

July 13, 1965

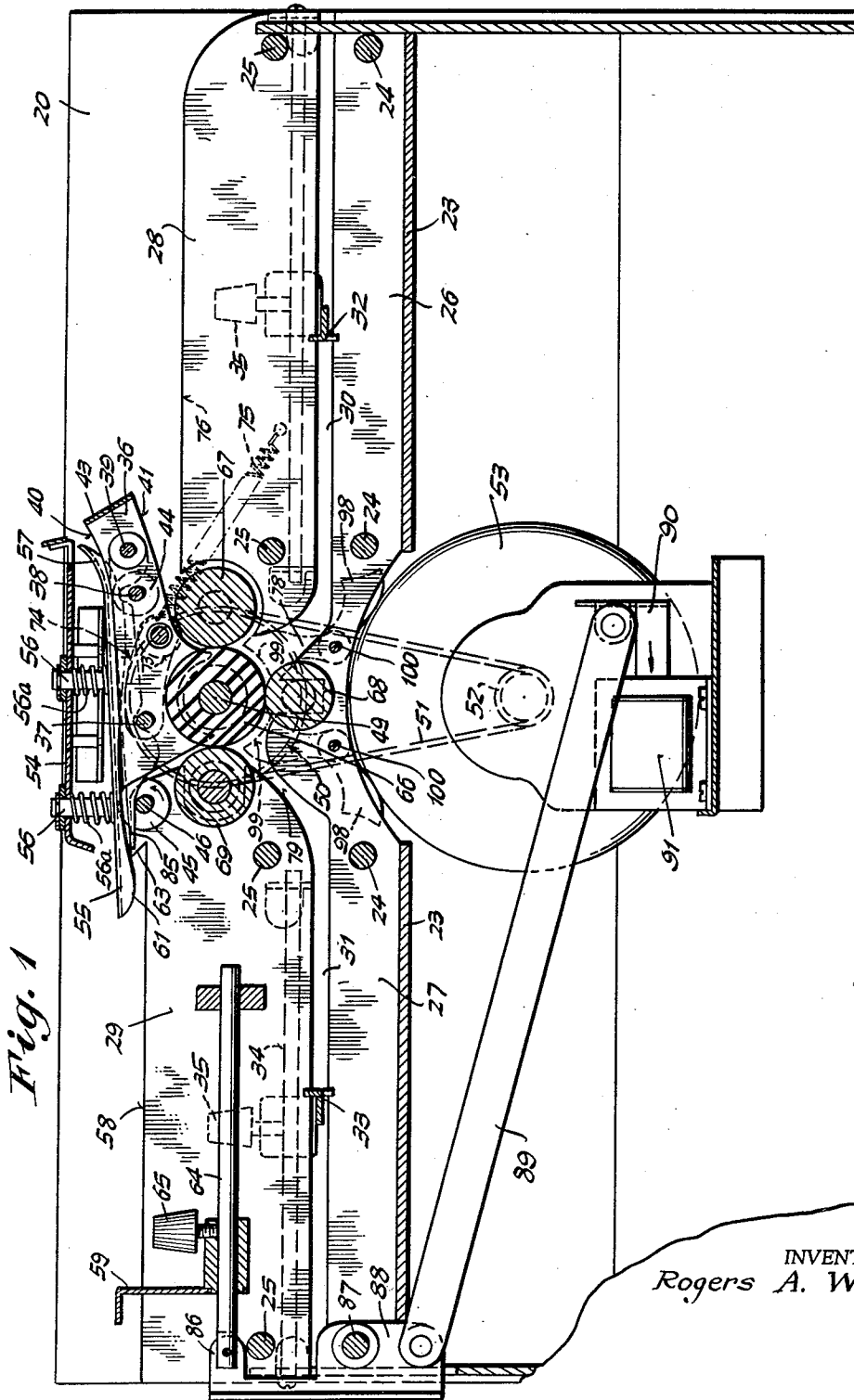
R. A. WELLS

3,193,983

FOLDER-INSERTER

