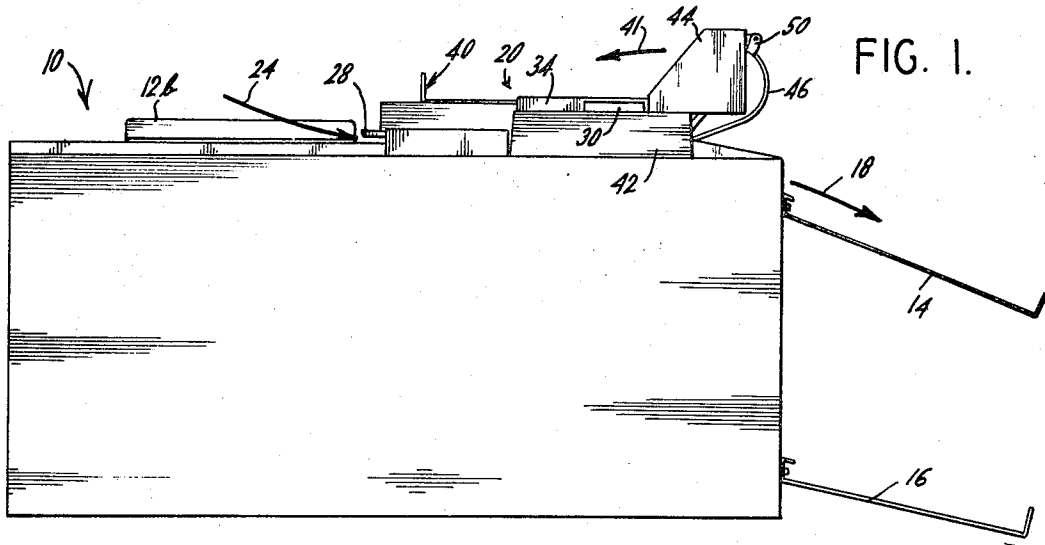


FIG. 1.

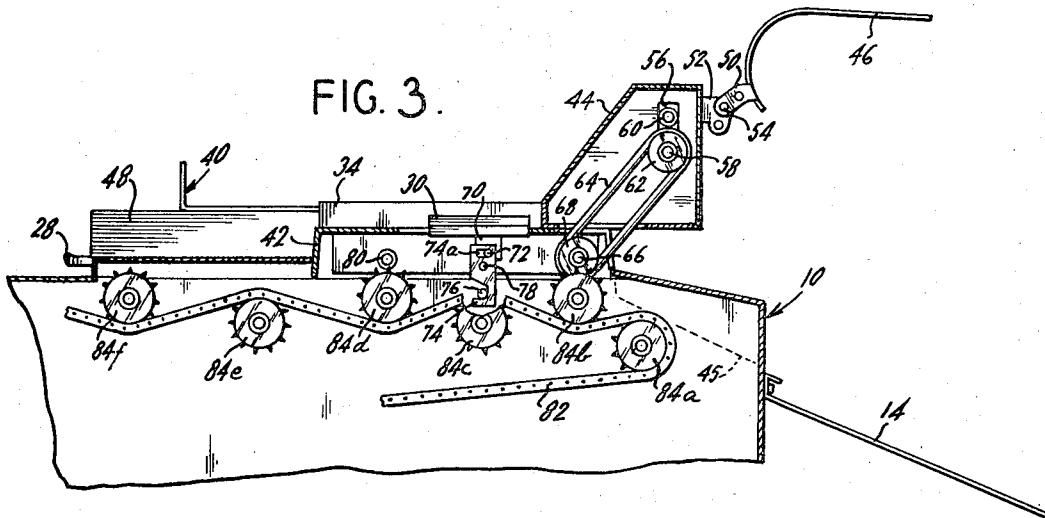


FIG. 3.

