

March 19, 1968

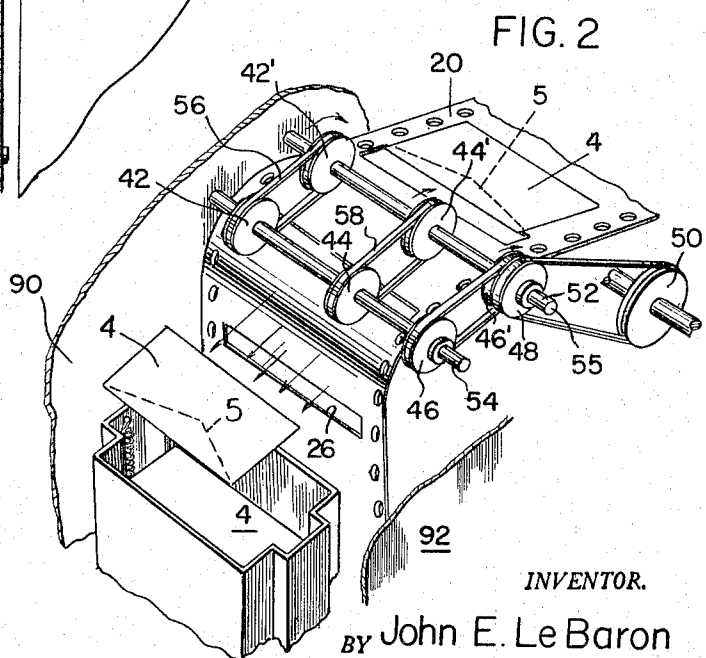
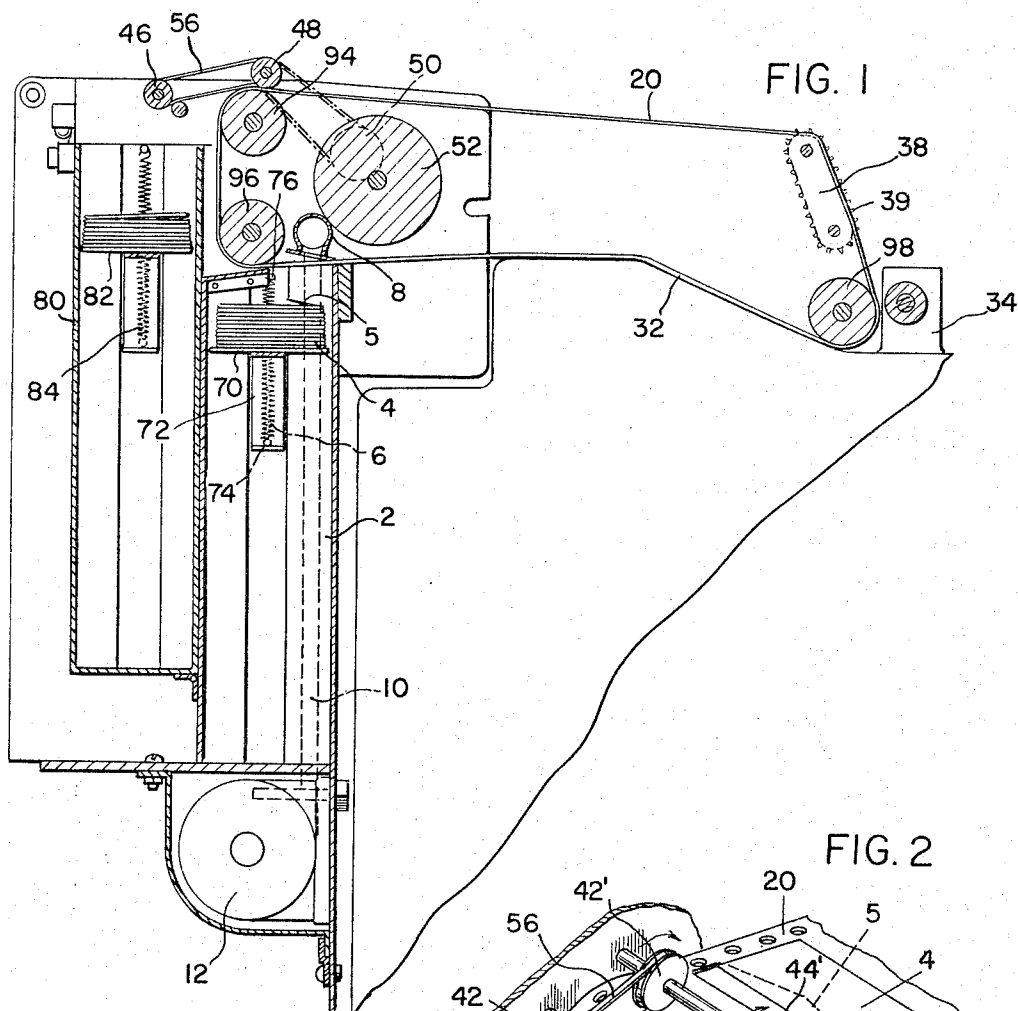
J. E. LE BARON

