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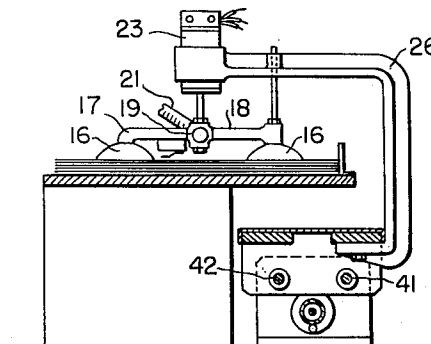
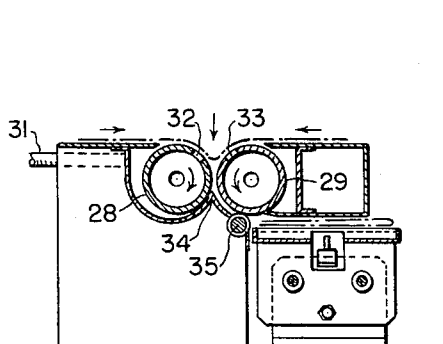
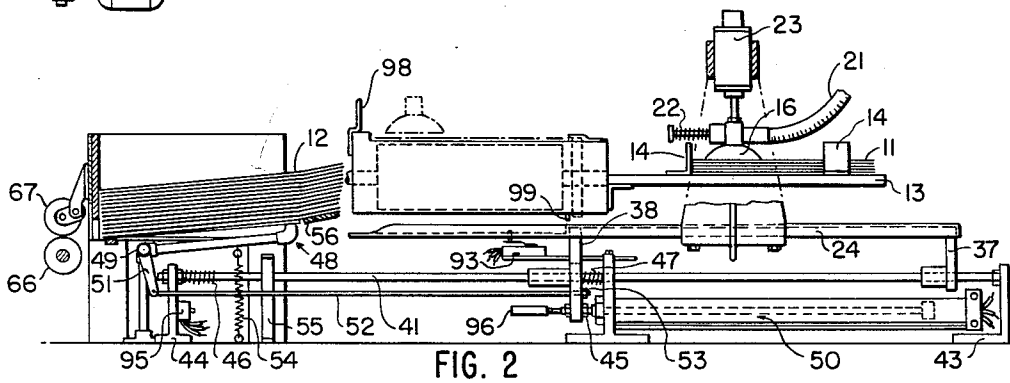
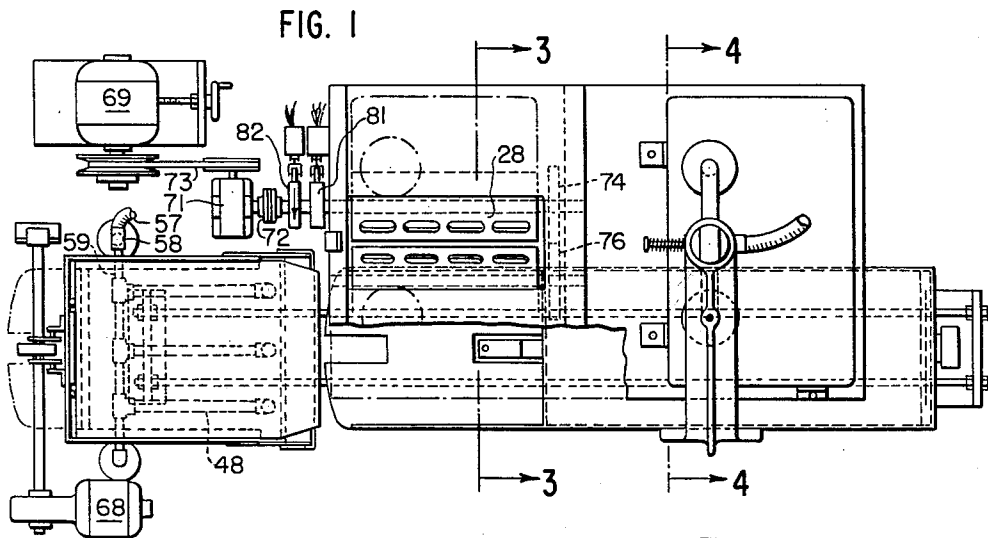
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3,131,519