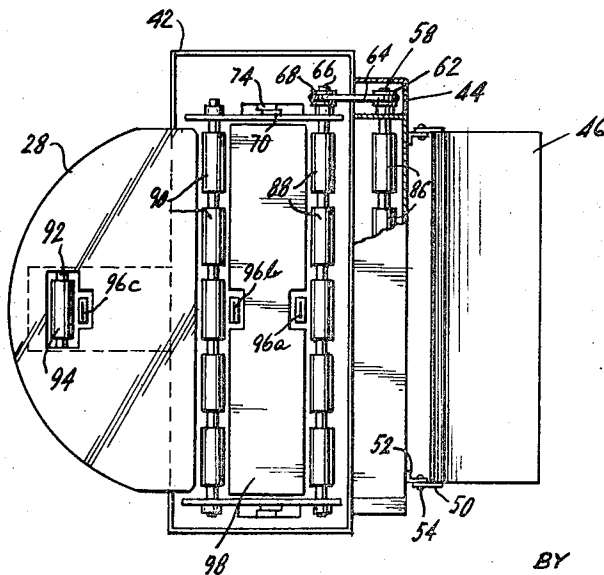
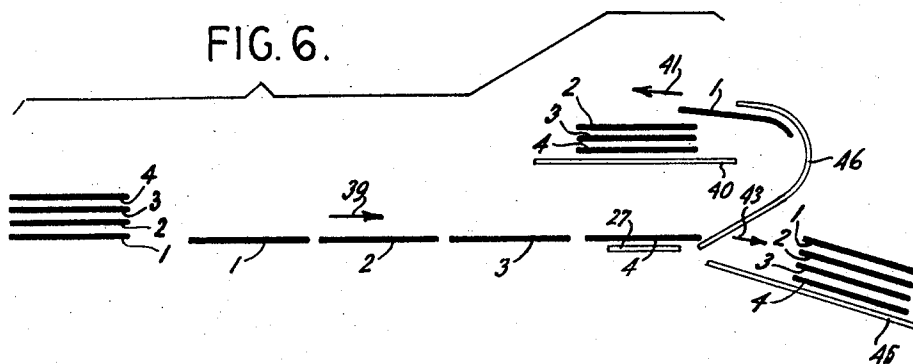
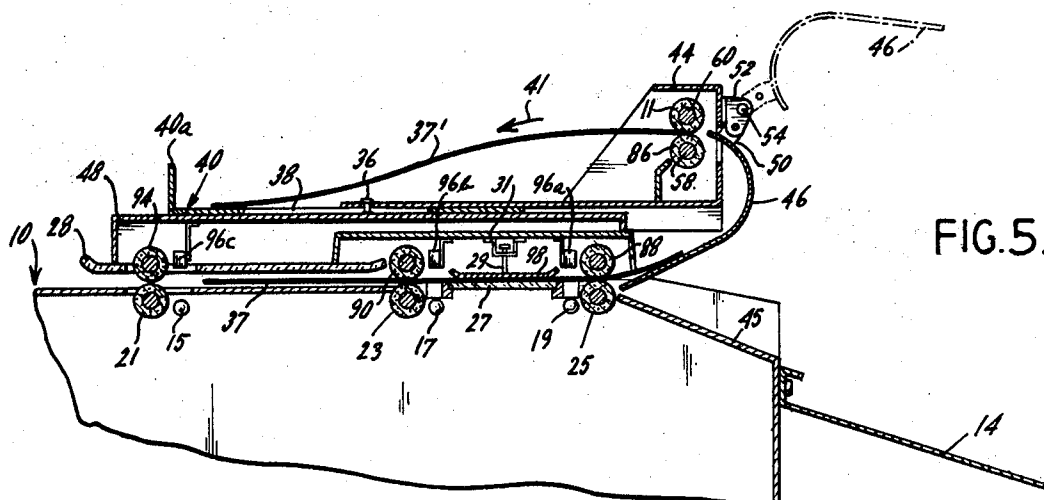
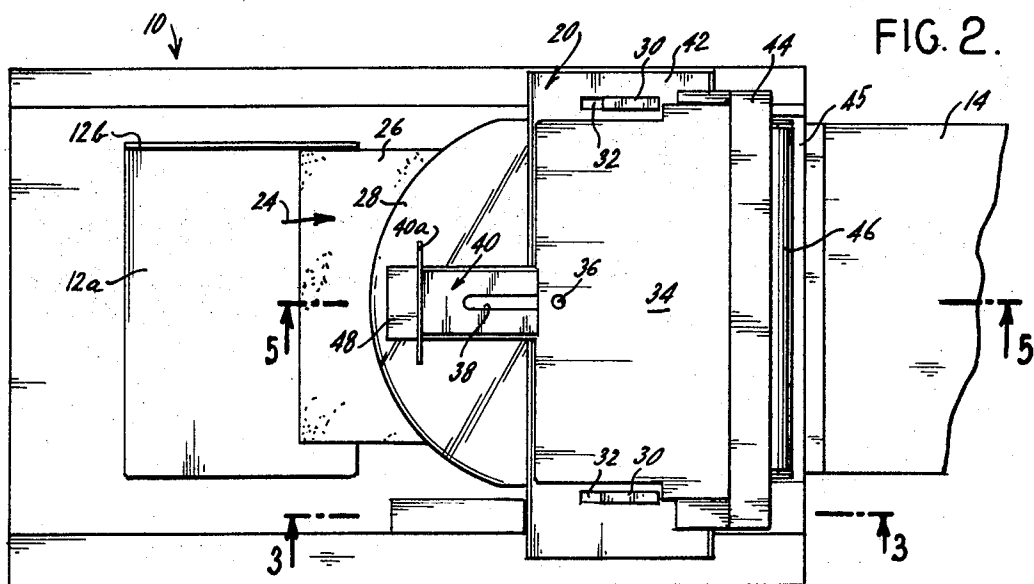


FIG. 4.

