

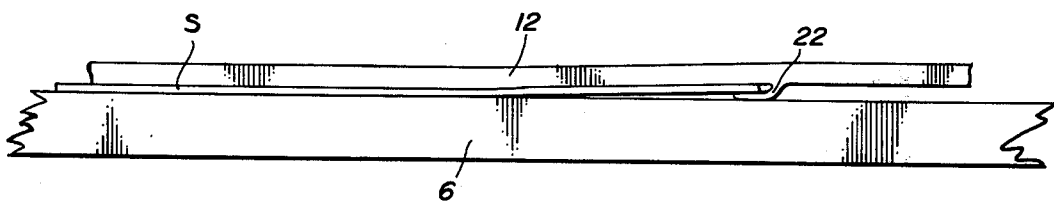
[54] **HORIZONTAL PLATEN BELT TRANSPORT** 643,400 3/1937 Germany 271/204
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[51] Int. Cl.²..... **B65H 9/10; B65H 5/14**
[58] Field of Search..... 271/4, 6, 7, 80, 226, 204, 271/243, 275, 277; 198/180; 101/242
[56] **References Cited**
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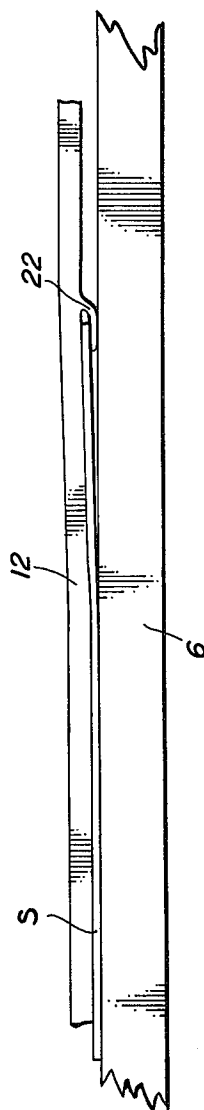
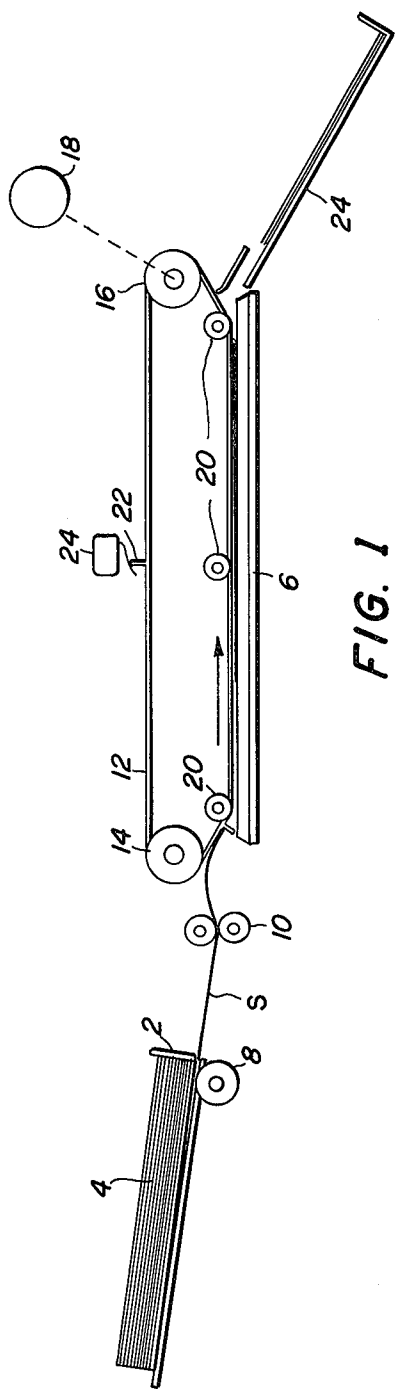
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[57] **ABSTRACT**

Sheet handling apparatus including a movable endless belt having a plurality of flexible tabs formed thereon adapted for deskewing and registering the lead edge of a sheet presented thereto, the tabs thereafter being deformed into contact with the lead edge of the sheet to grip the sheet for subsequent conveyance thereof.