INSERTING MACHINE FOR THE CONTENTS OF ENVELOPES

Filed Sept. 25, 1961

2 Sheets-Sheet 1



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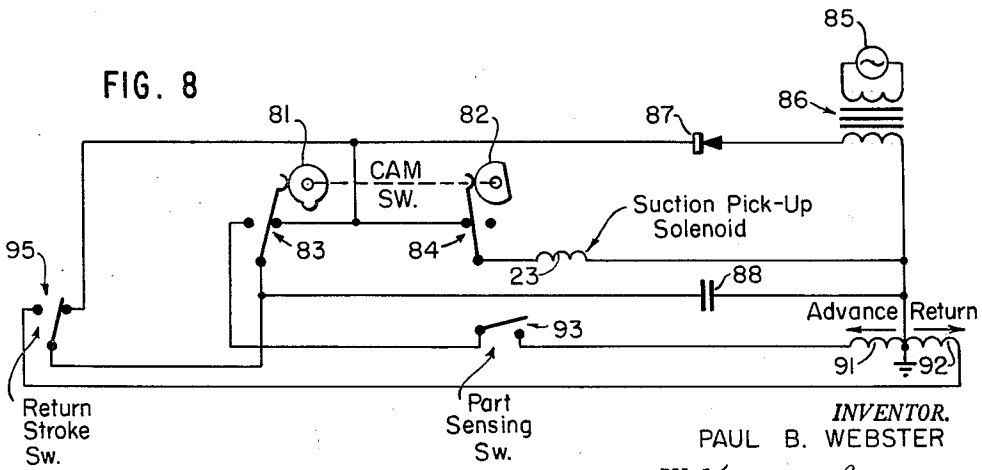
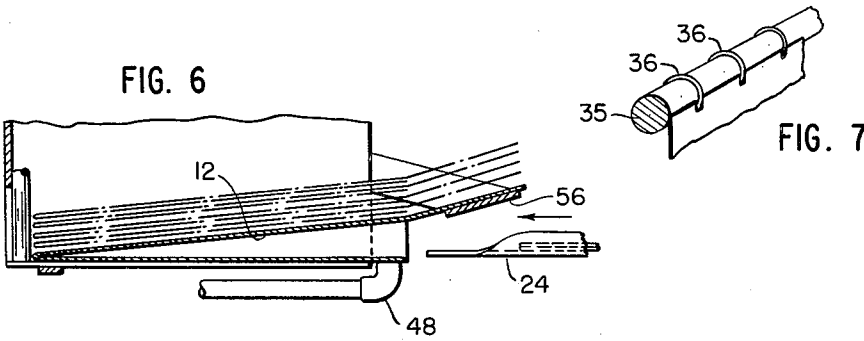
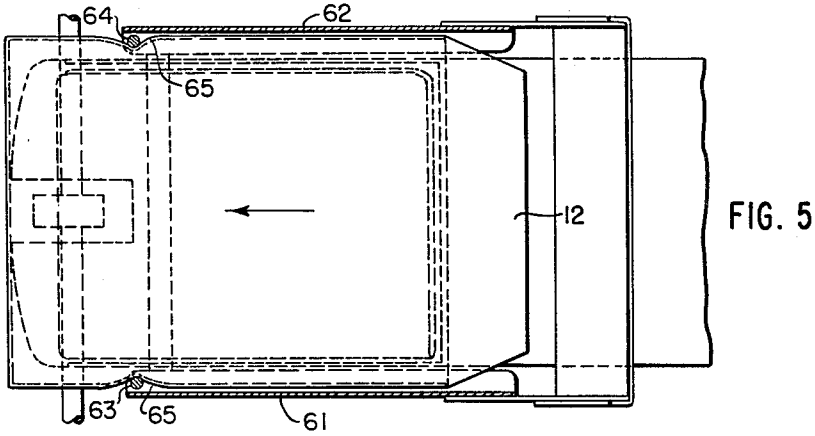
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INSERTING MACHINE FOR THE CONTENTS OF ENVELOPES

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2 Sheets-Sheet 2



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3,131,519

INSERTING MACHINE FOR THE CONTENTS OF ENVELOPES

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14 Claims. (Cl. 53-117)

This invention relates generally to inserting machines for the contents of envelopes and more particularly it is concerned with a machine for folding telephone book covers and placing them in mailing envelopes.