3,373,989

AUTOMATIC FOLDED MATERIAL CONVEYOR

Filed March 18, 1966

2 Sheets-Sheet 1



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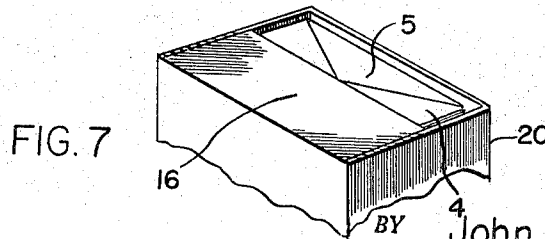
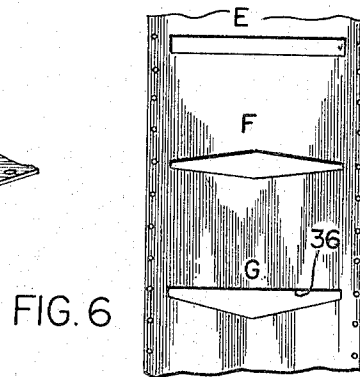
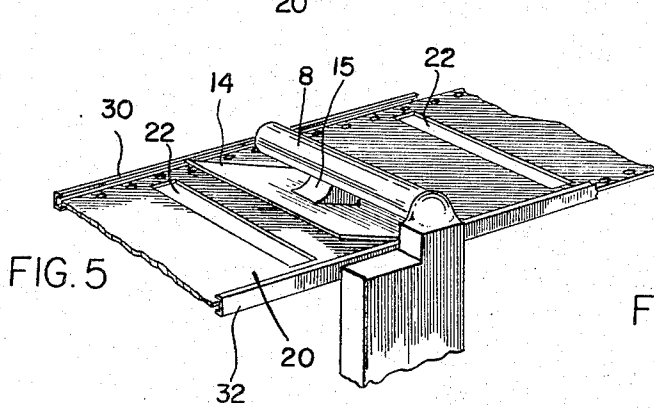
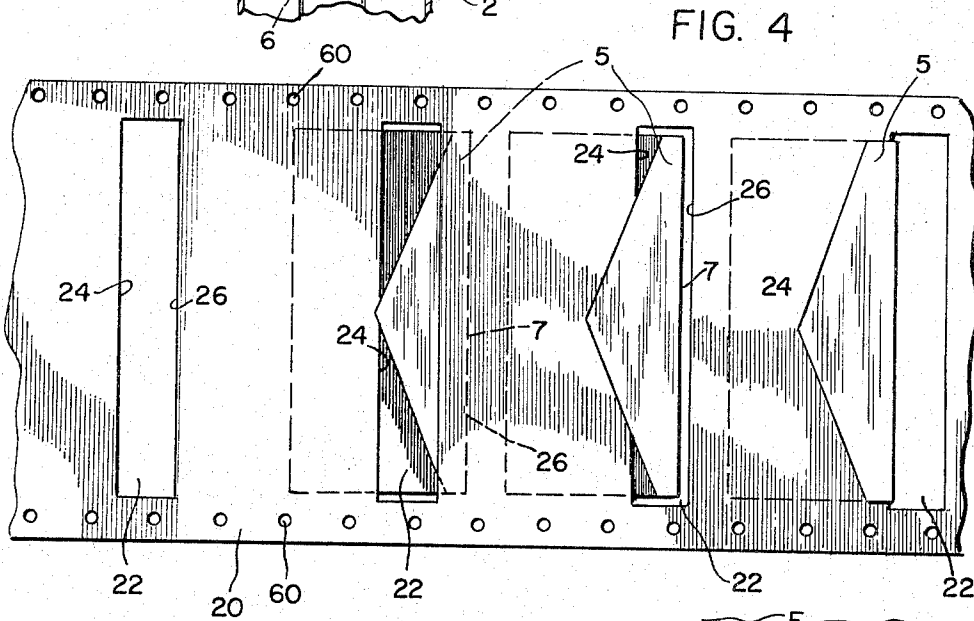
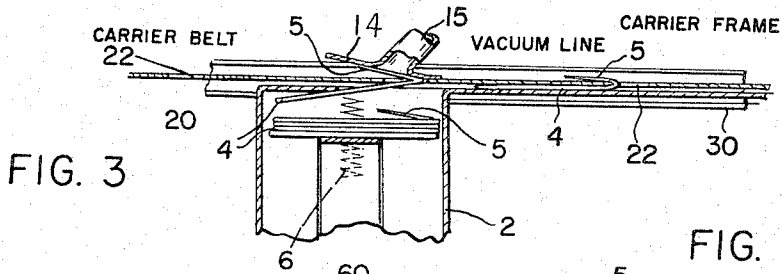
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AUTOMATIC FOLDED MATERIAL CONVEYOR
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13 Claims. (Cl. 271-2)