4 Claims, 2 Drawing Figures





HORIZONTAL PLATEN BELT TRANSPORT

BACKGROUND OF THE INVENTION

The development of high speed electrostatic reproduction machines has brought about the need for simple, yet reliable means for registering and conveying sheets or documents through the reproduction machine. This is especially true in the case of automatic document handlers wherein the document to be copied must be rapidly and carefully presented to the platen of the copy machine in proper registration and then removed therefrom. In electrostatic machines such as the xerographic type disclosed in U.S. Pat. No. 3,674,363 to Bayler et al., the documents to be reproduced are placed in an automatic document handler which sequentially feeds documents to the platen of the machine. After exposure, the device removes the copied documents and feeds the succeeding document to the platen for copying. Dependable apparatus for carrying out this function of placing documents on the scanning platen constitutes convenience to an operator who would otherwise have to manually change the document and, at the same time, increases the efficiency of the electrostatic reproduction system by permitting more copies to be made in a given time.

Generally speaking, sheet feeding devices for transporting sheets or documents singly from a stack to a work station are known in the art. However, known sheet feeding devices are inadequate for dependably keeping pace with the great speed at which electrostatic machines now operate. When devices for singly advancing sheets from a stack are designed to operate at higher speeds, a great number of problems are encountered in attempting to deskew, register, and convey the sheet to a precise position at a work station such as the platen of the reproduction machine.

A number of devices have been utilized in the past to properly locate a document on the platen of a copy machine. For example, in U.S. Pat. No. 3,790,158 there is disclosed a mechanism wherein the document is fed in a forward direction onto the platen of a copy machine and thereafter reversed against a registration edge to deskew and register the document. Problems may be encountered in the mechanism required to move the registration edge into and out of the document path or the sensors actuating the mechanism. Further, in positively driving the document against the registration edge while it is firmly pressed between the transport belt and the platen, the amount of deskewing that can be accomplished may be insufficient due to the frictional engagement between the document and the transport belt. Another type of locating system that has been utilized in the past is disclosed in the aforementioned U.S. Pat. No. 3,674,363 wherein the passage of the document past a certain point in the document path actuates a switch, which, in conjunction with the time delay, inactivates the document transport mechanism when the document is in the desired position on the platen.

Another method to present documents to the platen of a copy machine would be through the use of mechanical type gripper bars which would be employed to grip the leading edge of a document and thereafter positively transport the document to the proper location on the platen. However, ordinary grippers of necessity include a number of precision mechanical elements

adapted for opening and closing the gripper fingers and moving the gripper bars through the desired path.

SUMMARY OF THE INVENTION

The subject invention relates to a sheet handling mechanism for deskewing, registering, and transporting individual sheets of material including a movable endless belt having a plurality of flexible tabs formed thereon projecting substantially perpendicular from the belt surface, the tabs extending across the belt in a direction perpendicular to the direction of belt travel. Support means having a surface disposed opposite the belt are provided for cooperation therewith, contact of the tabs with the surface of the support means causing the tabs to deform against the surface of the belt. Sheet supply means for conveying sheet material to the belt are adapted to overdrive the sheet material against the tabs to cause the sheet to be deskewed thereagainst, movement of the belt relative to the support means causing the tabs to be deformed toward the surface of the belt to positively grip the lead edge of the sheet material between the tab and the belt surface for subsequent transport of the sheet material by the belt.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of a document feeding mechanism employing the deskewing, registering, and conveying belt of the present invention;