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## DOCUMENT TURN-AROUND DEVICE FOR COPYING MACHINE

This invention relates to document handling machines, and more particularly to an attachment for a copying machine which selectively stacks original documents having been copied in either their original order or in the reverse order.

In a popular type of copying machine on the market, original documents to be copied are fed in succession into the input section of the machine; after one or more copies of each document have been made, the document is transported out of the machine into a collecting bin. Since each original document must usually be fed into the machine face down, when a stack of documents is to be copied the entire stack is generally turned upside down and successive documents are then inserted into the machine from the top of the inverted stack. After all copies have been made, the resulting stack in the collecting bin is in reverse order because the first original delivered to the bin face down (and therefore the uppermost original when the stack is turned face up) is the last document in the original stack in its initial face-up position. Many times, however, it is desirable to have the originals in the final stack in the same order in which they were prior to their copying.

It is a general object of our invention to provide an attachment for a copying machine which enables the operator to control the automatic stacking of original documents in either of two opposite orders after they have been copied.

In accordance with the principles of our invention, a baffle is provided on top of the copying machine. When the baffle is in a first position, it makes no contact with the original documents as they are fed out of the machine. The original documents are stacked in the collecting tray in the usual manner (reverse order). However, when the baffle is placed in a second position each document is deflected by the baffle; it is turned around and is delivered to a second collecting tray. Although each document is fed to the machine face down, because it is turned around by the baffle it is delivered to the second collecting tray face up. Since the first document to be fed into the machine is the last one in the original stack, it is apparent that the lowermost face-up document in the final stack is the last document in the original stack. The order of the final stack is the same as that of the original stack. (In the following description, the phrase "last document" in a stack refers to the lowermost document when the stack is placed face up. The "first document" in the same stack is the uppermost one.)

When the baffle is in its second position, the documents which it deflects are transported by a pair of rollers to the second collecting tray. The rollers are driven by a belt which is coupled to one of the pressure rollers in a bridge containing the baffle. When the bridge is placed on the machine, a drive roller in the machine bears against the pressure roller to move the document past a scanning window. This same action drives the second collecting tray roller pair.

Further objects, features and advantages of our invention will become apparent upon consideration of the following detailed description in conjunction with the drawing, in which:

FIG. 1 depicts schematically the turn-around device of our invention placed on top of a prior art copying machine;

FIG. 2 is a top view of the machine of FIG. 1;

FIG. 3 is a sectional view taken through the line 3—3 of FIG. 2;

FIG. 4 is a bottom view of the device;

FIG. 5 is a sectional view taken through the line 5—5 of FIG. 2; and

FIG. 6 depicts the two possible sequences in which a series of original documents can be stacked with the use of the attachment of our invention.

The invention can be best understood with reference to the symbolic drawing of FIG. 6. As will be described below in connection with copying machine 10 on which the attachment of our invention is placed, at the top of the machine there is a glass ("scanning") window 27. A document to be copied is moved past the window as shown by arrow 39, with that side of the document to be copied facing downward. Light is directed toward window 27 inside the machine, and is reflected from the document to be copied to copy paper which is moved in synchronism with the original inside the machine. The copy paper is exposed and developed as is known in the art. After each document is copied, it is deposited in collecting tray 45 (in the absence of baffle 46).

FIG. 6 depicts the successive positions of four documents numbered 1 through 4. The lead line connecting each numeral to the respective document is extended to that side of the document to be copied, the "face" of the document. In the case of a stack of originals, when initially the faces are all oriented in the same direction with the face of document 1 being exposed to view, it is apparent that the easiest way to feed the documents face down into the machine is to invert the entire stack as shown in FIG. 6. In this manner, all of the documents initially are placed with their faces down so that as they are fed from the stack into the machine they need not be turned around. The first document to be fed is the last in the original stack, document 4. Then document 3 is fed into the machine, etc. FIG. 6 shows the four documents moving in sequence past scanning window 27.

