Sept. 18, 1951 V. E. HEYWOOD 2,568,629

FLAP GUMMING AND FOLDING MECHANISM FOR ENVELOPE MACHINES

Filed July 13, 1948 5 Sheets-Sheet 1

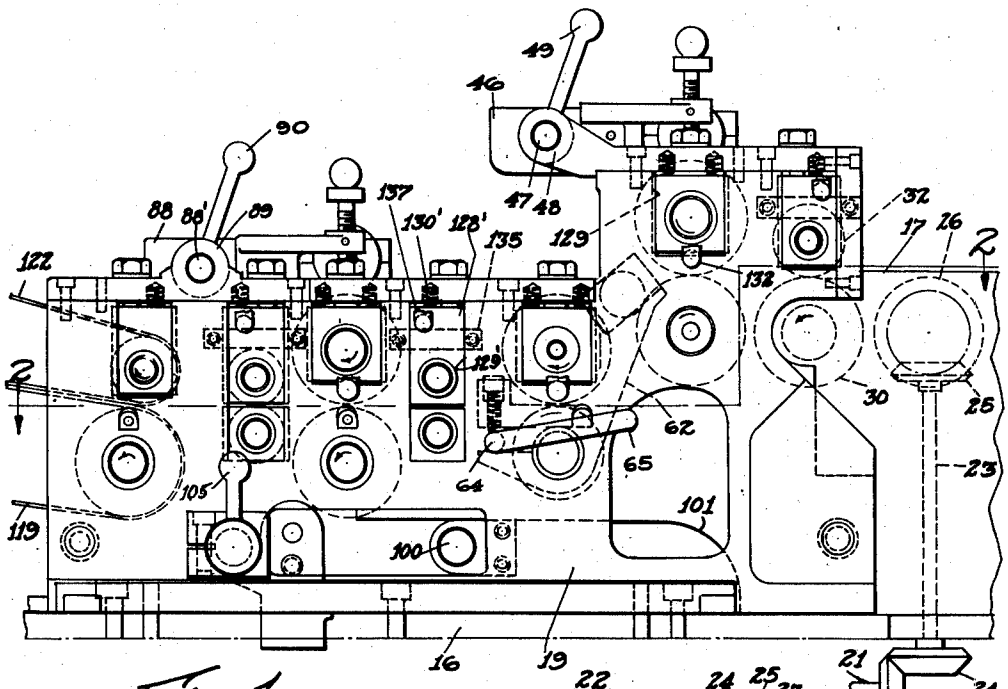


Fig. 1.

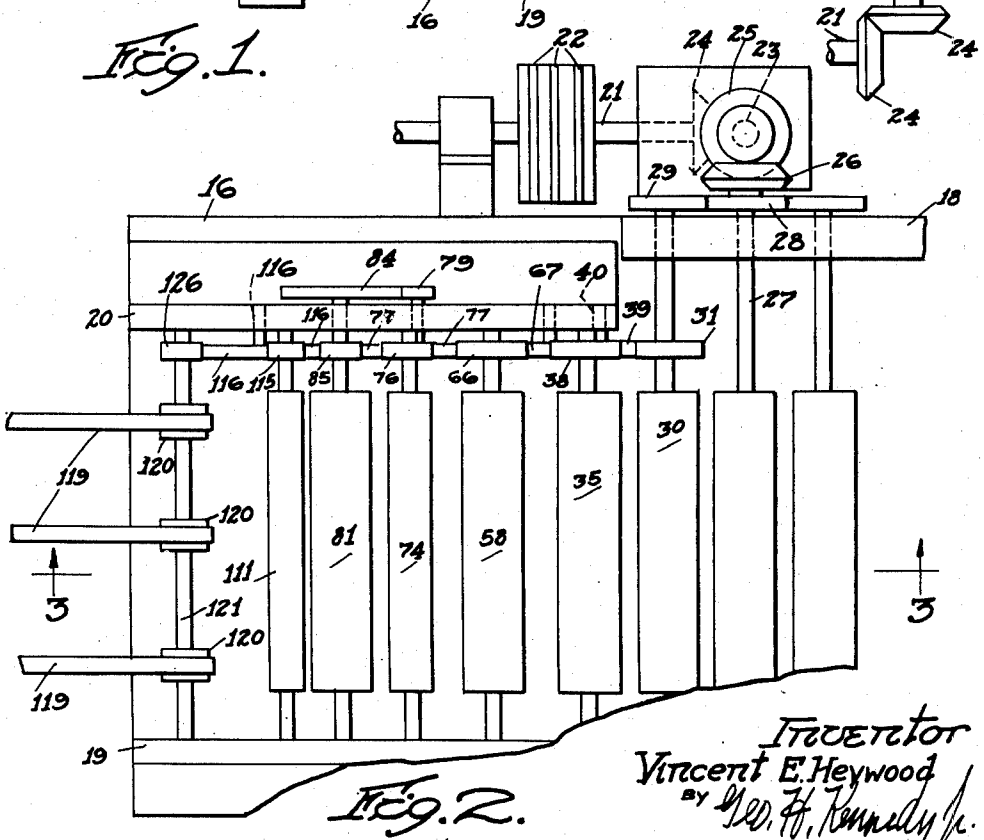


Fig. 2.

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Filed July 13, 1948 5 Sheets-Sheet 2

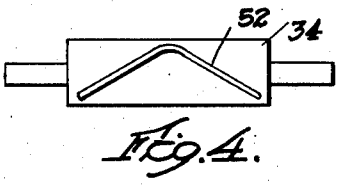


Fig. 4.

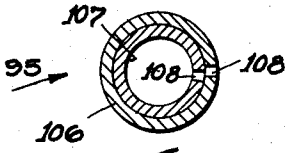


Fig. 6.

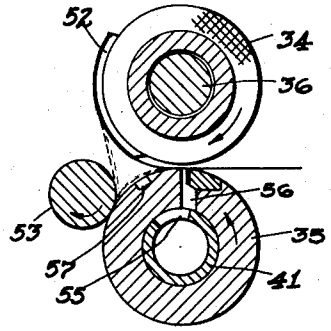


Fig. 5.