FIG. 2 is an enlarged section of a portion of the belt and platen surface illustrated in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, there is illustrated an automatic document handler including a document supply tray 2 adapted for receiving a plurality of documents 4 to be fed to the platen 6 of a copy machine. While the copy machine per se is not illustrated, it should be understood that any suitable copy machine such as that illustrated in the aforementioned U.S. Pat. No. 3,674,363 could be utilized therewith. The document handler includes a separating roll 8 adapted to remove documents individually from the bottom of the stack of documents 4 and forward individual documents to a take-away roll pair 10 which is adapted to forward the single document to a suitable platen belt 12. The belt 12 preferably comprises a single wide belt adapted to completely overlie the platen 6. The belt 12 is supported for movement on main support rolls 14 and 16, roll 16 being driven by a suitable motor 18 for moving the belt 12 relative to the platen 6. A plurality of bias rollers 20 may be provided to maintain the belt 12 against the platen 6 and thereby assure intimate contact of the document fed therebetween during the exposure or copying operation. Platen belt 12 is provided with a plurality of flexible projections 22 suitably formed thereon, as by molding, for reasons to be hereinafter explained. The document, after the copying operation is completed, is fed out from beneath belt 12 into document catch tray 24. While the document feeder illustrated is a single path document feeder, i.e., the documents are fed from a first tray through the copying operation to an output tray, it should be understood that suitable means could be provided through a second path to return the documents to tray 2 for repetitive recirculation thereof across platen 6.

Considering the operation of the illustrated document handler, upon initiation of the copy cycle, separator roll 8 and take-away roll pair 10 would be actuated to feed a document S from tray 2 to the platen belt 12. The rolls 8 and 10 are adapted to overdrive the document slightly against projections 22 to form a buckle in the document as illustrated in FIG. 1. This provides a positive deskewing action to assure proper alignment of the document on the platen when it is transported thereon by the belt 12. It should be understood that as the buckle is forming in the document, the belt 12 is also moving, albeit at a slightly slower speed than the document. Referring to FIG. 2, which illustrates a small section of platen 6 and belt 12, it can be seen that as the belt moves across platen 6, the tab 22 is deformed against the bottom surface of the document S to positively grip the lead edge of the document for movement across the platen 6. Suitable means such as a micro-switch 24 is provided to stop motor 18 and the belt 12 driven thereby when the document S carried by the belt is in the proper copying position on the platen.

In the embodiment illustrated, one of the tabs 22 is utilized for contacting the microswitch to inactivate the motor 18 although it should be understood that a variety of position sensors could be substituted therefore such as photosensors acting in conjunction with openings formed along one edge of the belt etc. When the copying cycle is completed the apparatus is again energized to carry the copied document off the platen and present the subsequent document from document tray 12 onto the platen for copying thereof.

While the invention has been described with reference to the structure disclosed, it is not confined to the details set forth, but is intended to cover such modifications or changes as may come within the scope of the following claims.

What is claimed is:

1. A sheet handling mechanism for deskewing, registering and transporting individual sheets of material comprising:
a movable endless belt having a plurality of flexible tabs formed thereon projecting substantially nor-

mal to the belt surface, the tabs extending across the belt in a direction perpendicular to the direction of belt travel;

support means having a surface disposed opposite the belt for cooperation therewith, contact of the tabs with the surface of the support means causing the tabs to deform against the surface of the belt; and sheet supply means for conveying sheet material to the belt, said sheet supply means being adapted to overdrive the sheet material against the tabs to cause the sheet to be deskewed thereagainst movement of the belt relative to the support means causing the tabs to be deformed toward the surface of the belt to positively grip the lead edge of the sheet material between the tab and the belt surface for subsequent transport of the sheet material by the belt across said support means.

2. A sheet handling mechanism according to claim 1 wherein said support means comprises a platen for a copy machine, the sheet handling mechanism further including:

drive means for driving said movable endless belt; and
sensing means adapted to sense a predetermined position of said belt for inactivating said drive means to position a sheet carried by said belt at a predetermined position on said platen for copying said sheet.

3. A sheet handling mechanism according to claim 2 wherein said sensing means comprises a microswitch adapted for actuation by movement of said tabs thereagainst.

4. A sheet handling mechanism according to claim 2 further including a sheet receiving tray, said tray being located downstream from said platen, movement of said belt to move said tabs gripping the sheets out of contact with said platen allowing said tabs to assume a normal orientation relative to the belt surface to release the lead edge of the sheet subsequent movement of said belt carrying the sheet off said platen into said sheet receiving tray.

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