April 20, 1937. A. A. BALLATORE 2,077,658

METHOD OF AND MACHINE FOR WRAPPING ENCLOSURES WITHIN ENVELOPES

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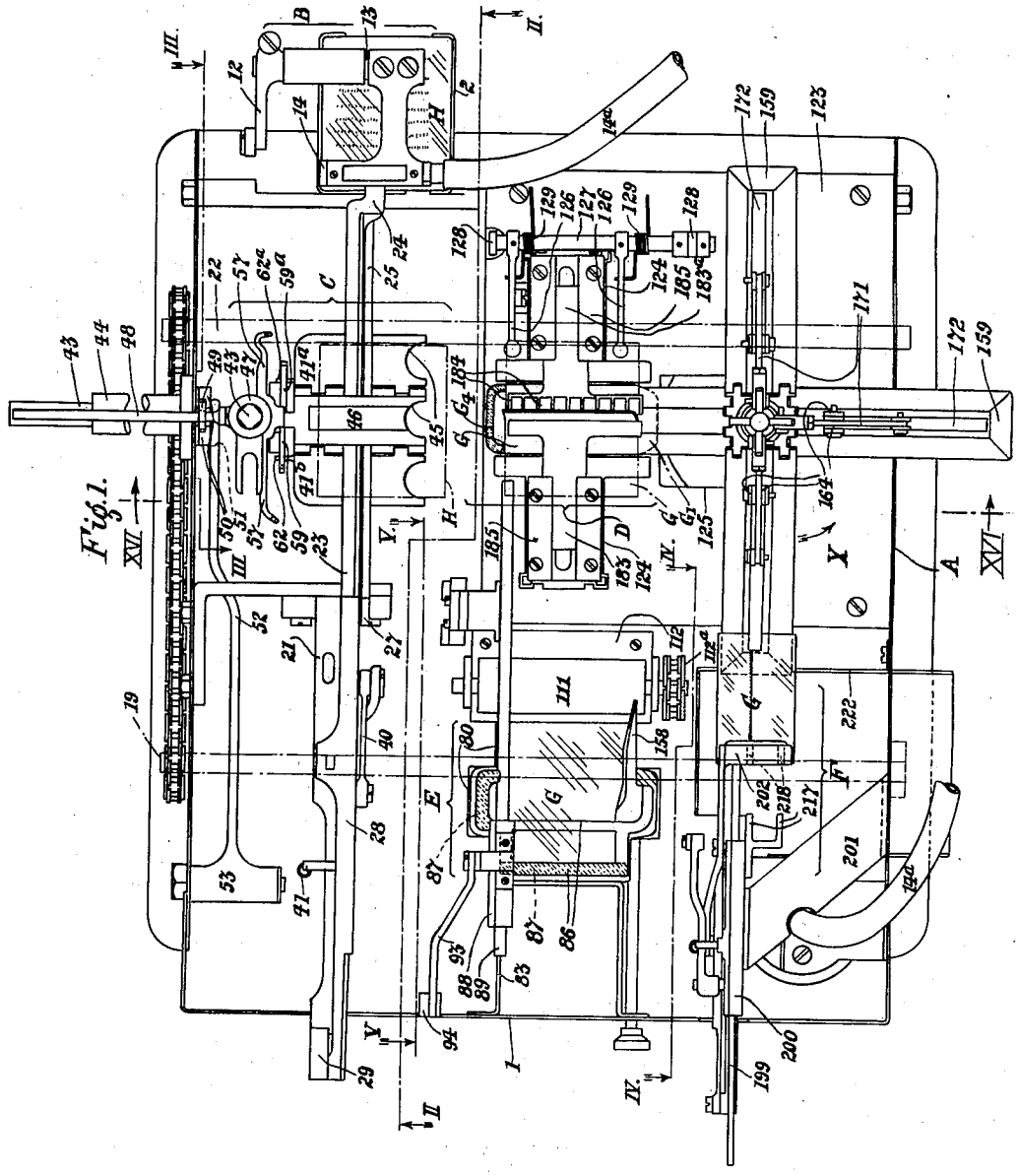


Fig. 1.

Anthony Angelo Ballatore INVENTOR.