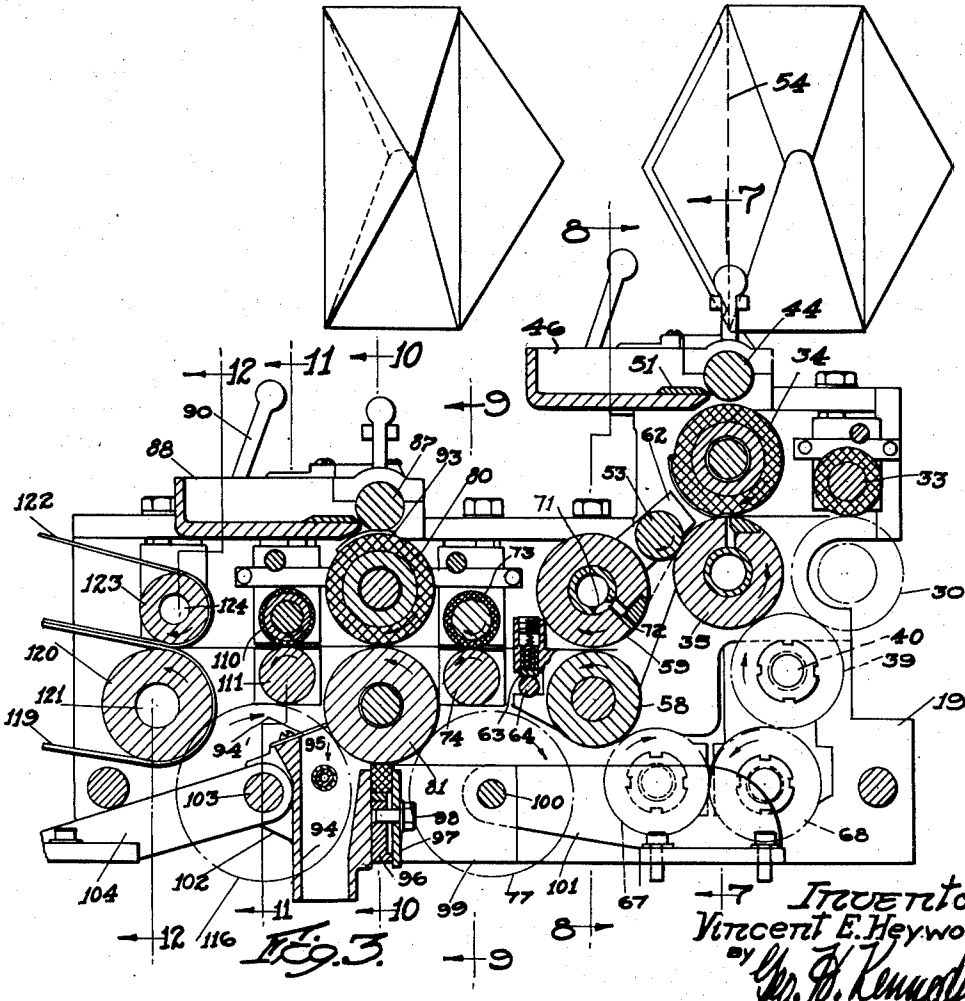


Fig. 3.

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FLAP GUMMING AND FOLDING MECHANISM FOR ENVELOPE MACHINES

Filed July 13, 1948 5 Sheets-Sheet 3

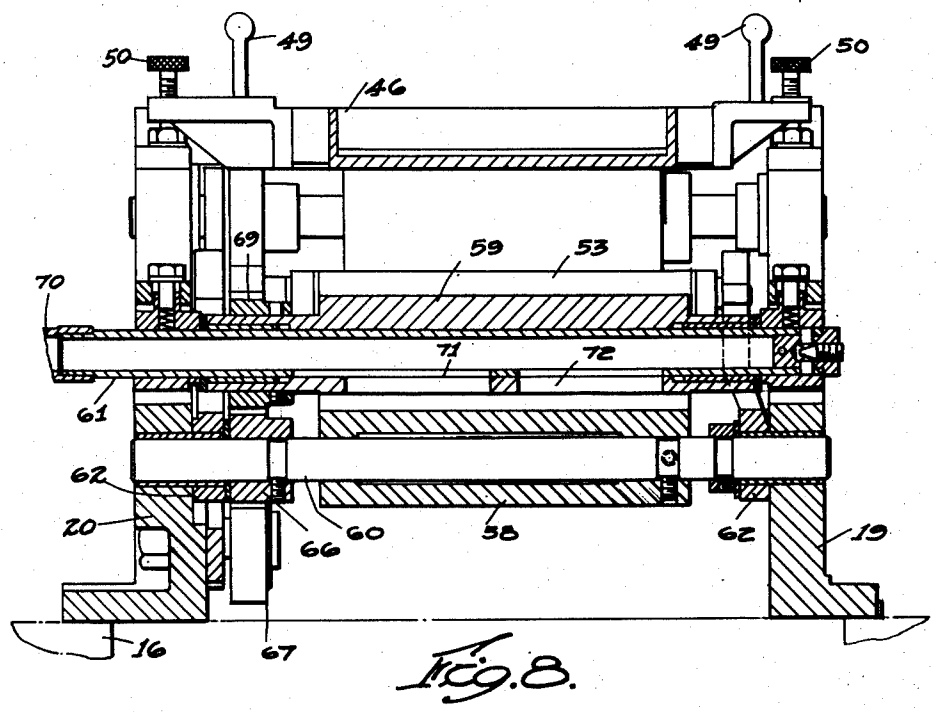


Fig. 8.

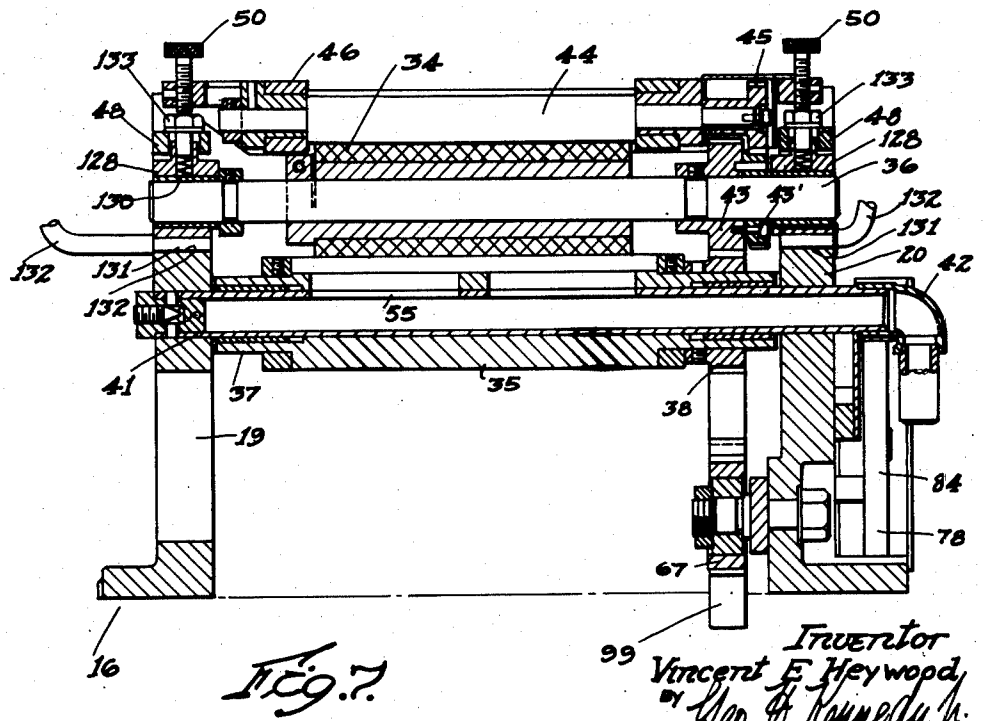


Fig. 7.