The present invention concerns a method and preferred apparatus for automatically conveying envelopes to a print position without actual attachment to a carrier or conveyor belt. More particularly, the invention provides for automatic successive feeding of a plurality of folded materials such as envelopes to a print position, and the conveying of said envelopes from the print position to an eject bin.

Conventionally, envelope conveying systems necessitate the actual attachment of the envelope to the belt as, for example, by glue or equivalent means. Obviously, gluing the envelope to a conveyor belt is time-consuming, expensive, and can damage the envelope or conveyor system. Moreover, it is necessary to remove the envelope from the conveyor belt in such a manner as to prevent tearing. Thus, the methods and apparatus utilized to automatically convey envelopes to a print position in the past have not proved satisfactory.

It is therefore an object of my invention to provide a method and apparatus for automatically successively conveying a plurality of envelopes to a print position without actual attachment to the conveyor.

It is another object of invention to automatically convey the printed envelopes from the print position to an eject bin, without actual attachment of the envelopes to the conveyor.

It is another object of invention to provide a method and apparatus whereby the conveyor system utilized is easily adaptable to fit a variety of electronic or mechanical printing units.

It is another object of invention to provide a method and apparatus in which a vacuum condition is created to force the envelope flaps into slots in a conveyor belt, wherein they are held for translation to the print position, and finally to the eject bin.

These and other objects of invention will be apparent from the following specification and drawings in which:

FIGURE 1 is a side sectional view of the envelope conveyor;

FIGURE 2 is a blown-up view in perspective of the ejection portion of the system, by which the envelopes are ejected from the conveyor belt to the eject bin;

FIGURE 3 is a sectional view of the eject bin and pneumatic apparatus by which the envelopes are delivered to the conveyor belt, the envelope flaps being forced into a hold position on the conveyor belt;

FIGURE 4 is a plan view of the conveyor belt, showing the successive steps by which the pneumatic device positions the envelope flaps into hold position on the conveyor belt;

FIGURE 5 is an isometric view of the pneumatic device as it is operable to position the envelope flaps on the conveyor belt;

FIGURE 6 is a plan view of the conveyor belt, and particularly of the various types of slots that may be utilized, depending upon the envelopes;

FIGURE 7 is an isometric view of the top of the feeding bin showing the position of the envelopes therein.

In FIGURE 1, feed bin 2 is shown filled with a large number of envelopes 4 which are to be fed to the conveyor belt 20. Spring 6 is provided within feed bin 2 to force the top envelope into contact with belt 20, which moves across the top of bin 2. Positioned above belt 20, in

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operable position with the top bin 2, is pneumatic device 8 which is supplied by pump 12 through pneumatic line 10 to create a vacuum.