It is the general object of the invention to provide a labor-saving machine for folding certain kinds of mailable matter and inserting it into envelopes.

It is another object of the invention to provide a high-speed machine of the above-mentioned character.

Still another object is to design such a machine for unattended service.

A further object is to provide a machine for this service which is not unduly complex and is relatively inexpensive to manufacture.

The novel features of the invention together with further objects and advantages will become apparent from the following detailed description of a preferred embodiment and the drawing to which the description refers. In the drawing:

FIG. 1 is a plan view of the machine according to the present invention;

FIG. 2 is a side view in elevation of the machine;

FIG. 3 is a sectional view taken on line 3-3 of FIG. 1;

FIG. 4 is a sectional view taken on line 4-4 of FIG. 1;

FIG. 5 is an enlarged sectional view of the envelope-holding assembly incorporated in the machine;

FIG. 6 is a diagrammatic view illustrating the mode of operation of the envelope-holding assembly;

FIG. 7 is a perspective view of the feed roll for the folded covers; and

FIG. 8 is a schematic diagram of the electrical connections found in the machine according to the invention.

With reference first to FIGS. 1, 2, and 4, and particularly to FIG. 2, it will be observed that the numeral 12 has reference to a stack of envelopes, and the numeral 11 has reference to the covers to be folded and inserted into the envelopes. Preparatory to folding, the covers are loaded onto a shelf 13 where they are maintained in a stack by upstanding guides 14. Disposed above the stack is a pickup device featuring a pair of suction heads 16. Suction heads 16 are carried by connecting lines 17 and 18 which are joined at a point approximately midway between the heads by a coupling 19. A flexible hose 21 leading to a source of vacuum is coupled to the latter as is a by-pass valve which is actuated by a plunger 22. To raise and lower the suction heads, a solenoid actuator 23 is provided. The body of the actuator 23 is rigidly fastened to a carrier tray 24 by an arm 26, and the movable element or armature thereof is joined to the coupling 19.

Disposed above the tray 24 is a mechanism to fold the individual covers which are picked up one at a time by the suction heads 16. This mechanism includes a pair of hollow suction rolls 28 and 29 served by a vacuum line 31, and having surface openings 32 and 33 respectively, with which to grip a cover such as the one shown in FIG. 3 resting on top of the suction rolls and about to be drawn into the nip thereof. Projecting into the space between the rolls from below, is a guide element 34 which serves to direct partially folded covers to feed roll 35 which co-operates with the undersurface of the suction roll 29. As shown in FIG. 7, feed roll 35 is provided with a series of circumferential grooves to retain O rings

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36. By this means, the covers are effectively stripped from the suction roll 29 and deposited on the elevated rearward portion of the tray 24.

Tray 24 is adapted for reciprocatory movement in a horizontal plane, from left to right and right to left in FIG. 2, and to this end a pair of brackets 37, 38 are rigidly fastened thereto. Brackets 37, 38 are carried by guide rods 41, 42 which are rigidly supported between fixed brackets 43 and 44. A hydraulic actuator piston 45 attached to the brackets 38 moves the latter forwardly to the limit established by a bumper spring 46, and rearwardly into a position of engagement with a bumper spring 47, the position shown in FIG. 2. The hydraulic actuator itself is designated generally by the numeral 50.