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FLAP GUMMING AND FOLDING MECHANISM FOR ENVELOPE MACHINES

Filed July 13, 1948 5 Sheets-Sheet 4

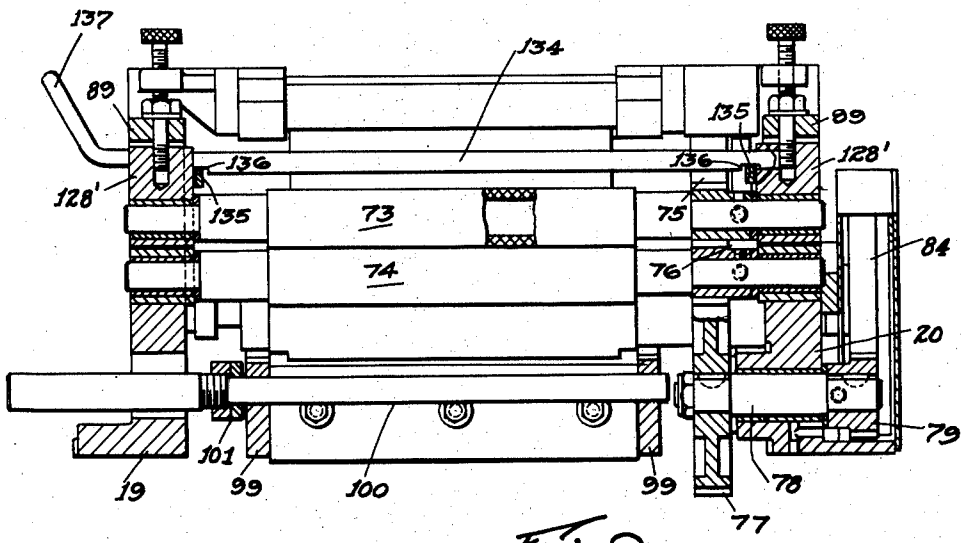


Fig. 9.

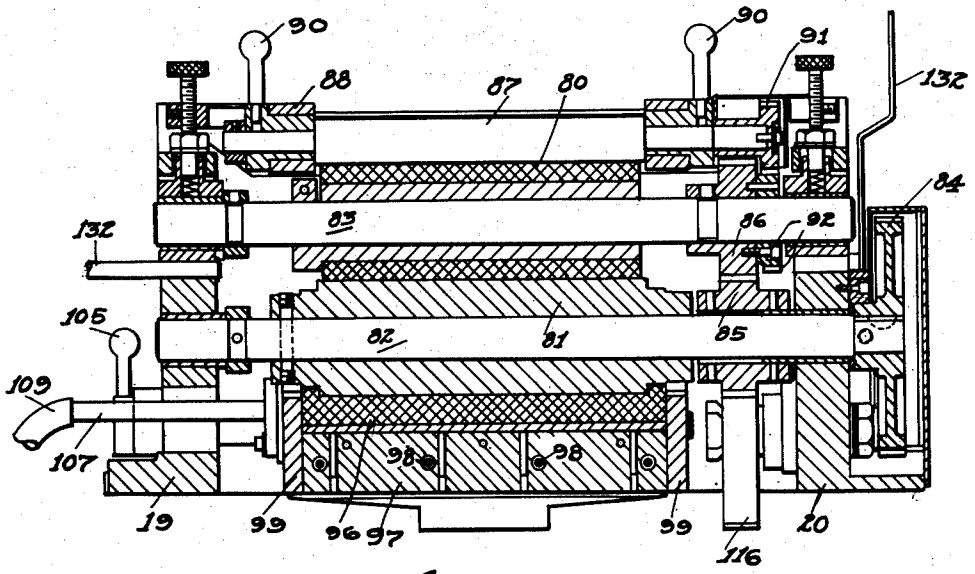


Fig. 10.

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FLAP GUMMING AND FOLDING MECHANISM FOR ENVELOPE MACHINES

Filed July 13, 1948 5 Sheets-Sheet 5

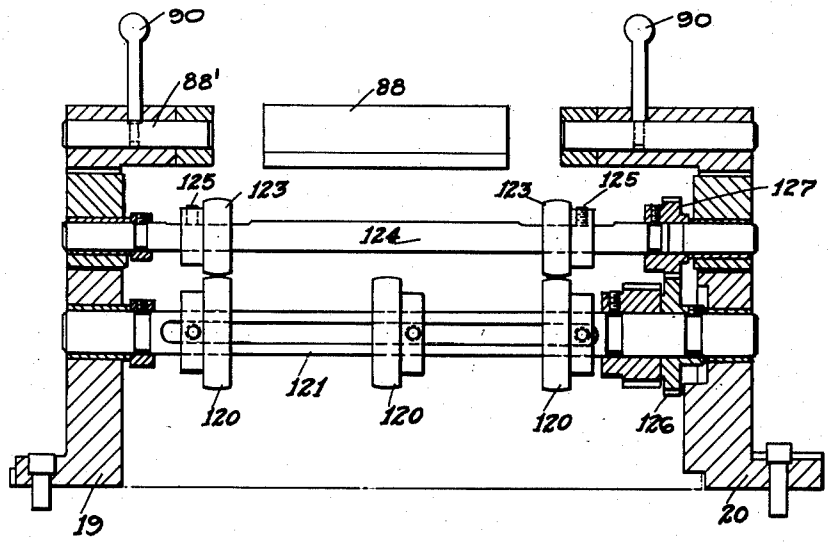


Fig. 12.