In the absence of baffle 46, the first document to be collected in tray 45 is document 4, with its face down. On top of this document, document 3 is deposited, followed by documents 2 and 1. It is apparent that if the entire stack is then turned around so that the document faces are upward, document 4 is at the top of the stack and document 1 is at the bottom — the order of the documents is reversed from that of the original stack. In prior art machines, the only way to preserve the order is to feed document 1 into the machine first, followed by document 2, etc. This in turn requires that the original stack of documents be placed face upward so that document 1 can be fed in first, and since each document must be fed into the machine face down, it is apparent that in order to preserve the order it is necessary to turn each document around between the time that it is lifted from the original stack and the time that it is inserted into the machine.

With baffle 46, however, the stack of originals can initially be inverted as shown in FIG. 6 for facilitating the feed of individual documents without turning them

around, and yet the documents are collected in tray 40 in the original order. The first document 4 fed into the machine (the last document in the stack when it is in its normal face-up position) is deflected by baffle 46 and is deposited on top of tray 40 facing upward. Similar remarks apply to each of the three documents fed after it, the drawing showing the final document 1 moving in the direction of arrow 41 as it is deposited on the stack collected in tray 40. The resulting stack is in the same order as the original stack.

For maximum flexibility, in the illustrative embodiment of the invention, baffle 46 can be moved between two positions. In the position shown in FIG. 6, the original documents are collected in tray 40 and the original order of the stack is not changed. When the baffle is rotated counter-clockwise such that the original documents pass through the machine without being deflected, they are collected in tray 45 in an order which is the reverse of the original order.

Copying machine 10 is of the type disclosed in the application of Van Auken et al. Ser. No. 30,923 filed on Apr. 22, 1970. The machine is provided with a flat top on which a letter bridge can be attached. At the top of the machine are three rollers 21, 23, 25 which terminate in gears 84f, 84d, 84b, as shown most clearly in FIGS. 3 and 5. The three gears are driven by drive chain 82, the drive chain transmitting motion to these three gears, and also to gears 84e, 84c and 84a. Depending on the direction of the movement of drive chain 82, the three rollers on top of the machine move either clockwise or counter-clockwise.

The underside of the letter bridge provided with the Van Auken et al. machine is similar to the underside of the attachment of our invention shown in FIG. 4. It includes three rollers 94, 88, 90 mounted on respective shafts. The three rollers in the bridge bear against the three rollers on top of the machine. Three lamps 15, 17, 19 are provided on top of the machine for directing light toward three photocells in the letter bridge, three such photocells 96a, 96b, 96c similarly being included in the attachment of our invention. An original document 37 (FIG. 5) fed into the nip of rollers 21, 94 is moved by the rollers in the forward direction on top of scanning window 27. In the Van Auken et al. system, the original document is shuttled back and forth in the event multiple copies of it are to be made, but after the last copy is made it exits the machine along inclined surface 45 and is collected in tray 14. The copies made by the machine are collected in tray 16.

The attachment of our invention is very similar to that disclosed in the Van Auken et al. application, at least insofar as the functions pertaining to the copying cycle are concerned. Attachment 20 includes a bridge section 42 which carries rollers 88, 90 and photocells 96a, 96b. The bridge is also provided with a bracket 31 from which plate 98 is held by a plurality of pins 29. The plate serves to bear against the original document to be copied on top of scanning window 27. On either side of the bridge is a rectangular cut-out 32 in which a slide switch 30 is provided. As seen most clearly in FIGS. 3 and 4, each slide switch includes a depending lug 70 on which a pin 72 is mounted. The pin extends through a cut-out 74a in a member 74 which is pivoted at 78. A pin 76 is provided on the machine. When slide switch 30 is moved to the left in FIG. 3, member 74

rotates in the counter-clockwise direction to release member 74 from pin 76. To secure the attachment to the machine, each of the two slide switches is moved to the left in FIG. 3, the attachment is placed on the machine, and the two slide switches are then moved to the right to lock member 74 around pin 76. Although not shown in the drawing, the attachment also includes an electrical connector for mating with a mating connector on the machine for extending connections of the photocells to the control circuit of the copying machine and for other purposes described in the Van Auken et al. application.

At the rear of bridge 42 is glass plate 28 under which an original document is fed. An original document to be copied is fed into the machine as shown by arrow 24 in FIGS. 1 and 2, FIG. 2 showing a document 26 moving in the direction of arrow 24. A plate 12 is provided on top of the machine having a base section 12a and an upstanding edge 12b. This plate serves to center original document 26 relative to scanning window 27. A support member 48 extends rearwardly of bridge 20 and is secured to the top of glass plate 28.