Belt 20 is provided with a series of apertures or slots 22, and moves in a horizontal position, relative to the vertical position of feed bin 2 (FIGURE 4). As illustrated in FIGURES 1, 3, and 5, when one of multiple slots 22 of belt 20 passes over the top of feed bin 2, flap 5 of the top envelope is forced through slot 22 in the belt. This is caused by the suction created by pneumatic device 8, and applied to the envelope flaps via vacuum duct 15 which concentrates the suction to a certain area for optimum effectiveness. The upper movement of flap 5 is restricted by restricting plate 14 (FIGURE 5), so that the entire envelope is not sucked out.

As illustrated in FIGURE 1, feed bin 2 comprises plate 70, upon which the supply of envelopes or other folded material is loaded. Attached to plate 70 is a center support section 72 to provide stability to plate 70. Spring 74 is mounted to the bottom of center section 72 at one end through a side-shaft section of feed bin 2, and is attached at its other end to the top portion 76 of feed bin 2. The spring-plate-support combination exerts equal pressure on the envelopes and provides a constant stabilized feed to the conveyor system.

Metal plate 16 holds the envelope at the top of feed bin 2 (FIGURE 7). FIGURE 4 illustrates the sequence of steps by which the envelopes are fed from feed bin 2 to engage conveyor belt 20. As slot 22 moves over feed bin 2, the vacuum forces an increasing portion of flap 5 through slot 22, as illustrated in the sequence of steps A-B-C-D. Finally, as slot 22 completes its translation across feed bin 2, flap fold 7 is co-extensive with side 24 of slot 22.

The envelope is then carried by conveyor belt 20, which is positioned between guide plates 30 and 32 to the proper index position for printing illustrated in FIGURE 1. As soon as the envelope or other folded material has been engaged by conveyor belt 20, and moves toward the print position, the next envelope or other folded material in the feed bin is then in the proper position with respect to the next slot 22, for a repeat of the same engagement process. Slots 22 are designed to coincide with the possible programming of the printing unit, so that print line one is always in the same relative position on the material that is being printed.

The print wheel location 34 is shown for one type of accounting machine, an IBM 407. For other machines, the actual print location might be different, and the invention is not limited to the print position illustrated.

No one belt will serve all purposes. Thus, a variety of belts would normally be used to meet the variety of uses, depending upon the type and size envelope or other folded material being processed. One belt, however, can be used for handling several sizes of such material. Furthermore, by alteration of the slot design in the conveyor belt, examples of which are illustrated in FIGURE 6, the conveyor system can process envelopes and other folded pieces within a large range of sizes.

Thus, slot E illustrates a rectangular slot, which is particularly adaptable to process envelopes with varying flap positions in feed bin 2. Slot F is contoured similarly to most envelope flaps.

Flap G is contoured such that it will best hold an envelope flap that is reversed in position to that illustrated in FIGURE 7. That is, as the conveyor belt moves from top to bottom in FIGURE 6, flap G is designed to engage an envelope flap that is reversed in position in the horizontal plane 180°, with respect to the envelope and holding plate position illustrated in FIGURE 7. Thus, the fold of the envelope flap will rest against the side 36 for convey-

ance to the printing position. Obviously, other types of slots may be designed depending upon the particular type of materials being processed.

FIGURES 1 and 2 illustrate the the eject portion of my invention, in which the envelopes leaving printer 34 are automatically ejected into eject bin 80. Eject motor 52 drives pulley combinations 48-50, which in turn drive pulley combinations 46-46', 44-44', and 42-42' via shafts 52 and 54, in a clockwise direction. Conveyor belt 20 is traveling in a counterclockwise direction relative to the ejection apparatus. The speed of ejection motor 52 is set so that the speed of ejection belts 56 and 58 exceeds the relative speed of carrier belt 20 between shafts 54 and 55. Thus, flap 5 is accelerated out of slot 22 and the envelope is forced out of engagement with the conveyor belt. At the end of the ejection apparatus, the envelope is guided by baffle plates 90 and 92 into the eject bin 80.