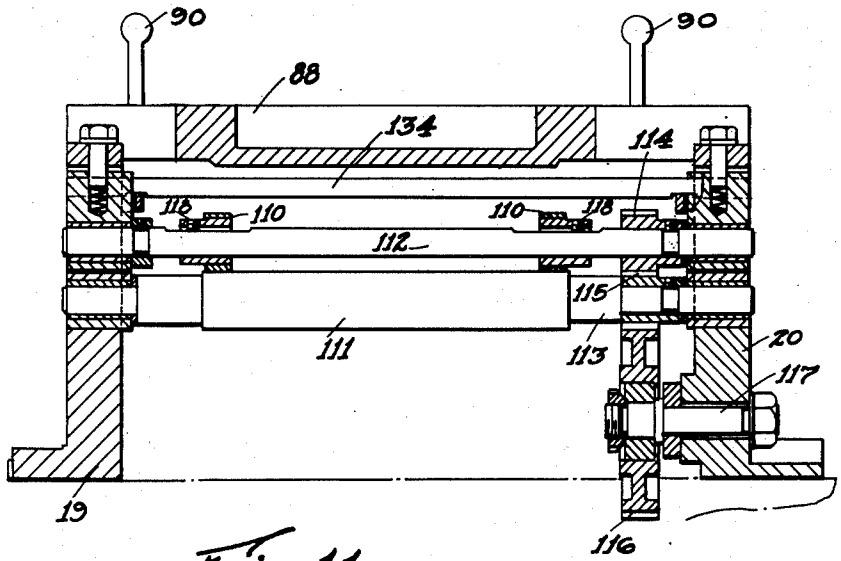


Fig. 11.

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2,568,629

UNITED STATES PATENT OFFICE

2,568,629

FLAP GUMMING AND FOLDING MECHANISM FOR ENVELOPE MACHINES

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Application July 13, 1948, Serial No. 38,494

3 Claims. (Cl. 93—62)

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The present invention relates to envelope machines and more particularly to such machines of the rotary type wherein the operations involved in the forming of envelopes are performed in a continuous manner by the passage of the material from end-to-end of the machine in rolling contact with the various instrumentalities thereof.

More specifically, the mechanism of the present invention is concerned with the gumming of the bottom and seal flap portions of each envelope blank, as well as the folding down of the bottom flap, to form the usual seams with the infolded side flaps. The present mechanism may with advantage be used in conjunction with envelope blank-forming mechanism of the type disclosed in my copending application Serial No. 36,776, filed July 2, 1948, Envelope Machine, which produces ungummed envelope blanks from a web; regardless of how said blanks are produced, they are forwarded successively to the present mechanism with their side flaps folded toward each other and with their bottom and seal flaps extended and unscored. After passing through the mechanism comprising the present invention, the glued and partly folded blanks may be delivered to other mechanism of the type disclosed in my copending application Serial No. 21,673, filed April 17, 1948, Drier Mechanism for Envelope Machines, in order to dry the seal flap gum, and then are delivered to still other mechanism of the type disclosed in my copending application Serial No. 38,495, filed July 13, 1948, Envelope Folding and Stacking Machine, for folding the seal flaps down over the envelope bodies, and finally stacking the envelopes on edge, upside down.

A primary object of the present invention is to provide an envelope machine of the rotary type with simplified flap gumming and folding means which is capable of efficient high-speed operation.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings,

Fig. 1 represents a partial side view of an envelope machine in which the present invention is incorporated.

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Fig. 2 represents, on a reduced scale, a sectional view taken substantially along the line 2—2 of Fig. 1.

Fig. 3 represents a sectional view taken substantially along the line 3—3 of Fig. 2 and showing also schematically in plan the gluing and folding operations performed on a pair of successive blanks.

Fig. 4 represents a side elevation view of one of the envelope gumming rolls employed in the present invention.

Fig. 5 represents, on an enlarged scale, a vertical sectional view taken through an opposed pair of gumming and suction rolls which are disclosed in Fig. 3.

Fig. 6 represents, on an enlarged scale, a vertical sectional view through a pair of concentrically arranged spray tubes which are disclosed in Fig. 3.

Fig. 7 represents a vertical sectional view taken substantially along the line 7—7 of Fig. 3.

Fig. 8 represents a vertical sectional view taken substantially along the line 8—8 of Fig. 3.

Fig. 9 represents a vertical sectional view taken substantially along the line 9—9 of Fig. 3.

Fig. 10 represents a vertical sectional view taken substantially along the line 10—10 of Fig. 3.

Fig. 11 represents a vertical sectional view taken substantially along the line 11—11 of Fig. 3.

Fig. 12 represents a vertical sectional view taken substantially along the line 12—12 of Fig. 3.

The present invention is concerned with the gumming of the bottom and seal flap portions of successive envelope blanks, as well as with the folding and sticking down of their bottom flaps, and accordingly, the mechanism for performing other operations on the envelope blanks, such as notching, side flap folding, and seal flap folding, are not illustrated. It will be understood, however, that the illustrated mechanism desirably forms a part of a complete machine, which includes means for performing these other additional steps, together with means for cutting the blanks from a continuously moving web, and advancing the blanks in a spaced relation relative to one another, in a definitely timed relation. More specifically, the present mechanism is adapted to receive successive envelope blanks each with the side flap portions thereof folded over, and with the bottom and seal flap portions extended and ungummed, as shown schematically in plan at the right in Fig. 3.

Referring particularly to Figs. 1, 2, and 7, the

present mechanism includes a table top 16 upon which is mounted a pair of spaced apart vertically disposed brackets 17 and 18 between which the envelope side flap folding mechanism is mounted. As noted hereinabove, the side flap folding mechanism forms no part of the present invention and thus, it is not illustrated herein. However, it is contemplated that the side flap folding means used in conjunction with the present invention may be of the type illustrated in the United States Patent No. 1,855,842 of Novick, issued April 26, 1932. Also mounted upon the table 16 are a pair of spaced brackets 19 and 20 between which the mechanism comprising the present invention is mounted.

Referring now particularly to Figs. 1 and 2, the present mechanism is adapted to be driven by an electric motor (not herein shown) which is connected to a drive shaft 21 by means of a plurality of V-belts 22, 22. The main shaft 21 is operably connected with a vertically disposed jackshaft 23 by means of intermeshing bevel gears 24, 24. The upper end of the jackshaft 23 carries a bevel gear 25 which meshes with a corresponding gear 26 mounted upon the distal end of a horizontally disposed shaft 27 which is journalled within the spaced brackets 17 and 18 and forms a part of the side flap folding mechanism.

It is to be particularly noted that the distal end portion of the shaft 27 carries a gear 28 which meshes with a similar gear 29 carried upon the distal end of a forwarding role 30 which forms a part of the present mechanism, and which is journalled between the brackets 17 and 18. As may be particularly seen in Figs. 1, 2, and 3, the forwarding roll 30 carries intermediate its end portions a gear 31 which meshes with a gear 32 carried upon an upper forwarding roll 33 which cooperates with the lower roll 30 in the forwarding of successive envelope blanks from the side flap folding mechanism to the present mechanism. The above noted driving mechanism is designed to rotate in a direction such that the lower feeding roll 30 will be driven in a counterclockwise direction, as viewed in Fig 3. It will be particularly noted that the upper feeding roll 33 is journalled between projecting portions of the brackets 19 and 20 which overhang the brackets 17 and 18 in a manner particularly disclosed in Figs. 1 and 3.