Filed July 3, 1962

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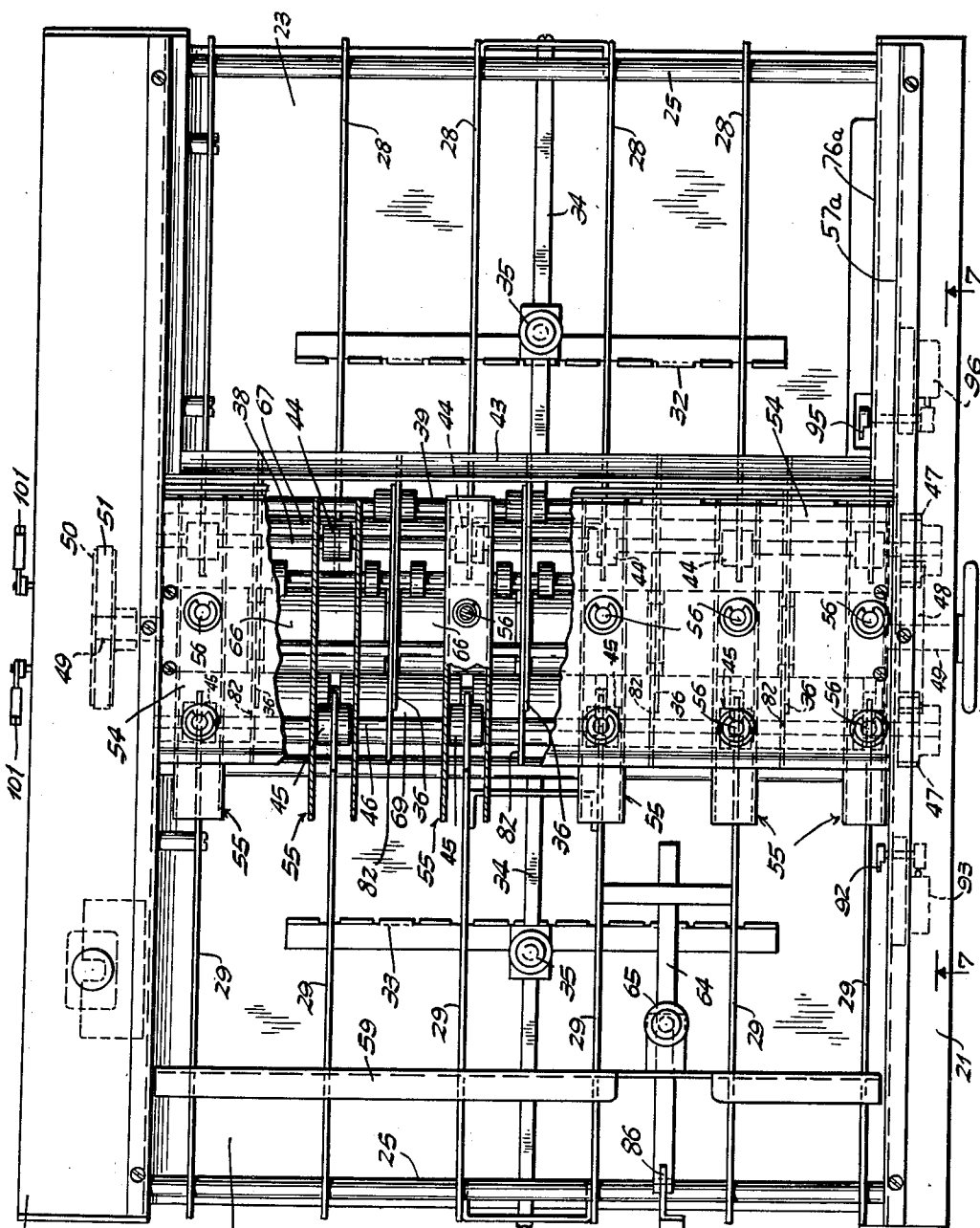