Also during its return stroke, piston 45 serves to pivot an assembly of suction-gripping devices 48 into engagement with the lowermost envelope in the stack of envelopes toward the left of the machine. For this purpose, the gripping devices in the form of vacuum nozzles and associated connecting lines are pivotally mounted at 49 where an arm 51 is rigidly fastened to them. Arm 51, in turn, is pivotally connected to a rod 52 which is carried by bracket 38. That is to say, bracket 38 is provided with a clearance hole to receive the rod 52, and rod 52 has a nut 53 threaded onto its end remote from arm 51. As the piston retracts, bracket 38 is brought into engagement with the nut 53 causing the rod to move with the piston during the latter portion of its return travel. When the piston is in an advanced position, a restoring spring 54 pivots the gripping devices in the opposite direction to the limit defined by a stop 55. In this way, the underside of the lowermost envelope is effectively pulled down as shown in FIG. 6, while the opposite side is maintained in a fixed position by a retaining bar 56. The latter is disposed beneath the flap portion of the envelope which is integral with the side thereof away from the gripping devices. Vacuum is applied to the gripping devices by way of a flexible hose 57 and a rotary coupling 58 which connects the hose to a common supply line 59 (FIG. 1).

The holder assembly for the envelopes is shown more in detail in FIG. 5. From FIG. 5 it will be observed that the stack of envelopes 12 rests on parallel supports in the form of angle irons 61, 62 which are spaced apart a distance approximating the widths of the envelopes. Projecting vertically from the rearward corners of the supports are upstanding rods 63, 64. The spacing of the rods 63, 64 is slightly less than that of the sides of the supports such that horizontal movement of an envelope from the bottom of the stack entails appreciable deformation of the envelope as shown at 65. Finally, there are provided a pair of pickup rolls 66 and 67 to complete the one at a time withdrawal of the envelopes from the bottom of the stack once the covers have been placed in them. Roll 67 is an idler whereas roll 66 is driven by a motor 68 as shown in FIG. 1. FIG. 1 also shows the drive mechanism for rolls 28 and 29, namely a motor 69 and a gear box 71 having an output or drive shaft 72 coupled to roll 28. The motor and gear box are seen to be interconnected by a belt 73 while the roll 28 mounts a gear 74 in driving engagement with a similar gear 76 on the roll 29.

To actuate the piston 45 for reciprocating the carrier or tray, and also the solenoid 23 for the cover pickup operation, a pair of cams 81 and 82, respectively, are mounted on the drive shaft for the suction roll 28. As best shown in FIG. 8, cam 81 controls the operation of a switch 83 and cam 82 controls the operation of a switch 84. In its normal position, switch 84 is open. When closed, switch 84 couples solenoid 23 to an A.C. source 85 through a transformer 86 and a diode rectifier 87

which serve to energize the solenoid. When the switch 83 is in its normal position, as shown, a capacitor 88 is charged through the diode 87, while movement of the switch 83 away from its normal position discharges the capacitor and initiates the advance of the hydraulic actuator piston. That is to say, hydraulic actuator 50 includes solenoid valves to control its movement such as are found in various commercial actuator models and these elements are shown schematically in FIG. 8 as windings 91 and 92. Winding 91, which when energized causes the actuator piston to advance, is coupled to the capacitor through a switch 93 and the aforementioned switch 83, when the latter is caused to assume other than its normal position. Switch 93, as best shown in FIG. 2, is mounted beneath the forward portion of the tray for actuation by the weight of a cover 11 after it has been deposited on the tray 24 and moved from the rearward to the forward portion thereof. The winding 92, which when energized is adapted to cause the actuator piston to retract, is coupled to the capacitor 88 by a switch 95. As best shown in FIG. 2, switch 95 is mounted on the fixed bracket 44 for actuation by a plunger 96 on the end of the piston when the latter is fully advanced. In its normal position free of the plunger, switch 95 also serves to complete a circuit for charging the capacitor 88.