It is the function of the cooperating upper and lower forwarding rolls 33 and 30 to deliver each envelope blank between the bite of rolls 34 and 35 which comprise a bottom flap gumming roll and a suction roll, respectively. Referring particularly to Figs. 2, 3, and 7, it is to be noted that the rolls 34 and 35 are mounted upon a pair of vertically spaced shafts 36 and 37, respectively, which are journalled between the brackets 19 and 20. The suction roll 35 has a gear 38 mounted upon its shaft 37, and this gear meshes directly with an idler gear 39 journalled upon a stub shaft 40 which is carried directly by the bracket 20. Referring particularly to Fig. 3, it is to be seen that gear 39 is driven by gear 31 which is carried by the above noted forwarding roll 30. Thus, the suction roll 35 is positively driven in synchronism with the forwarding roll 30 at all times.

Still referring to Fig. 7, the suction roll shaft 37 is hollow and is journalled upon a hollow stationary tube 41 which is secured within the brackets 19 and 20. The left-hand end portion of the tube 41 is closed over, while the right-hand end portion is connected with a vacuum pump

(not herein shown) by means of an elbow coupling 42. Thus, the hollow portion of the tube 41 is adapted to be partially evacuated at all times.

The gumming roll 34 is driven in synchronism with the suction roll 35 by means of a gear 43 carried upon the gumming roll shaft 36 in a manner so as to mesh directly with the suction roll gear 38. Disposed in parallel relation with the gumming roll shaft 36 is a gum roll 44 having a gear 45 mounted upon its distal end so as to mesh directly with a gear 43' carried upon one side of the gumming roll gear 43.

As may be particularly noted in Figs. 1, 3, and 7, the gum roll shaft 44 is mounted within spaced side wall portions of a gum dish 46 which is pivotally mounted upon a horizontally disposed shaft 47 which, in turn, is carried by a pair of spaced bosses 48, 48. Referring to Fig. 1, it is to be seen that the bosses 48, 48 are rigidly mounted upon the top portions of the brackets 19 and 20. The left-hand end portion (as viewed in Fig. 1) of the gum dish 46 is provided with a handle member 49 which provides a means whereby an operator may pivot the dish about its shaft 47 for the purpose of raising the gum roll 44 above the gumming roller 34. The right-hand end portions of the gum dish are each provided with thumb screws 50, 50 which function as adjusting means whereby the height of the gum roll may be adjusted relative to the gumming roller 34. As may be noted in Fig. 3, the gum dish is also provided with a scraper or doctor blade 51 which cooperates with the gum roll 44 in the usual fashion.

Referring particularly to Figs. 3, 4, and 5, it is to be understood that the gumming roller 34 is provided with the usual gumming strip or picker 52 which is designed in a conventional manner so that as the roller 34 rotates in a clockwise direction, as viewed in Fig. 3, it will function to present the picker 52 to the gum roll 44 for the purpose of receiving gum on its peripheral surface and thereafter, continued rotation of the roller will carry the picker into contact with the bottom flap portion of each envelope blank to the end that the gum from the picker will be deposited along the outer surface of each bottom flap, as the blank is forwarded between the bite of the gumming roller 34 and the lower suction roll 35.

Referring particularly to Figs. 3 and 5, there is associated with the suction roll 35 a small forwarding or folding roll 53 which is biased, by means which will be hereinafter described, against the peripheral surface of the roll 35. When the bottom flap portion of each envelope blank substantially clears the bite of the rollers 34 and 35 in a manner as is particularly disclosed in Fig. 5, the flap will remain in engagement with the periphery of the picker element 52 due to the presence of gum on the picker. The suction roll 35, however, is adapted to grasp the blank along a line which is designated in Fig. 3 by the numeral 54, and then as the lower roll 35 continues in its counterclockwise rotation, it will strip the bottom flap from the picker and cause the flap to fold about the line 54 as the envelope blank is carried between the bite of the suction roll 35 and the forwarding roll 53.

As viewed in Figs. 5 and 7, it is to be noted that the hollow tube 41 of the suction roll 35 is provided with a longitudinally disposed slot 55 which periodically communicates with a radially disposed slot 56 formed in the peripheral surface of the roll 35. Thus, the partial vacuum existing in the tube 41 will cause each blank to be seized

substantially along line 54 by the suction slot 56, whereby to draw said blank downwardly in the rotation of roll 35, as shown by the broken lines in Fig. 5. The continuation of this movement carries the fold 54 into the bite of rolls 35 and 53, the latter acting to stick down the gummed margin of the bottom flap against the infolded side flaps of each blank, as shown schematically in plan at the left in Fig. 3. As soon as each blank is well advanced between the bite of the suction roll 35 and the forwarding roll 53, the slot 56 no longer communicates with the tube 41 and thus, the envelope material will be free of the suction.

Across the peripheral surface of the suction roll 35, there is provided a relief slot 57 which is so formed and positioned that it will prevent the gum picker 52 from engaging the surface of the roll 35 when no envelope blank is disposed between the rolls 34 and 35. Thus, the relief slot 57 will prevent the roll 35 from being smeared with gum, in the event that the delivery of the blanks is inadvertently interrupted.

From the above, it is to be understood that each envelope blank may be delivered to the bite of the gumming and suction rolls without having any scoring lines provided between the juncture of the bottom flap and the blank proper, for such scoring is entirely unnecessary in view of the fact that the suction roll 35 accurately grasps the blank along the line 54, thereby to cause a proper folding of the bottom flap.

As each envelope blank passes between the bite of the rolls 35 and 53, it is to be understood that the forwarding roll 53 presses the gummed and folded bottom flap firmly into adhesive contact with the edge portions of the infolded side flaps, thereby to form the usual seams between bottom and side flaps. In this latter connection, it is also to be understood that no gum is forced from under the bottom flap so as to be deposited on the forwarding roll 53, for the reason that the picker element 52 is so designed that it is adapted to deposit its gum just inwardly of the edge of the bottom flap. Thus, as the bottom flap is forced into engagement with the side flaps, there is no opportunity for the gum to be squeezed out from under the edge of the bottom flap so as to be smeared over the roll 53.