Fig. 2

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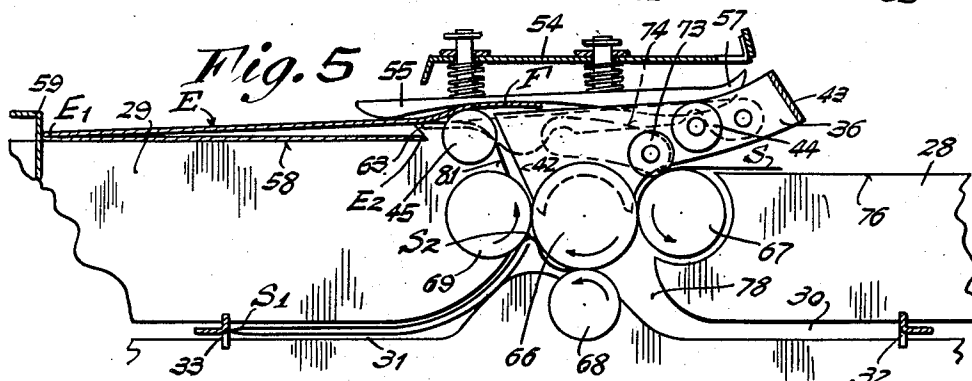
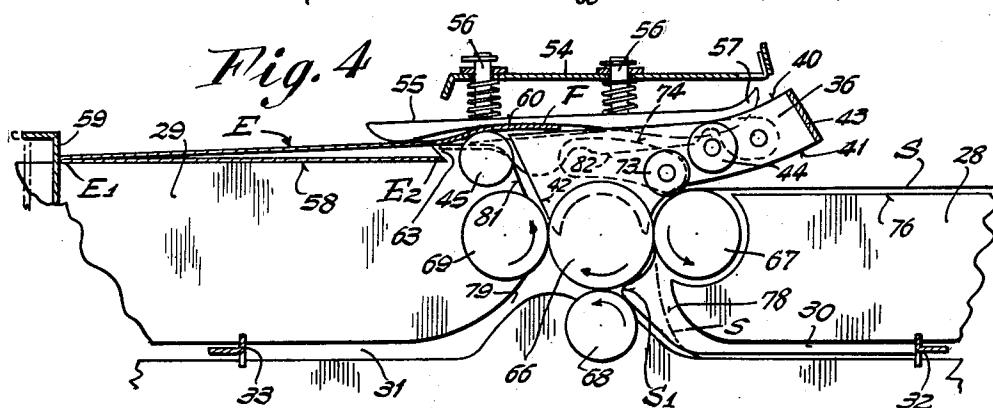
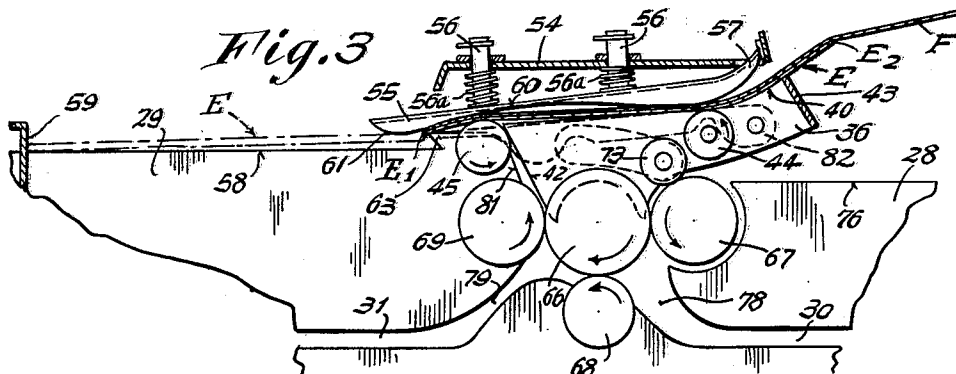
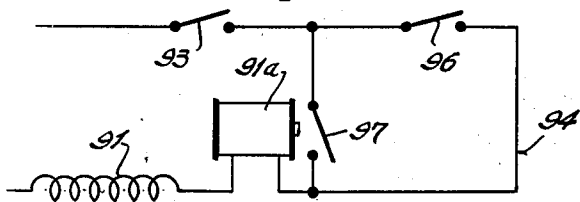