In operation, the uppermost cover in the stack, toward the right of the machine as shown in FIG. 2, is picked up by the suction heads 16 and caused to move forwardly towards the left when the tray 24 moves forwardly. As the tray reaches the limit of its forward movement, the cover which is moved to a position above the suction rolls 28, 29 is released due to the fact that the plunger 22 is actuated by a stop 98 which opens the vacuum line 21 to the atmosphere. As soon as the apertures in the suction rolls are presented to the cover, the same is drawn into the nip of the rolls and thereby folded. Thereafter, feed roll 35 operates to strip the cover from the suction roll 29 and deposit it upon the elevated rearward portion of the tray before the tray retracts.

When the tray does retract, a doctor 99 engages the cover and prevents its rearward movement with the tray. In this way, the cover is transferred to the forward portion of the tray and the switch 93 is actuated by its weight. Also, by means of the return motion of the piston, gripping nozzles 48 are caused to pivot into engagement with the underside of the lowermost envelope in the stack.

Actuation of switch 93 under the weight of the cover followed shortly by movement of cam switch 83 away from its normal position again causes the piston to advance. This frees rod 52 permitting nozzles 48 to pivot in a clockwise direction under the influence of spring 54. As the flap of the lowermost envelope is held in place by cross bar 56, pivotal movement of the nozzles carrying with them the underside of the lowermost envelope, effectively opens the envelope to admit the tray 24 with the cover thereon.

When the tray during its advance reaches the rear end of the envelope, the envelope is pushed by the tray out from under the stack into the nip of the pickup rolls 66 and 67. The rolls 66 and 67 serve to prevent return of the loaded envelope with the tray and to feed the envelope out of the machine towards the left of FIG. 2. Displacement of other than the loaded envelope from the stack is prevented by rods 63 and 64 which insure that deformation of the envelope, as can only be accomplished by direct engagement of the tray with the lowermost envelope in the stack, is required to move the envelopes horizontally. Also, withdrawal of an empty envelope from the stack is prevented by adjustment of the gripping force of the pickup rolls such that an empty envelope is too thin for the rolls to feed. Finally, actuation of the limit switch 95 by the plunger 96 on the end of the piston initiates return of the tray to the position shown.

Although the invention has been described in connection with a single preferred embodiment, it will be appre-

ciated that various modifications thereof within the spirit and scope of the invention are possible. Therefore the invention should not be deemed to be limited to the details of what has been described herein by way of illustration but rather it should be deemed to be limited only by the scope of the appended claims.

What is claimed is:

1. An inserting machine for the contents of envelopes comprising means to support a stack of envelopes, means to open successive envelopes in the stack, a carrier for the inserts to be placed in the envelopes, means to deposit a said insert on said carrier, means comprising a fluid actuator responsive to electrical signals to reciprocate said carrier between a first position free of the envelopes and a second position with said insert inside a said envelope having been opened, means to control the advance of said carrier from said first to said second position comprising a first electrical switch responsive to the weight of said insert on said carrier and circuit means to apply signals to said actuator under control of said first switch, means to control retraction of said carrier from said second to said first position in time sequence to the advance thereof from said first to said second position, and means to maintain said insert inside said envelope during retraction of said carrier.

2. An inserting machine for the contents of envelopes comprising means to support a stack of envelopes, means to open successive envelopes in the stack, a carrier for the inserts to be placed in the envelopes, means to deposit a said insert on said carrier, means to reciprocate said carrier between a first position free of the envelopes and a second position with said insert inside a said envelope having been opened, said opened envelope being pushed laterally of the stack of envelopes by the advance of said carrier, means to control the advance of said carrier from said first to said second position in response to the weight of said insert thereon, means to control retraction of said carrier from said second to said first position in time sequence to the advance thereof from said first to said second position, and means to maintain said insert inside said envelope during retraction of said carrier comprising a pair of pickup rolls to grip said envelope with said insert inside and to feed it in a direction opposite to the movement of said carrier when it retracts.

3. An inserting machine as claimed in claim 1 wherein said means to cause retraction of said carrier includes a second electrical switch responsive to the movement of said carrier into said second position, and circuit means to apply signals to said actuator under control of said second switch.

4. An inserting machine as claimed in claim 3 wherein said means to deposit said inserts upon said carrier includes a suction gripping device periodically to pick up and to release the inserts.