After each envelope blank leaves the bite of the rolls 35 and 53, it will be delivered between the bite of a lower folding roll 58 and an upper suction roll 59 which are disposed between the brackets 19 and 20, as is particularly illustrated in Figs. 3 and 8. Referring particularly to Fig. 8, the lower folding roll 58 is carried by a shaft 60 which is journalled within the brackets 19 and 20, while the suction roll 59 is mounted directly upon a hollow stationary tube 61 which is mounted within the brackets 19 and 20. Adjacent each end portion of the folding roll shaft 60 is pivotally mounted a bell-crank lever 62. As viewed in Figs. 3 and 8, it is to be observed that the upper end portion of each of the bell-crank levers 62, 62 supports one end of the above noted folding roll 53, so that the latter may rotate freely. The lower or left-hand end portion of each of the bell-crank levers 62, 62 is provided with a spring biased plunger 63 which engages a cam shaft 64 so as to bias the folding roll 53 toward the first suction roll 35. The cam shaft 64 is mounted within the spaced brackets 19 and 20 and is provided with a handle member 65 (see Fig. 1) which, when rotated, functions to shift the folding roll 53 away from the first suction roll 35, in the event that the operator finds such a maneuver necessary in the adjusting of the machine.

Referring again to Figs. 3 and 8, the lower folding roll shaft 60 has mounted thereon a gear 66 which meshes directly with an idler gear 67 which, in turn, meshes with a second idler gear 68. Each of these idler gears 67 and 68 is mounted directly upon the bracket 20, and the gear 68 meshes with the above noted idler gear 39 so that the gear 66 will be positively driven to the end that the folding roll 58 will be rotated in a counterclockwise direction, as viewed in Fig. 3, and in synchronism with the first portion of the above described mechanism.

The second suction roller 59 is positively driven in synchronism with the lower folding roll 58 by means of a gear 69 which is carried by the suction roll and which meshes directly with the folding roll gear 66.

Referring particularly to Fig. 3, it is to be understood that as the envelope blank, with its bottom flap folded over the side flaps, is delivered between the bite of the folding roll 53 and the first suction roll 35, the suction will cease and the forward edge of the blank will engage the periphery of the second suction roll 59. In order to deliver this envelope blank between the bite of the second suction roll and the folding roll 58, the suction roll 59 is designed in a manner similar to the first suction roll 35. Thus, as viewed in Fig. 8, the left-hand end portion of the suction roll 63 is connected by means of a coupling 70 to a vacuum pump, not herein shown. Also, the suction tube 61 is provided with a longitudinally disposed slot 71 which communicates with a radial slot 72 formed in the surface of the suction roll proper. Thus, the roll 59 is so timed that its slot 72 will be covered by the forward edge portion of the envelope blank, and because of the existence of the partial vacuum within the slot, the partly-formed envelope will be forced against the surface of the roll, and the latter will then function to draw the blank horizontally between itself and the lower folding roll 58. After each partly-formed envelope is positioned between the bite of the rolls 58 and 59, the suction will cease and thereafter, these latter two rolls will function to deliver each partly-formed envelope, horizontally, toward a pair of upper and lower forwarding rolls 73 and 74 which are particularly disclosed in Figs. 3 and 9.

Referring particularly to Fig. 9, each of the forwarding rolls 73 and 74 has its opposite end portions journalled within the spaced bracket members 19 and 20. Also, they are operably connected together by means of intermeshing gears 75 and 76 which are respectively secured to the rolls 73 and 74. Referring to Figs. 3 and 9, it is to be understood that the lower roll gear 76 meshes directly with an idler gear 77 carried upon a stub shaft 78 which extends through the bracket 20, and has secured on its opposite end portion a small gear 79. By referring particularly to Fig. 3, it is to be understood that the idler gear 77 functions to drive the forwarding rolls 73 and 74 because it meshes with the gear 66 which is carried upon the lower forwarding roll 58. Thus, the idler gear 77 connects the folding roll gear 66 with the forwarding roll gear 76, to the end that the forwarding rolls 73 and 74 are rotated in synchronism with the above described portions of the present mechanism. These two forwarding rolls 73 and 74 will, of course, engage each partly-formed envelope as

the same is forwarded from between the bite of the second suction roll 59 and the lower folding roll 58, to the end that the piece, folded edge 54 foremost, will be delivered to the bite of a seal flap gumming roll 80 and a wash roll 81, which are particularly illustrated in Figs. 3 and 10.

Referring now to Fig. 10, the wash roll 81 is mounted fast upon a shaft 82, the end portions of which are journalled within the spaced brackets 19 and 20, while the gumming roll 80 is similarly secured upon a shaft 83 also mounted between the brackets 19 and 20. The right-hand end portion of the wash roll shaft 82, as viewed in Fig. 10, projects through the bracket 20, and has secured upon its distal end portion a large gear 84 which, as may be seen in Fig. 9, meshes directly with the small pinion gear 79. These gears are so designed that the wash roll 81 will be driven at one-half the surface speed at which the envelopes are delivered through the mechanism, for reasons which will be hereinafter set forth.

Referring again to Figs. 3 and 10, the wash roll shaft 82 has freely journalled thereon a gear 85 which meshes directly with the idler gear 77 and with a gear 86 carried rigidly upon the gumming roll shaft 83. Thus, the idler gear 77 will function to rotate the gumming roll 80 at a surface speed which is equal to that of the forwarding rolls 73 and 74, which speed is substantially twice that of the lower wash roll 81.

Referring now particularly to Figs. 1, 3 and 10, there is mounted above the gumming roll 83 a gum roll 87 which is similar in function and in construction to the above noted gum roll 44. Actually, this second gum roll 87 is associated with a second gum dish 88 in the exact same manner as described in conjunction with the first gum roll 44. Furthermore, this second gum dish 88 is constructed in a manner similar to the first gum dish 46 and is pivotally mounted upon a horizontally disposed shaft 88', the end portions of which are journalled within bosses 89, 89 which are, in turn, secured directly upon the brackets 19 and 20. A handle 90 permits the operator to pivot the gum dish 88 about its shaft so as to raise the gum roll 87 off the gumming roll 83. Referring specifically to Fig. 10, the right-hand end portion of the gum roll 87 has secured thereto a gear 91 which meshes directly with a gear 92 mounted fast upon the face of the gumming roll gear 86. Thus, the rotation of the gumming roll shaft 83 will drive the gum roll 87 in synchronism therewith.

This second gumming roll 83 is constructed in a manner similar to the first gumming roll 34 but it is, of course, provided with a differently designed picker element 93, so that the gum deposited on the latter element by the gum roll 87 will be transferred in proper relation upon the edge portion of each partly-folded envelope's seal flap. It will be recalled that in connection with the first gumming roll 34, the picker element 52 was so designed and the roll itself was so timed that the gum would be deposited upon the bottom flap of each blank just inwardly of the marginal edge portion thereof. However, in applying the gum upon each envelope's seal flap, it is necessary to have the picker element 93 deposit the gum all the way to the extreme edge of the seal flap, so that the seal flap may be properly sealed by an envelope user without having any part of the marginal portion of the seal flap free of the envelope body. To insure that the edge portion of the seal flap has its gum properly deposited thereon, it is necessary to have the picker element 93 overlap the edge portion of the seal flap to a slight degree. Thus, it is obvious that some quantity of gum will be deposited upon the wash roll 81 as the gum is applied to the seal flap. Clearly, any gum which is deposited on the wash roll must be removed therefrom, so that the latter element will not function to transfer such gum to the underneath sides of the following envelope blanks. Therefore, the present invention contemplates the provision of means whereby the wash roll 81 may be cleared of any gum deposits.