Fig. 12



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Fig. 6

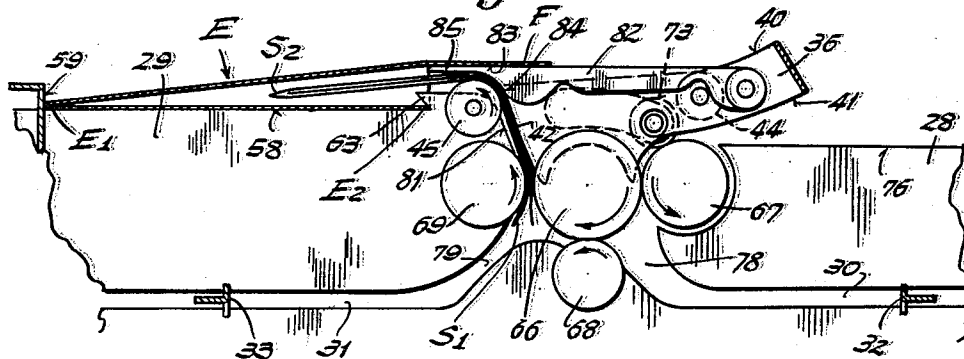


Fig. 7

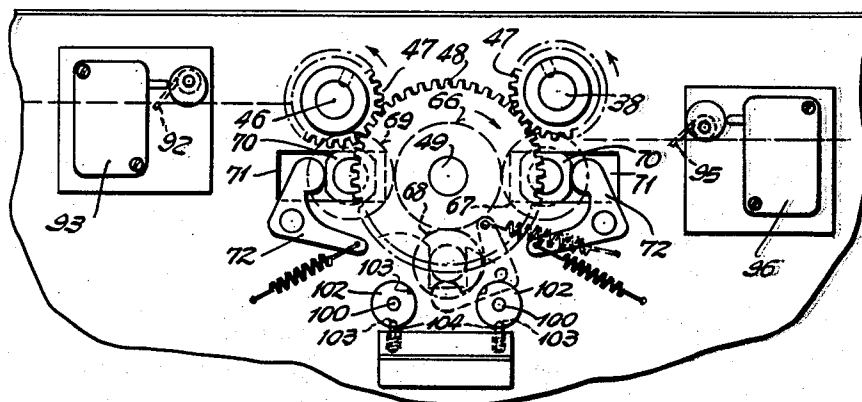


Fig. 8

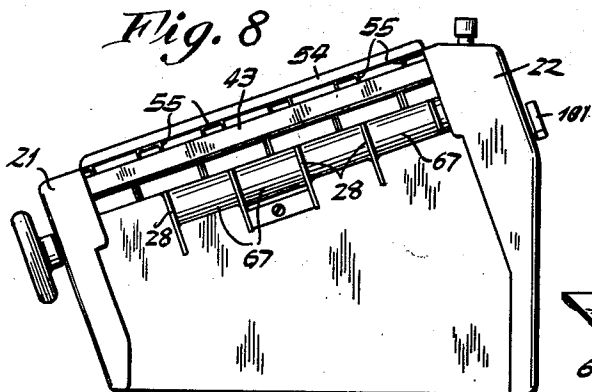


Fig. 9



Fig. 10



Fig. 11



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Filed July 3, 1962, Ser. No. 287,327

11 Claims. (Cl. 53-117)

This invention relates to the folding of sheets of paper and the inserting of them in envelopes.

An object of this invention is to provide a simple hand-fed machine suitable for use on a desk or table for instance, which is capable: of folding one or more sheets of paper and delivering the same folded; or of feeding an envelope to receiving position, folding one or more sheets of paper and inserting the same in the envelope; or, if desired, of feeding an envelope to receiving position and inserting therein one or more sheets of paper which have been folded elsewhere and/or one or more single ply pieces such as cards and the like which are fed into the envelope unfolded. Any of these variations in the operation of the machine are according to this invention under the immediate control of the user.

A feature of this invention is the provision of improved means for positioning the envelope preparatory to receiving the inserts so as to facilitate their easy and ready insertion and avoid jamming the machine by improper or insufficient control of the pieces—the envelope particularly. This is accomplished, as will more fully appear below, by providing means for initially feeding the envelope to a determinate position of rest and then, by retrograde movement thereof, spreading open the throat of the envelope and keeping it open until the inserting operations are completed and the envelope is manually removed from the machine.

Another feature of this invention is the provision of means for automatically controlling the operation of the means for applying to the envelope the retrograde throat-opening movement controlled by the sheet or card to be inserted being placed in feeding position, and by means operated when the insert reaches a predetermined position in its travel.

Another feature of this invention is the provision of envelope-controlling means whereby, when the envelope reaches its approximate insert-receiving position, the flap of the envelope is deflected away from the path of the paper or card to be inserted.

Other features and advantages will hereinafter appear.

In the drawings—

FIG. 1 is a longitudinal section of the machine of the present invention showing the parts in idle position.

FIG. 2 is a plan view partly in section of the top of the machine.

FIG. 3 is a diagrammatic view showing the manner in which the envelope to be opened and stuffed is fed to receiving position.

FIG. 4 is a similar view showing the envelope in receiving position and a sheet to be folded ready to have its first fold formed.

FIG. 5 is a view like FIG. 4 but shows the second fold about to be formed.

FIG. 6 is a similar view showing the throat of the envelope opened wide and the folded sheet partly inserted therein.

FIG. 7 is a view taken on line 7-7 of FIG. 2 of the front of the machine showing means for driving the feed rollers, switches for controlling the envelope-positioning means and the manually operated means for rendering the folding means inoperative, as when inserting a card or previously folded sheet.

FIG. 8 is a side view of the receiving side of the machine.

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FIG. 9 is a side view of the dilator for spreading the throat of the envelope.

FIG. 10 is a side view of one of the deflector plates.

FIG. 11 is a perspective view of one of the spring-operated presser plates engaged by the envelope in being positioned in the machine.

FIG. 12 is a diagram showing the solenoid for operating the envelope-opening means and the switches controlling the same.