5. An inserting machine as claimed in claim 4 including means to enable said gripping device to pick up said inserts in a timed cycle, and means to disable said gripping device for release of said inserts in response to the movement of said carrier into said second position.

6. An inserting machine for the contents of envelopes comprising means to support a stack of envelopes, means to open successive envelopes in the stack, a carrier for the inserts to be placed in the envelopes, said carrier having a forward portion and a rearward portion, means to reciprocate said carrier between a first position free of the envelopes and a second position with said forward portion within a said envelope having been opened, means to deposit an insert on the rearward portion of said carrier when in said second position, means to control retraction of said carrier from said second to said first position in time sequence to the advance thereof from said first to said second position, means to transfer said insert from the rearward to the forward portion of said carrier when the same retracts, and means to control the advance of said carrier from said first to said second po-

sition in response to the transfer of said insert from said rearward to said forward portion thereof.

7. An inserting machine for the contents of envelopes comprising means to support a stack of envelopes, means to open successive envelopes in the stack, a carrier for the inserts to be placed in the envelopes, said carrier having a forward portion and a rearward portion which is elevated with respect to said forward portion, a fluid actuator including electrical signal responsive means to reciprocate said carrier between a first position free of the envelopes and a second position with said forward portion within a said envelope having been opened, means to deposit an insert upon the rearward portion of said carrier when the same is in said second position, a limit switch responsive to the movement of said carrier from said first to said second position, circuit means for producing electrical signals to cause retraction of said carrier from said second to said first position upon the actuation of said limit switch, means to transfer said insert from the rearward to the forward portion of said carrier when the same retracts, a sensor switch disposed beneath the forward portion of said carrier for actuation by the weight of said insert, and circuit means to develop electrical signals for controlling the advance of said carrier from said first to said second position in response to the actuation of said sensor switch.

8. An inserting machine according to claim 7 wherein said means to support said stack of envelopes includes a pair of support members disposed beneath the side edges of the lowermost envelope in the stack, and a cross member disposed beneath the flap of said lowermost envelope.

9. An inserting machine as claimed in claim 8 wherein said means to open successive envelopes in the stack includes a suction device for engagement with the undersurface of said lowermost envelope, and a mechanism operatively connected between said fluid actuator and said suction device to raise and lower the latter.

10. An inserting machine according to claim 7 wherein said envelope having been opened is pushed laterally of the stack by the advance of said carrier, and including a pair of pickup rolls to grip said envelope with said insert inside and feed it in a direction opposite to the movement of said carrier when it retracts.

11. An inserting machine for the contents of envelopes comprising means to support a stack of envelopes, means to open successive envelopes in the stack, a carrier for the inserts to be placed in the envelopes, said carrier having rearward and forward portions, means to reciprocate said carrier between a first position free of the envelopes and a second position with said forward portion within a said envelope having been opened, means to support a stack of inserts, means joined to said carrier to pick up the uppermost insert in the stack and to release the same when said carrier is in said second position, means disposed beneath said pickup and release means for said insert when said carrier is in said second position for folding of said insert and depositing it on the rearward portion of said carrier, means to maintain said insert in a horizontally fixed position when said carrier retracts so that the insert is transferred to the forward portion of said carrier, and means responsive to the transfer of said insert onto said forward portion to control the advance of said carrier.

12. An inserting machine as claimed in claim 11 wherein said means to pick up and release inserts includes at least one suction head, a linear actuator periodically to raise and lower said suction head, and means to disable said suction head for release of a said insert when said carrier is in said second position.

13. An inserting machine as claimed in claim 12 wherein said means for folding of said inserts comprises a pair of suction rolls to draw in said insert along the fold line to be made therein, a feed roll disposed adjacent the undersurface of one of said rolls to feed said insert onto the rearward portion of said carrier, and a guide to direct said insert into the nip between said feed roll and said one of the suction rolls.

14. An inserting machine as claimed in claim 13 wherein said feed roll is provided with a plurality of O-rings extending circumferentially of the surface thereof at axially spaced locations.

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