Eject bin 80 is similar to feed bin 2 as illustrated in FIGURE 1. Envelopes are guided to the eject bin 40 via baffles 90 and 92, and are supported therein by plate 82. The spring 84 is of such strength that the continued discharge of envelopes or other folded material into the eject bin 80 forces the spring to expand thereby lowering feed plate 82 and making room for additional envelopes or other folded material to be deposited.

Rollers 94 and 96 and platen 98 rotatably support the conveyor belt, and are adjustable depending upon the type and location of the printer, and size of materials being printed.

Pin wheel 38 may comprise part of an electronic data-processing printing unit to drive the conveyor belt. Conveyor belt 20 defines apertures 60 and 60' along the outer periphery of the belt that fit the pin wheel teeth drive 39 of most electronic data-processing printing units. It is, of course, possible to use drive mechanisms from other sources for supplying motive force to the belt. As heretofore explained, various types and sizes of belts may be used. The belt may be made from a wide range of materials that are long-wearing, flexible, and strong. Also, a wide range of feed and eject bin sizes and belt widths may be employed to handle the various sizes of envelopes or other folded material being processed.

Having thus described my invention, I claim the following:

1. A method for automatically conveying a plurality of individual pieces of materials having a fold to a printer, comprising:

- A. feeding a stack of said individual pieces to a slotted moving conveyor belt;
- B. creating a suction force directly above the top piece of the stack with a vacuum device, forcing the fold of successive pieces into engagement with successive slots in the conveyor belt;
- C. conveying the engaged pieces to the printer via the conveyor belt.

2. The method as described in claim 1, further comprising:

- D. restricting upward movement of the pieces when under the suction force, preventing entrapment of the pieces within the vacuum device.

3. The method as described in claim 1, further comprising:

- E. translating the pieces from the printer to an eject position;
- F. disengaging the folds from the slots;
- G. feeding the pieces to an eject bin.

4. The method as described in claim 3, said disengaging step comprising:

- H. contacting the folds of the engaged pieces between the conveyor belt and an eject belt, oppositely rotat-

ing at a faster speed than the conveyor belt, thereby forcing the folds out of the slots and into the eject bin.

5. The method as described in claim 4, further comprising:

- I. guiding said pieces into the eject bin with baffles.

6. The method as described in claim 5, further comprising:

- J. restricting upward movement of the pieces when under the suction force, preventing entrapment of the pieces within the vacuum device.

7. A method for disengaging a series of flaps of folded material being carried on slots of a conveyor belt comprising:

- A. contacting the flaps being carried between an eject belt and the conveyor belt;
- B. rotating the eject belt at a faster speed and in a direction opposite to the conveyor belt, thereby discharging the flaps from the slots.

8. An apparatus for automatically conveying a plurality of folded materials to printer, which comprises:

- A. a conveyor belt defining a plurality of successive slots;
- B. a feed bin for feeding said materials consecutively to said conveyor belt, for engagement with said slots;
- C. a vacuum apparatus in operable relationship with said conveyor belt and said feed bin;
- D. drive means to translate said conveyor belt across said feed bin, whereby as said slots pass over said folded materials, the vacuum pulls the top one of said plurality of folded materials into engagement with one of said slots for conveyance to the printer.

9. The apparatus as described in claim 8, further comprising:

- E. an eject apparatus to discharge said folded materials from said conveyor belt;
- F. baffle means to guide said discharge materials to an eject bin.

10. The apparatus as described in claim 8 wherein said eject apparatus comprises at least one rotating eject belt, said eject belt being in operable relationship to said conveyor belt and rotating at a faster speed and in an opposite direction to said conveyor belt, whereby when the engaged folded materials pass between said conveyor belt and said eject belt, the folded material is disengaged from said slot.

11. The apparatus as described in claim 10, wherein baffles are provided to guide said disengaged folded materials to the eject bin.

12. The apparatus as described in claim 8, wherein a plate is mounted in said feed bin to support a stack of folded materials, and wherein spring means are attached to said plate and to the top of said feed bin to continually feed the materials to the conveyor belt, and stabilize the plate.

13. The apparatus as described in claim 8, wherein a restricting plate is attached to said vacuum apparatus to prevent the materials from being sucked into said vacuum apparatus.

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