As shown in the accompanying drawings, the machine of the present invention comprises a suitable framework 20 having a front plate 21 and back plate 22 (FIGS. 2 and 8) between which is supported a top plate 23 and fore-and-aft lower rods 24 and upper rods 25. The lower rods 24 carry a plurality of spaced edgewise positioned plates 26 and 27 while the upper rods 25 similarly carry plates 28 and 29, the upper edges of the plates 26 and 27 and the lower edges of the plates 28 and 29 forming between them respectively paper guiding chutes 30 and 31.

The effective lengths of the chutes 30 and 31 are controlled respectively by stop plates 32 and 33 adjustable on rods 34 and secured in adjusted position thereon by finger-operated clamping screws 35. Also forming guides for the inserts are deflector plates 36 (FIG. 10) which are mounted on shafts 37 and 38 and rod 39 which extend through holes 37a, 38a and 39a in the plates shown in FIG. 10. The upper edges 40 of the deflectors 36 act as guides for the envelope and the lower edges 41 and 42 act as guides for the inserts to be fed into the envelopes. A cross bar 43 connects the ends of the deflectors 36 at the introductory side thereof.

To feed the envelopes to insert-receiving position, there is provided a plurality of power driven rollers 44 secured to the shaft 38 and a plurality of power driven rollers 45 secured to a shaft 46. The shafts 38 and 46 also have secured to them gears 47 meshing with a common gear 48 secured to a shaft 49 having a pulley 50 connected by a belt 51 to a pulley 52 on a motor 53. When the motor is operated, the power driven rollers 44 and 45 rotate counterclockwise as viewed in FIGS. 1 and 7.

Supported on a fixed plate 54 also extending fore-and-aft of the machine is a plurality of spring-operated pressure plates 55 which are U-shape in cross section (see FIG. 11) and each of which straddles one pair of feed rollers 44 and 45. Each plate 55 has a pair of pins 56 extending upwardly through holes in the plate 54 and there are springs 56a between the latter and the pressure plates so as to yieldingly urge the pressure plates toward the feed rollers 44 and 45. Each pressure plate 55 has its right end 57 curved upwardly, ski fashion, away from the plane in which lies the edges 40 of the deflector plates 36.

To place an envelope E in position to receive the insert, its bottom closed edge E¹ is introduced between the sloping surfaces 57 of the pressure plates and the edges 40 of the deflector plates; the envelope being pushed forwardly manually with a side edge thereof in guided engagement with a guide surface 57a and with the flap F uppermost and extended.

The edge E¹ of the envelope being gripped by the feed roller 44, the envelope is advanced to the feed roller 45 and from the latter onto upper edges 58 of the plates 29 where it comes to rest, as shown in dotted lines in FIG. 3 against a stop plate 59.

During this operation, the envelope E is maintained in feeding engagement with the feed rollers 44 and 45 by the pressure plates 55 as shown in FIG. 3. In its position of rest, the body of the envelope has moved clear of the pressure roller 44 but the flap F is still located between the pressure plates 55 and the feed rollers 45.

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However, in this position, very little pressure is applied by the pressure plates to the single ply of the flap. The recess portions 60 also permit the end of the flap to spring up from the body of the envelope because of the pressure applied thereon by the ends 61 of the pressure plates.

It will be noted from FIG. 3 that the envelope is initially fed to a position where the edge E² thereof has been fed beyond an abutment 63 on the upper edge of each plate 29, the end stop 59 having been adjusted along a rod 64 to proper position according to the depth of the envelope being used. The stop 59 is locked in adjusted position by a finger-operated clamping screw 65.

To assure the adequate opening of the throat of the envelope so that the inserts will be received without possibility of jamming, the present invention provides for moving the envelope from its position shown in dotted lines in FIG. 3 to the position shown in FIG. 4 where the edge E² of the envelope engages the abutment 63. Due to the upwardly and outwardly sloping surface of each abutment 63, the edge E² of the envelope is cammed down against the upper surface of the plate 29 and is trapped against movement. This movement of the envelope is accomplished by means which will be pointed out below by moving the stop plate 59 to the right as shown in FIG. 4.

To feed and fold the sheets S, there is provided a plurality of main feed rollers 66 secured to the shaft 49 driven by the gear 48 and pressure rollers 67, 68 and 69 driven by frictional engagement with the feed rollers 66 or the material carried thereby. The rollers 67, 68 and 69 are mounted on bearings 70 located in slots 71 in the machine frame and engaged by a spring-operated bell crank 72 so that the rollers are normally pressed against the drive rollers 66. In addition, there is a plurality of auxiliary pressure rollers 73 at the introductory side of the machine mounted on arms 74 and urged toward engagement with the pressure rollers 67 by springs 75.