As hereinabove noted, the wash roll 81 rotates at a surface speed which is one-half that of the gumming roll 80 and from this, it is to be understood that the gumming roll 80 will deposit a relatively narrow strip of gum across the face of the wash roll whenever the picker 93 engages the face of the wash roll; it being understood that the picker will engage the wash roll face whenever no envelope material is disposed between the two rolls. In other words, if the speed of the two rolls was exactly the same, the picker 93 would deposit a relatively wide strip of gum upon the wash roll and thus, the problem of removing the gum from the wash roll would be more difficult to solve than in the present case.

As may be particularly seen in Figs. 3 and 10, there is disposed adjacent to the lower surface of the wash roll 81, a substantially rectangular hollow casing 94 which is disposed between the bracket members 19 and 20. Mounted within the opposite side wall portions of the casing 94 is a spray means generally designated by the numeral 95, which means functions to project streams of water against the lower peripheral surface of the wash roll 81 so as to remove the gum which has been deposited thereon. The upper portion of the casing 94 is closed over by means of a cover plate 94', while the lower portion of the casing is left entirely open so as to permit the water along with the gum to drop away from the wash roll and into a catch basin, not herein shown. As may be particularly noted in Figs. 3 and 10, the one side wall of the casing 94 has mounted thereon a dam plate 96, the upper end portion of which intimately engages the wash roll for the purpose of wiping the water and gum therefrom. This dam may be made of an appropriate nonmetallic material, and it functions to remove completely any water and gum emulsion from the surface of the roll, so that a substantially dry roll surface may be presented to the successive partly-folded envelopes. A plate 97 and screws 98, 98 function to maintain the dam 96 in its proper position of adjustment, the screws being threaded directly within the one end portion of the casing 94.

The end portions 99, 99 of the casing 94 extend under the forwarding rolls 73 and 74 for the purpose of being mounted directly upon a cross shaft 100, the end portions of which are mounted within a pair of brackets 101, 101 which are secured directly to the table top 16 at locations between the brackets 19 and 20. Projecting from the back wall of the casing 94 is a boss 102 within which is mounted a cam shaft 103, the opposite end portions of which are mounted in a pair of brackets 104, 104, each of which is secured directly upon the table 16 between the brackets 19 and 20. The distal end portion of this cam shaft projects through the bracket side wall 19, and is provided with a handle 105 which may be rotated by an operator so as to drop the casing 94 and the dam plate 96 away from the

wash roll, as the casing member pivots about the cross shaft 100.

As hereinabove noted, there is provided lengthwise of the casing 94, a spray means 95 which functions to eject a plurality of streams of water toward the wash roll 81. More specifically, the spray means 95 comprises two concentrically arranged tubes 106 and 107, each of which is provided with a plurality of nozzle apertures 108, 108 through which water may be ejected. The quantity of water ejected from the spray means may be governed by adjusting one of the tubes relative to the other, so as to bring the inner and outer apertures 108, 108 into coincidence, or to place them slightly out of phase, depending upon the amount of water it is desired to play upon the wash roll 81. Referring particularly to Fig. 10, it is to be understood that the right-hand end portions of the spray means 95 are closed over, while the left-hand end portions extend through an opening in the bracket member 19, so as to facilitate the coupling of a water-supply hose 109 to the inner tube 107. The outer tube 106 is rigidly carried with the opposite wall portions of the casing 94. From this, it should be understood that this hose 109 will supply a constant stream of water for the wash roll 81, to the end that the gum may be continually removed from this roll. It is also pertinent to point out that in the event that the apertures 108, 108 of the spray tubes tend to become clogged with foreign matter, the operator may grasp the distal end portion of the tube 107 and rotate the same, relative to the outer tube 106, thereby freeing the apertures 108, 108 of any foreign matter.

As each partly-formed envelope passes between the bite of the seal flap gumming roll 80 and wash roll 81, the leading edge portion 54 thereof will be forwarded to a pair of upper forwarding rolls 110, 110 and a lower forwarding roll 111. (See Figs. 3 and 11.) In every case, when the seal flap of an envelope has been freshly gummed between the rolls 80 and 81, some time must elapse before this gum will dry, and thus, no forwarding or feeding instrumentalities can come in contact with these gummed areas of the seal flaps. Therefore, as may be seen in Fig. 11, the upper forwarding rolls 110, 110 are widely spaced apart, so as to contact only the folds of the side flaps, and so as not to engage the gummed area of the seal flap as each partly-formed envelope passes between the bite of the upper rolls 110, 110 and the lower roll 111.

Still referring to Fig. 11, it is to be noted that the upper forwarding rolls 110, 110 are each mounted upon a shaft 112 which is journalled within the side brackets 19 and 20, while the lower forwarding roll 111 is mounted upon a shaft 113, the end portions of which are similarly journalled in the bracket side walls 19 and 20. The upper and lower shafts 112 and 113 are positively coupled together by means of intermeshing gears 114 and 115. Referring now to Figs. 3, 10, and 11, it is to be understood that the lower forwarding roll gear 115 meshes directly with an idler gear 116 carried by a shaft 117 which is mounted within the bracket 20. Also, this idler gear 116 meshes with the gear 85 which is freely mounted upon the wash roll shaft 82, and which is driven by means of the large idler gear 77 in a manner as hereinabove set forth. From this, it is to be understood that the forwarding roll shafts 112 and 113 are synchronously driven at a surface speed which is exactly the same as that imparted to the forwarding rolls 73 and 74.

Referring again to Fig. 11, it is to be noted that each of the forwarding rolls 110, 110 is provided with a set screw 118 which permits the roll to be adjusted longitudinally of its shaft 112, so that the two rolls 110, 110 may be properly positioned for receiving and operating on envelope blanks of various sizes.

The above noted forwarding rolls 110, 110 and 111 function to deliver each partly-formed envelope, having wet glue on its seal flap, to a set of conveyor belts which, in turn, deliver the successive pieces to the chain, not shown, of a drying mechanism which functions to carry the envelopes about a closed path, for the purpose of drying the gummed areas of the seal flaps before the latter elements are folded over upon the envelope bodies. Since this drying mechanism forms no part of the present invention, it is not disclosed or described herein.