The attachment of our invention includes a housing 44 which carries two rollers 11 and 86, and a movable baffle 46. Housing 44 is provided with a lug 52 on each side. A similar lug 54 is provided at each side of baffle 46, pairs of lugs being hinged to each other as shown at 54 in FIG. 3.

The baffle can be moved between the position shown in FIG. 3 (shown in phantom FIG. 5) and the position shown in FIG. 5. With the baffle in the position shown in FIG. 3, the system operates just as does that disclosed in the Van Auken et al. application; original documents are transported on top of the machine and are collected in tray 14.

With the baffle in the position shown in FIG. 5, however, an original document 37 fed into the machine is intercepted and directed upward along the baffle into the nip of rollers 11, 86. The rollers turn, as will be described below, and serve to transport the original document in the direction shown by arrow 41 in FIG. 5. Document 37 is thus moved to the position shown by the document identified by the numeral 37'. On top of support 48 is a slide 40 having an upstanding ridge 40a. The slide further includes a cut-out 38 through which a pin 36 in housing 44 is extended to support 48. Slide 40 can be moved from left to right in FIG. 2 and can be adjusted to accommodate any length original. The longer the original, the more slide 40 should be moved to the left in FIGS. 2 and 5. As each original document is transported through the housing, it is deposited on top of the slide, which thus serves as a second original document collecting tray, as depicted symbolically in FIG. 6.

The three rollers in the bridge attachment disclosed in the Van Auken et al. machine are driven by the three rollers on top of the copying machine. The three pressure rollers at the bottom of our attachment are similarly driven. However, rollers 11 and 86 are also driven in our attachment in order to transport original documents to collecting tray 40. Each of the rollers is mounted on a respective one of shafts 60, 58, the two shafts being mounted in cut-outs 56 on either side of housing 44 in any conventional manner. At one end of shaft 58 is a pulley 62, and an additional pulley 68 is

5

mounted at the end of shaft 66 which carries roller 88. A belt 64 is extended between pulleys 62, 68. As roller 88 is driven by roller 25, belt 64 turns in the counter-clockwise direction of FIG. 3 to cause pulley 62, shaft 58 and roller 86 to similarly turn in the counter-clockwise direction. The force of roller 11 bearing down against roller 86 causes the former roller to move in the clockwise direction. The two rollers together serve to transport an original document which is inserted between them toward the rear of the machine where they are deposited in tray 40.

It is thus apparent that the Van Auken et al. bridge attachment can be modified very easily to control the stacking of original documents in either their original or the reverse order. All that is required is to provide a baffle which is movable between two positions, together with additional rollers and a drive mechanism for them coupled to one of the pressure rollers which facilitate transport of the original documents and effectively flip them over.

Although the invention has been described with reference to a particular embodiment, it is to be understood that this embodiment is merely illustrative of the application of the principles of the invention. For example, it is possible to provide a similar turn-around device for reversing the order of the stack of copies which exit the machine and are collected in tray 16. Similarly, an attachment of this type can be provided for any type of document feed in which it is desired to reverse the order of the documents in the final stack. Thus it is to be understood that numerous modifications may be made in the illustrative embodiment of the invention and other arrangements may be devised without departing from the spirit and scope of the invention.

What we claim is:

1. An attachment for a copying machine, said copying machine having a plurality of drive rollers along the upper surface thereof for controlling the transport of an original document to be copied along the top of the

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machine and a tray in which documents transported along the top of the machine are successively deposited, said attachment comprising means for mounting said attachment on top of said machine in cooperating relating thereto, said attachment including a plurality of pressure rollers for directly and frictionally engaging the drive rollers on top of said machine for facilitating the transport of an original document along the top of said machine, a collecting tray, a baffle selectively positionable between a first position in which the original documents transported along the top of the machine are not intercepted and are allowed to be deposited in said copying machine collecting tray and a second position in which the documents are intercepted and directed to said attachment collecting tray, roller means for engaging an original document directed thereto by said baffle for moving said original document to said attachment collecting tray, and means couple between one of said attachment pressure rollers and said roller means for turning said roller means.

2. An attachment for a copying machine in accordance with claim 1 wherein said baffle controls each intercepted original document to be turned around and moved in a direction which is the reverse of the direction in which said original document is moved as it is transported on top of the machine.

3. An attachment for a copying machine in accordance with claim 2 wherein said attachment collecting tray is disposed at the top of the attachment.

4. An attachment for a copying machine in accordance with claim 3 wherein said turning means is a drive belt.

5. An attachment for a copying machine in accordance with claim 2 wherein said turning means is a drive belt.

6. An attachment for a copying machine in accordance with claim 1 wherein said turning means is a drive belt.

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