When a sheet S is to be folded, it is placed on the upper edges 76 of the plates 28 with one side edge thereof in guided engagement with a side guide 76a and is urged forwardly by hand into the bite of the rollers 67 and 73. The leading end of the sheet is guided into the bite of rollers 67 and 73 by the lower surfaces 41 of the deflector plates 36 and the upper surfaces 76 of the plates 28. The leading end of the sheet S is fed by the rollers 67 and 73 down into the mouth 78 of the buckle chute 30, as indicated in dotted lines in FIG. 4, until the leading end engages the stop 32 in the chute. The continued feeding of the sheet S causes it to buckle at S¹ and to go into the bite of the rollers 66 and 68 as it is about to do as shown in full lines in FIG. 4. This causes the sheet to be folded and in folded condition to move forwardly between the rollers 66 and 68 into the mouth 79 of the buckle chute 31, and this movement continues until the fold S¹ engages the end stop 33 of the chute 31, as shown in FIG. 5. This causes the sheet to buckle at S² as shown in FIG. 5 and to be drawn in along with the leading edge of the bite between the rollers 66 and 69 and from thence upwardly in the space between the edges 42 of the deflector plate and the edges 81 of the plates 29 until the fold S² encounters the driven rollers 45.

When the leading edge (the fold S²) engages the driven rollers 45, it also engages the edges of a plurality of pressure fingers 82 each of which has an upper surface 83 underlying the surface of the flap F and lower guide surfaces 84 which, as shown in FIG. 5, extend across the path of the fold S² which at that time is confined between the surfaces 42 of the deflector plates 36 and the surfaces 81 of the plates 29. Therefore, in order for the fold S² or the leading edge of whatever is being fed to continue to travel, it must raise the ends 85 of the fingers 82 and in so doing will dilate the throat of the envelope as shown in FIG. 6 against the downward pressure being applied by the pressure plates 55.

It will thus be seen that the insert, even after it passes

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out of the bite between the rollers 66 and 69, continues to be driven by the rollers 45, and since the machine operates rather rapidly the insert has acquired sufficient momentum by the time it leaves the driven rollers 45 to be thrust forward by its momentum until it comes to rest at or near the bottom of the envelope. After the insert has been injected into the envelope, the latter may be lifted off the plates 29 by hand, bottom end E¹ first, with a slight forward movement allowing the flap F to slide out from under the pressure plates 55, and the edge E² of the envelope to be released from the overhanging cam surfaces 63.

In the broader aspects of this invention, the retrograde movement of the envelope from the position of rest to position to receive the insert with the throat dilated may be performed by hand or in any suitable way. However, according to the embodiment of the present invention as disclosed herein, this operation is performed automatically under the control of the sheet to be folded or other insert.

For this purpose, the rod 64 on which the end stop 59 for the envelope is mounted is slidably mounted, its forward end being mounted on an arm 86 pivoted on a shaft 87 and having another arm 88 connected by a link 89 to an armature 90 of a solenoid 91. Operation of the solenoid in the direction of the arrow shown in FIG. 1 will cause the end stop 59 to move toward the folding and feeding mechanism and to move the envelope retrograde as described above to the position shown in FIG. 4.

For controlling the energization of the solenoid 91, the present invention provides a tripper 92 operating a switch 93 closing a gap in a circuit 94 (see FIG. 12) including the solenoid 91 and a source of current. The tripper 92 is engaged by the advancing edge E² of the envelope and is held in closed circuit position by the envelope so long as the envelope remains in position against the end stop 59. The closing of the switch 93 does not, however, energize the solenoid. This is accomplished by a tripper 95 which operates a switch 96 closing another gap in the circuit 94. This tripper is in position to be engaged by the leading edge of the insert and results in closing the circuit 94, energizing the solenoid 91 and a holding-coil 91a and operating the link 89 to move the end stop 59 and the envelope retrograde toward the feeding mechanism.

When the circuit is closed by the switch 96 and solenoid 91 is operated, the holding-coil 91a closes a switch 97 in a shunt circuit around the switch 96 and thus holds the circuit closed even after the trailing edge of the insert passes the tripper 95 and allows the switch 96 to open. The circuit remains closed and the end stop 59 remains in its operated position until the envelope is removed from the plates 29 allowing the tripper 92 to return to normal position, the switch 93 to open, and allowing the solenoid circuit, including the shunt circuit controlled by the switch 97, to open.