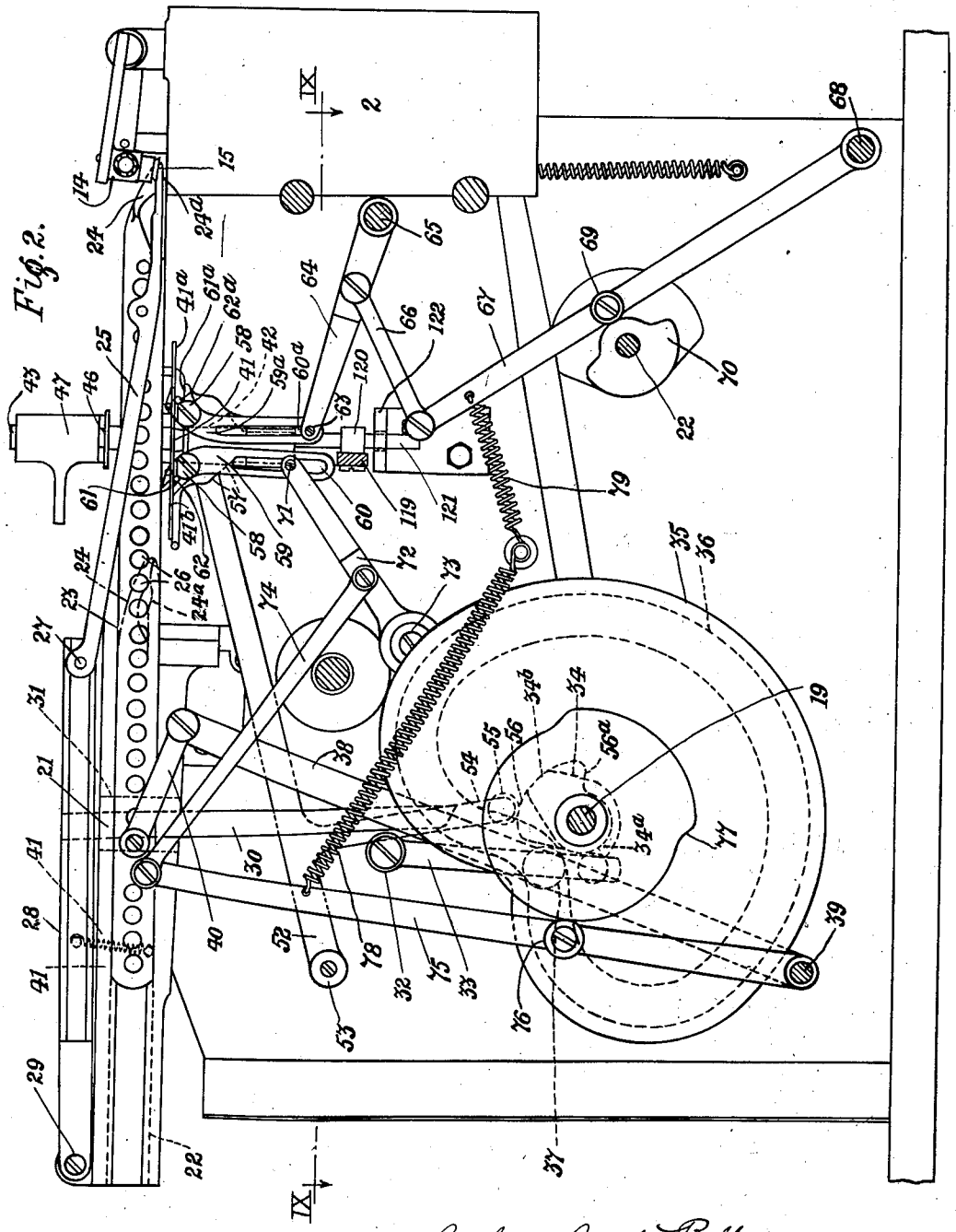
per N. A. Fitzpatrick ATTORNEY.

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METHOD OF AND MACHINE FOR WRAPPING ENCLOSURES WITHIN ENVELOPES

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Fig. 2.



Anthony Angelo Ballatore INVENTOR.