Referring particularly to Figs. 2, 3, and 12, it is to be understood that three lower and two upper conveyor belts are provided for so conveying the envelopes to the drying mechanism. More specifically, each of the lower belts, which are designated herein by the numeral 119, is trained over one of three pulleys 120, 120, each of which is mounted upon a lower shaft 121, the end portions of which are journalled within the side bracket members 19 and 20. Also, each of the upper two belts, which are designated by the numeral 122, is trained over one of a pair of upper pulleys 123, 123, each of which is mounted upon a shaft 124, the end portions of which are journalled in the bracket members 19 and 20. It is to be noted that each of the pulleys 120 and 123 is provided with a set screw 125 which functions to permit the pulley to be adjusted longitudinally of its associated shaft, so as properly to space the various pulleys for the reception of various sized envelopes.

The shafts 121 and 124 are positively coupled together by means of intermeshing gears 126 and 127, of which the lower gear 126 meshes with the idler gear 116, so that the conveyor belts 119 and 122 are positively driven at a surface speed which is commensurate with that imparted to the last mentioned forwarding rolls 110 and 111.

Referring particularly to Figs. 1 and 7, it is to be understood that the present invention contemplates the provision of means whereby the various cooperating pairs of rolls, which have been hereinabove fully described, may be separated in a vertical direction, for the purpose of facilitating the adjustment of the present mechanism. For example, the first gumming roll 34 is mounted upon a shaft 35, the opposite end portions of which are each rotatably mounted within a block 128 which is slidably mounted with an opening 129 formed in a respective one of the side brackets 19 and 20. Each of these blocks 128, 128 is maintained in its lowermost position by means of a pair of coil springs 130, 130, the lower portions of which bear against the upper portion of the block, while the upper portions thereof bear against the member 48. In order to raise each of the blocks 128, 128 against the force of the springs 130, 130, there is provided a cam 131 which is appropriately disposed within an arcuate aperture 132 formed in each of the brackets 19 and 20 just below a respective one of the blocks 128, 128. Each of these cams 131 is provided with a handle member 132 which, when rotated, turns the cam so that each of the blocks 128, 128 is elevated, thereby raising the gumming roll 34 above its associated suction roll 35.

Referring particularly to Figs. 1, 7, 8, and 10, it is to be understood that each of the two gumming rolls 34 and 80, as well as the upper suction roll 59, is provided with similar mechanism for so elevating each of these rolls above its associated bottom roll. Also, in this latter connection, it is to be noted that each of the blocks 128, 128 has threaded in its upper portion a cap screw 133, the head portion of which rests upon the upper portion of one of the bracket members 19 or 20, so that as this screw is rotated, it will function to adjust the position of its associated roll. For example, by use of these cap screws 133, 133, the first gumming roll 34 may be nicely adjusted relative to its associated suction roll 35.

Referring particularly to Figs. 1, 3, and 9, a second form of upper roll elevating means is provided in conjunction with the upper forwarding roll 73. For example, each end portion of the roll 73 is rotatably mounted within a block 128' which, in turn, is slidably mounted within a vertically disposed slot or aperture 129' formed in a respective one of the brackets 19 and 20. Each of these blocks 128', 128' is maintained in its normally operative position by means of a coil spring 130', the lower portion of which engages the block 128', while the upper portion thereof engages the member 89 which is carried upon a respective one of the brackets 19 and 20. For raising each of the blocks 128', 128' against the force of its associated coil spring 130', there is provided a cam shaft 134, the opposite end portions of which are each rotatably mounted within one of the oppositely disposed blocks 128', 128'. Associated with this cam shaft are a pair of bracket members 135, 135, each of which is rigidly mounted upon a respective one of the brackets 19 and 20 so as to underlie a cam portion 136 of the cam shaft 134. A handle member 137 projects upwardly from one end of the cam shaft 134 so that an operator may elevate the upper forwarding roll 73 by merely rotating the handle.

By referring to Figs. 1, 9, and 11, it is to be understood that each of the upper forwarding rolls 33, 73, and 110 is adapted to be raised above its lower associated forwarding roll by a means similar to that hereinabove described.

I claim:

1. In an envelope machine, bottom flap gumming means, means for successively conveying to said gumming means, bottom flap foremost, envelope blanks each with its side flaps folded over upon the blank body and with its bottom and seal flaps extended, bottom flap folding and sealing means including a pair of opposed rollers, suction-creating means disposed longitudinally across the face of one of said rollers for gripping the ungummed face of each blank along a line corresponding to the juncture of the flap and the blank body as the same emerges from said gumming means and for delivering the same to the bite of said opposed rollers thereby to cause the flap to be folded in seam forming relation against the side flaps, seal flap gumming means including first and second opposed rollers, a gumming element carried upon said first roller, means to rotate said second roller at a substantially reduced speed relative to said first roller, a pair of opposed transfer rollers for delivering the envelope blanks from said folding rollers to said seal flap gumming rollers, and suction-creating means disposed longitudinally across the face of one of said transfer rollers for gripping the folded over portion of said blank as the same emerges from said folding rollers and for delivering the same to the bite of said transfer rollers.

2. In an envelope machine, bottom flap gumming means, means for successively conveying to said gumming means, bottom flap foremost, envelope blanks each with its side flaps folded over upon the blank body and with its bottom and seal flaps extended, bottom flap folding and seaming means including a pair of opposed rollers, suction-creating means disposed longitudinally across the face of one of said rollers for gripping the ungummed face of each blank along a line corresponding to the juncture of the flap and the blank body as the same emerges from said gumming means and for delivering the same to the bite of said opposed rollers thereby to cause the flap to be folded in seam forming relation against the side flaps, seal flap gumming means including first and second opposed rollers, a gumming element carried upon said first roller, means for directing a liquid spray upon said second roller, means for removing the liquid from said second roller, means to rotate said second roller at a substantially reduced speed relative to said first roller, and means for successively transferring the envelope blanks from said bottom flap folding means to the bite of said seal flap rollers.

3. In an envelope machine, bottom flap gumming means including a first pair of opposed rollers, means for conveying to the bite of said gumming rollers, bottom flap foremost, envelope blanks each with its bottom and seal flaps extended, a gumming element carried by one of said rollers and being arranged to engage the envelope bottom flap just inwardly of the flap edge thereby to insure application of gum inwardly of the flap edge, seal flap gumming means including a second pair of opposed rollers, means for conveying envelope blanks from said first pair of rollers to the bite of said second pair of rollers, a gumming element carried upon a first of the rollers of said second pair of rollers and being arranged to engage the envelope seal flap so as to overlap the edge portion of the flap thereby to insure application of gum to the precise edge thereof, means cooperating with a second roller of said second pair of rollers for removing gum from such roller, means for driving each of the rollers of said first pair in synchronism with the first roller of said second pair, and means for driving the second roller of said second pair at a substantially reduced speed relative to the other three rollers thereby to maintain the width of the gum strip deposited thereon by said second gumming element at a minimum.

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