As stated above, the machine of the present invention may be used advantageously for inserting material which is brought to the machine in folded condition or which has a single ply such as a card which is not to be folded. In using the machine for this purpose, the envelope is fed in as described above and its throat opened but before the insert is introduced into the machine, two groups of deflector plates 98 are swung from the position shown in full and dotted lines in FIG. 1 to the dot-and-dash line positions shown in that figure, and which in such operative position present arcuate guide surfaces 99 to the advancing edge of the insert so that after passing the bite between the rollers 66 and 67 the insert will pass between the rollers 66 and 68 rather than entering into the buckle chute 30 and then will pass into the bite of the rollers 66 and 69 rather than entering into the mouth 79 of the buckle chute 31. After leaving the rollers 66 and 69, the single piece will engage the pressure fingers 82 causing the latter to be lifted to dilate

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the throat of the envelope and permit the single piece to be injected into the envelope by the pressure rollers 45. The deflector plates 98 are mounted on shafts 100 having finger-pieces 101 located on the exterior of the machine. The shafts 100 also have detent disks 102 (see FIG. 7) having notches 103 for engaging detents 104 holding the shafts and the deflector plates in either operative or inoperative positions.

It being noted (see FIG. 2) that the guide 57a for the envelopes and the tripper 92 for the switch 93 are offset from the guide 76a and the tripper 95 for the switch 96 for the pieces to be inserted and that the tripper 95 is spaced to the right of and below the path of movement of the envelopes, it is clear that only an envelope will operate the tripper 92 and only a piece to be inserted will operate the tripper 95. Also, the tripper 92 is maintained in tripped position by an envelope that has been fed to the position of rest, and the tripper 95 is only momentarily tripped by a piece to be inserted during feeding of the latter. As a consequence, both of the switches 93 and 96 will be closed to effect energization of the solenoid 91 and retrograde movement of the envelope end stop 59 only when a piece to be inserted is fed after an envelope has been fed. It follows that no retrograde movement of the end stop 59 occurs when it is desired merely to fold a sheet without inserting the folded sheet into an envelope. Of course, if a second piece is to be inserted into an envelope into which a first piece has already been inserted, the tripper 95 of the switch 96 will be operated by this second piece but this will have no effect because the solenoid remains energized through the holding coil 91a whether the switch 96 is again closed or not.

If it is desired to provide but one fold in the insert, only the right-hand deflector plate 98 is placed in position so that the leading edge of the insert will bypass the throat 78 of the buckle chute 30 and pass directly into the buckle chute 31 until it stops. Continued feeding of the insert causes the sheet to buckle as at S² in FIG. 5 to fold the sheet in half.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

What is claimed is:

1. A machine of the character described comprising: forward feeding means for feeding an envelope in one direction along a feed path to a predetermined position of rest, the envelope closed edge being foremost and the flap uppermost;
means for advancing insert material from a receiving position to a delivering position in which the material is injected into the throat of the envelope;
reverse feeding means for moving said envelope in an opposite direction along said path to an insert-receiving position from said position of rest prior to injection of said insert material into the throat of the envelope;
and means engaged by the envelope in moving to said insert-receiving position for maintaining the lower edge of the throat of the envelope in depressed position out of the path of the advancing insert material.
2. A machine of the character described comprising: means for feeding an envelope closed edge foremost with the flap uppermost to a predetermined position of rest;
means for advancing insert material from a receiving position to a delivering position in which the material is injected into the throat of the envelope;
means for moving the envelope retrograde closed edge trailing to an insert-receiving position from said position of rest prior to injection of said insert material into the throat of the envelope;
stationary camming means engaged by the envelope in moving to said insert-receiving position for maintaining the lower edge of the throat of the envelope

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in depressed position out of the path of the advancing insert material;
and means for holding the flap of the envelope spaced from the flap-free edge thereof.

3. A machine of the character described comprising: means for feeding an envelope closed edge foremost with the flap uppermost to a predetermined position of rest;

means for advancing insert material from a receiving position to a delivering position in which the material is injected into the throat of the envelope;
means for moving the envelope closed edge trailing to an insert-receiving position from said position of rest;

cam means engaged by the envelope in moving to said insert-receiving position for maintaining the lower edge of the throat of the envelope in depressed position out of the path of the advancing insert material;

and means operated by the advancing insert material and extending into the envelope for raising the flap and the flap-carrying edge of the envelope to dilate the throat thereof preparatory to receiving the insert material.

4. A machine of the character described comprising: means for feeding an envelope closed edge foremost with the flap uppermost to a predetermined position of rest;

means for advancing insert material from a receiving position to a delivering position in which the material is injected into the throat of the envelope;
means operable for moving the envelope closed edge trailing to an insert-receiving position from said position of rest;

a switch closed by the envelope in reaching said position of rest;

another switch closed by the advancing insert material;

actuating mechanism for operating said last-named means when both of said switches are closed;

and stationary camming engaged by the envelope in moving to said insert-receiving position for maintaining the lower edge of the throat of the envelope in depressed position out of the path of the advancing insert material.