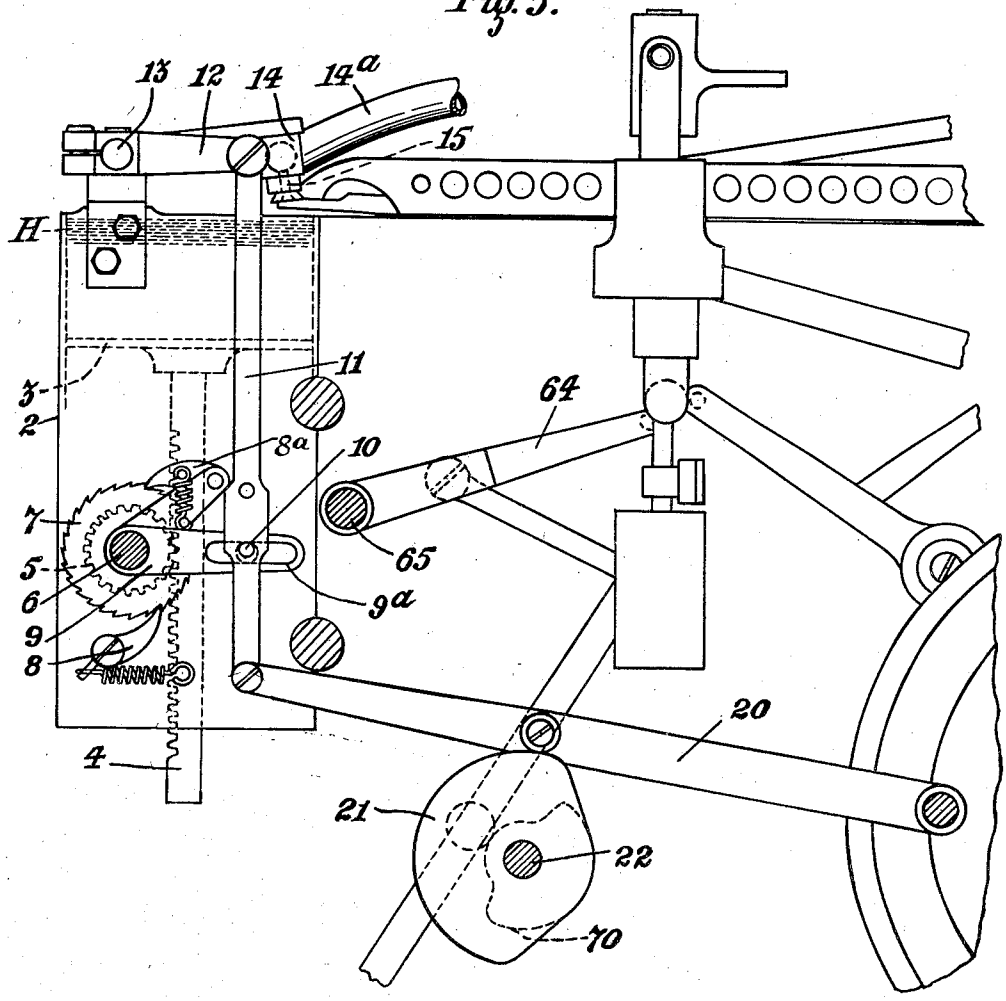
per N. A. Tompkins ATTORNEY.

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METHOD OF AND MACHINE FOR WRAPPING ENCLOSURES WITHIN ENVELOPES

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Fig. 3.



per Anthony Angelo Ballatore INVENTOR.

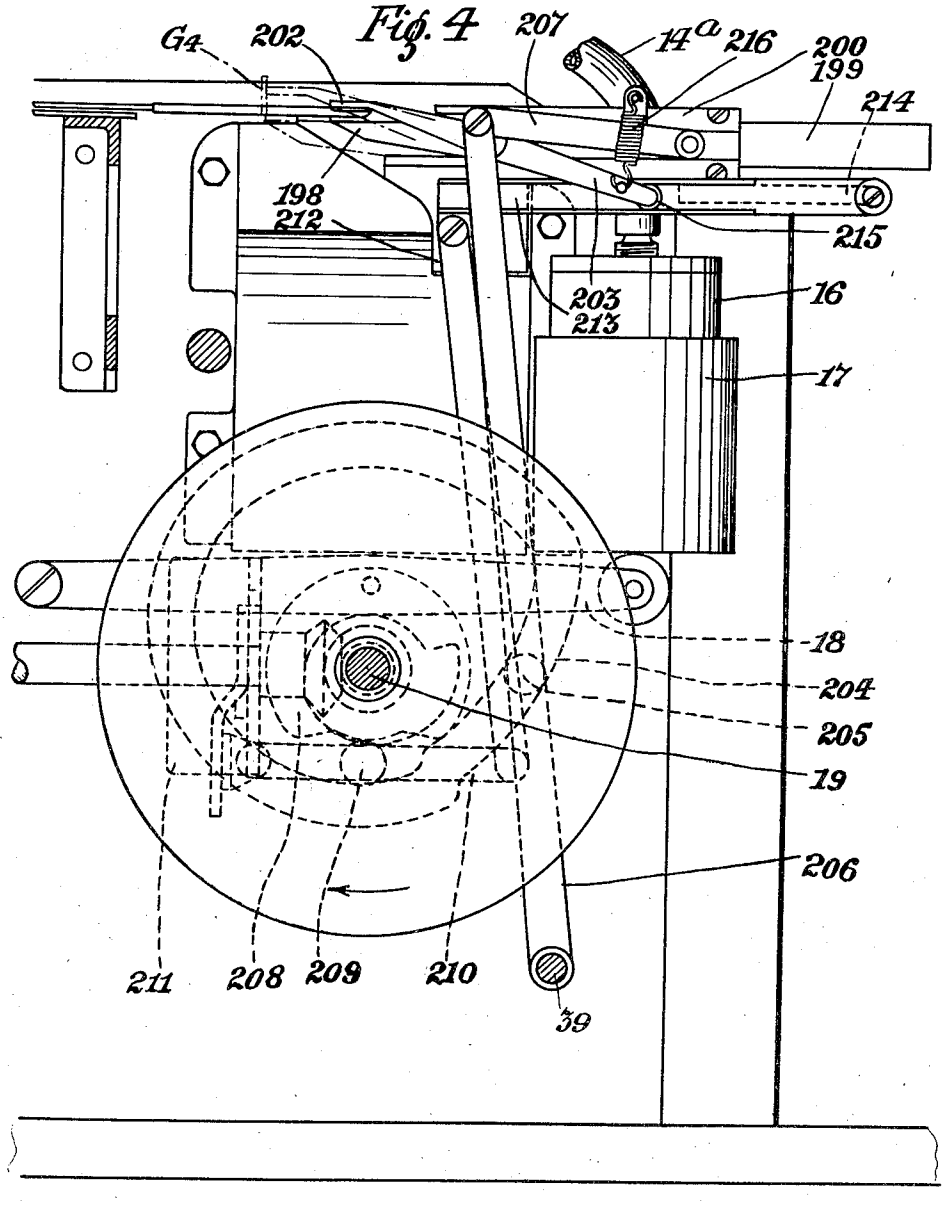
A. D. Simpson ATTORNEY

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METHOD OF AND MACHINE FOR WRAPPING ENCLOSURES WITHIN ENVELOPES

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Fig. 4



Anthony Angelo Ballatore INVENTOR.

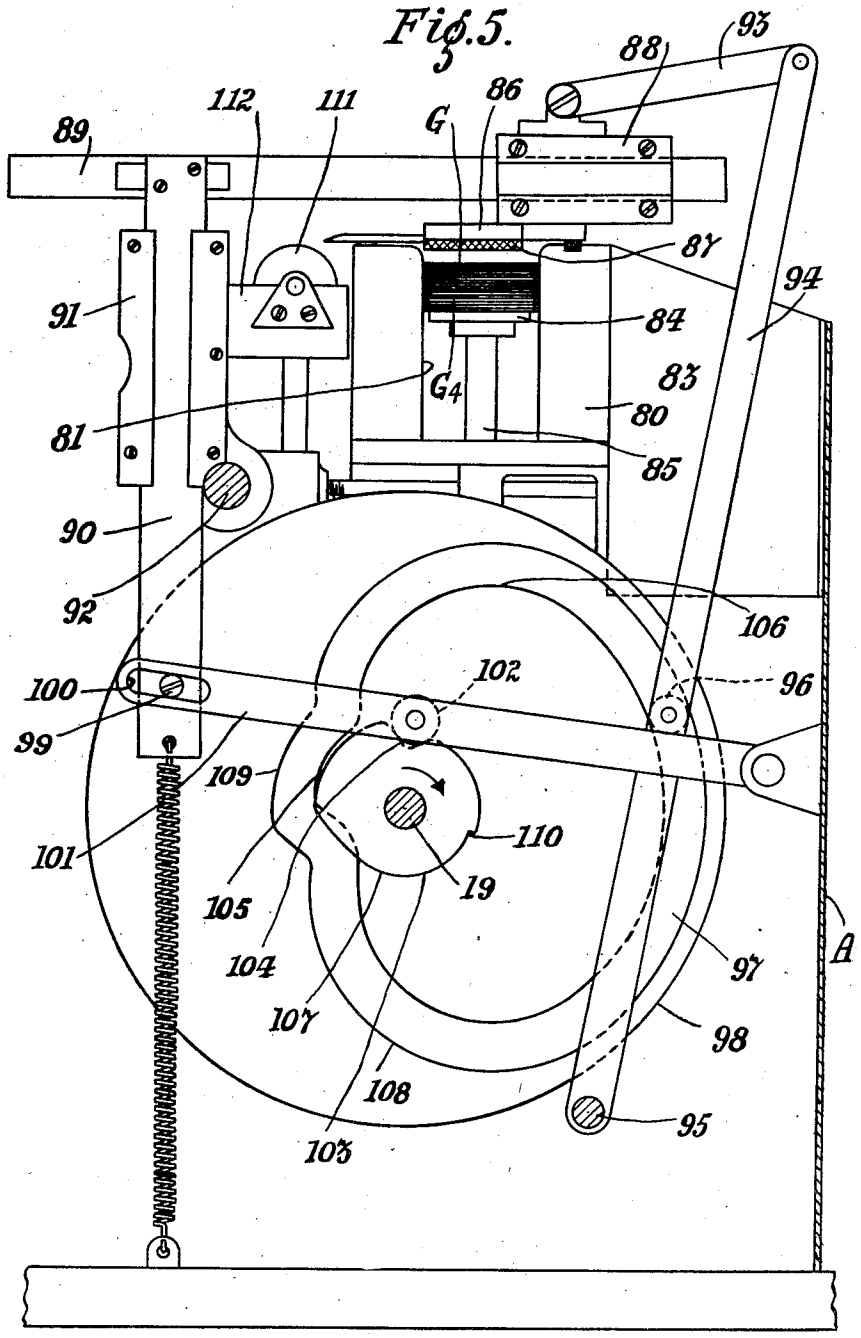
per A. D. Simpkinson ATTORNEY.