5. A machine of the character described comprising: means for feeding an envelope closed edge foremost with the flap uppermost to a predetermined position of rest;

means for advancing insert material from a receiving position to a delivering position in which the material is injected into the throat of the envelope;

a switch closed by the envelope in reaching said position of rest;

another switch closed by the advancing insert material;
means operable when energized for moving the envelope closed edge trailing to an insert-receiving position from said position of rest when both of said switches are closed;

a holding switch closed by operation of said last-named means to keep the circuit closed until the envelope is removed from said insert-receiving position;
and means engaged by the envelope in moving to said insert-receiving position for maintaining the lower edge of the throat of the envelope in depressed position out of the path of advancing insert material.

6. A machine of the character described comprising: means for feeding an envelope closed edge foremost with the flap uppermost to a predetermined position of rest;

means, including mechanism for producing at least one transverse fold in the insert material, for advancing insert material from a receiving position to a delivering position in which the material is injected into the throat of the envelope;

means for moving the envelope closed edge trailing to an insert-receiving position from said position of rest; and stationary camming means engaged by the envelope in moving to said insert-receiving position for maintaining the lower edge of the throat of the envelope in depressed position out of the path of the advancing insert material.

7. A machine of the character described comprising: means for feeding an envelope closed edge foremost with the flap uppermost to a predetermined position of rest;

means for advancing insert material from a receiving position to a delivering position in which the material is injected into the envelope;

means actuated by movement of the insert material toward said delivering position for engaging the closed edge of the envelope and moving the latter closed edge trailing to an insert-receiving position from said position of rest;

and means engaged by the envelope in moving to said insert-receiving position for maintaining the lower edge of the throat of the envelope in depressed position out of the path of the advancing insert material.

8. A machine of the character described comprising: means for feeding an envelope closed edge foremost with the flap uppermost to a predetermined position of rest;

means for advancing insert material from a receiving position to a delivering position in which the material is injected into the envelope;

pusher means actuated by the combination of the movement of the insert material toward said delivering position and the movement of the envelope to said position of rest for engaging the closed edge of the envelope and moving the latter closed edge trailing to an insert-receiving position from said position of rest;

and means engaged by the envelope in moving to said insert-receiving position for maintaining the lower edge of the throat of the envelope in depressed position out of the path of the advancing insert material, said pusher means being rendered inoperative upon removal of an envelope from insert-receiving position.

9. A machine of the character described comprising: power-driven pressure rollers;

pressure plates cooperating with said pressure rollers for feeding an envelope to a position of rest with its flap open and uppermost;

supporting means receiving and holding the envelope in said position of rest;

reverse feeding means engageable with the closed bottom edge of the envelope for moving said envelope closed edge trailing from said position of rest to an insert-receiving position;

cam means engaged by the flap-free edge of the throat of the envelope during that movement of said envelope produced by the operation of said reverse feed-

ing means whereby said flap-free edge is cammed downwardly;

and finger means extending into said envelope and movable to cam the flap-carrying edge of the envelope upwardly to dilate the throat of the envelope preparatory to the insertion of material therein.

10. A machine of the character described comprising: power-driven pressure rollers;

pressure plates cooperating with said pressure rollers for feeding an envelope from a first position to a position of rest with its flap open and uppermost; supporting means receiving and holding the envelope in said position of rest;

means engageable with the bottom edge of the envelope for moving the latter from its position of rest to an insert receiving position;

cam means engaged by the flap-free edge of the throat of the envelope in moving to said insert receiving position whereby said flap-free edge is held depressed; finger means extending into said envelope when said envelope is in said insert receiving position and movable to raise the flap-carrying edge of the envelope to dilate the throat of the envelope preparatory to the insertion of material therein;

and means operated by the leading edge of the insert material for displacing said finger means so as to thereby further dilate the throat of said envelope.

11. A machine of the character described comprising: means for feeding an envelope closed edge foremost with the flap uppermost to a predetermined position of rest;

means for advancing insert material from a receiving position to a delivering position in which the material is injected into the throat of the envelope;

reverse feeding means for moving the envelope closed edge trailing to an insert-receiving position from said position of rest prior to injection of said insert material into the throat of the envelope;

stationary cam means engaged by the envelope in moving to said insert-receiving position for maintaining the lower edge of the throat of the envelope in depressed position out of the path of the advancing insert material;

and movably mounted finger means operated by the leading edge of the material to be inserted in said envelope for engaging the flap-carrying edge of the envelope and raising it to dilate the throat of the envelope for the reception of the material to be inserted.

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