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Fig. 5.



Anthony Angelo Ballatore INVENTOR.

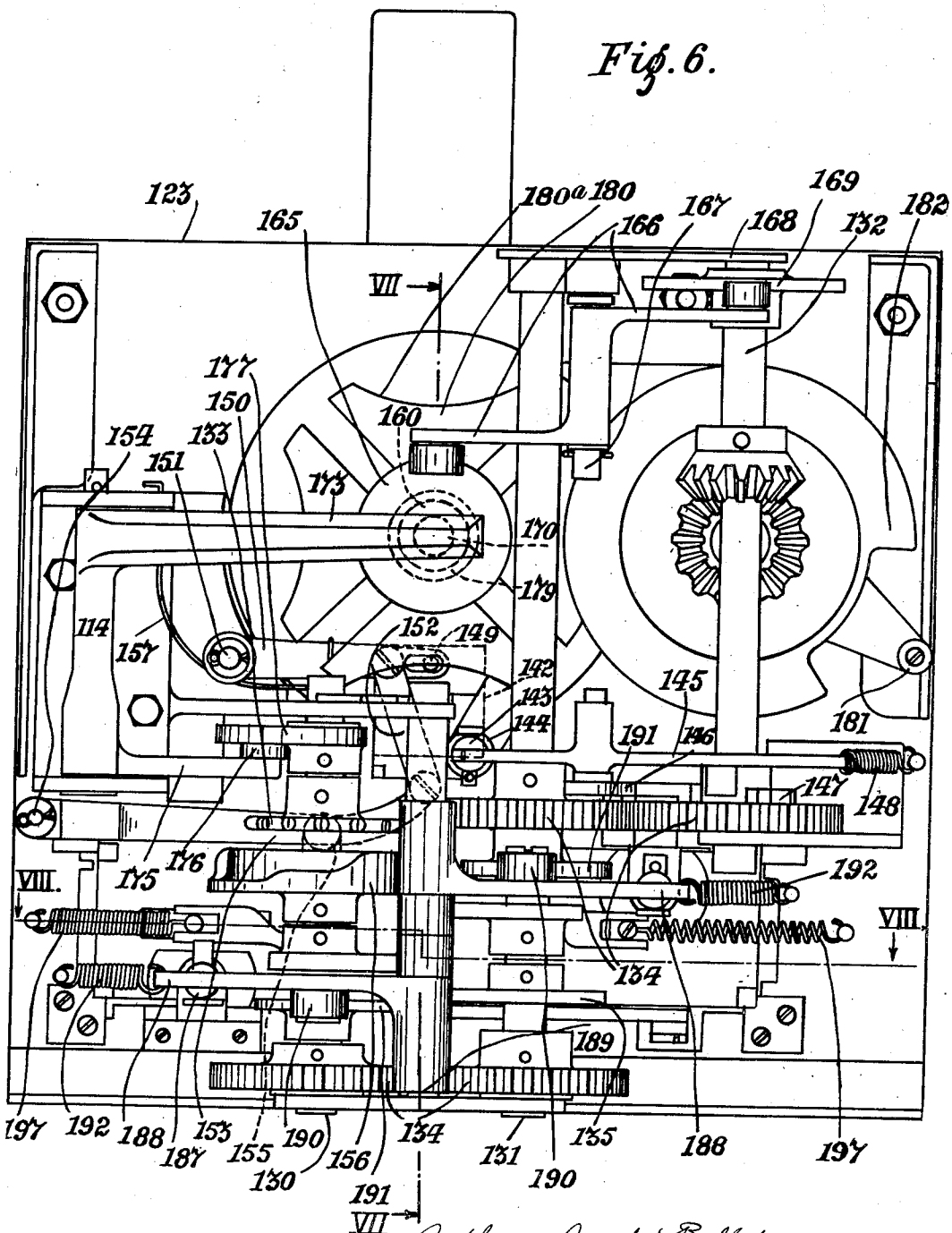
per A. D. Patrick ATTORNEY.

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METHOD OF AND MACHINE FOR WRAPPING ENCLOSURES WITHIN ENVELOPES

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Fig. 6.



Anthony Angelo Ballatore INVENTOR

per A. A. Ballatore ATTORNEY

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METHOD OF AND MACHINE FOR WRAPPING ENCLOSURES WITHIN ENVELOPES

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Fig. 7.

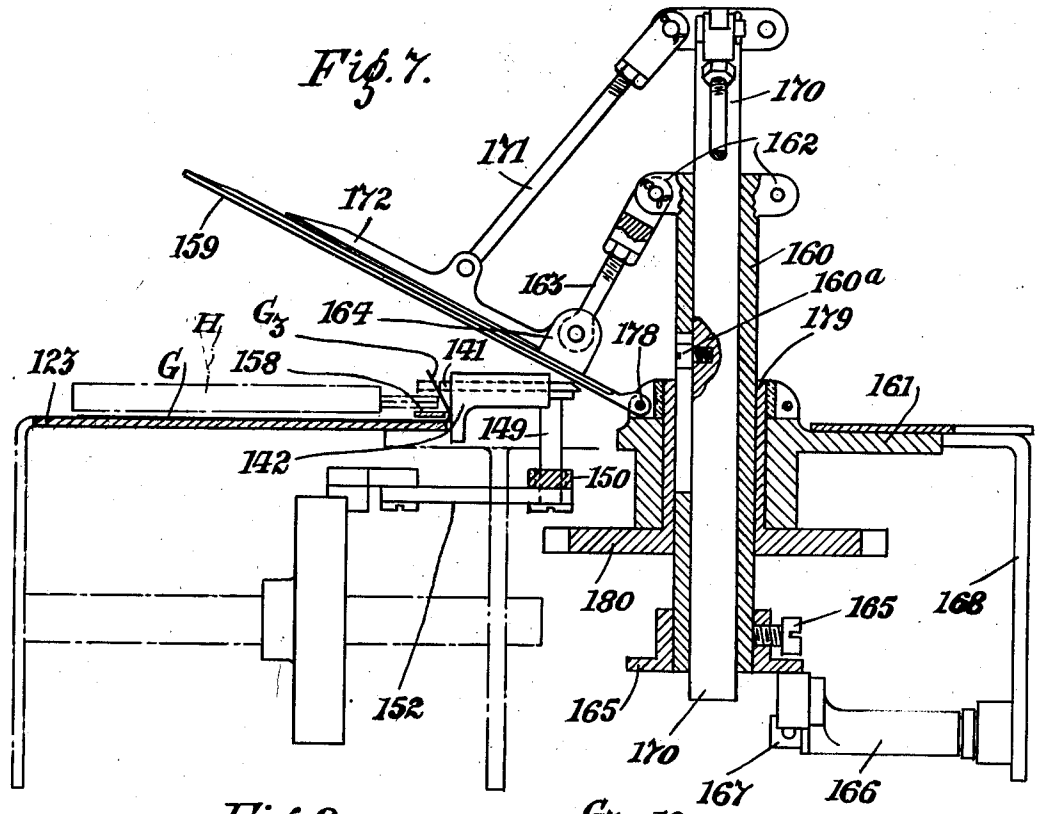
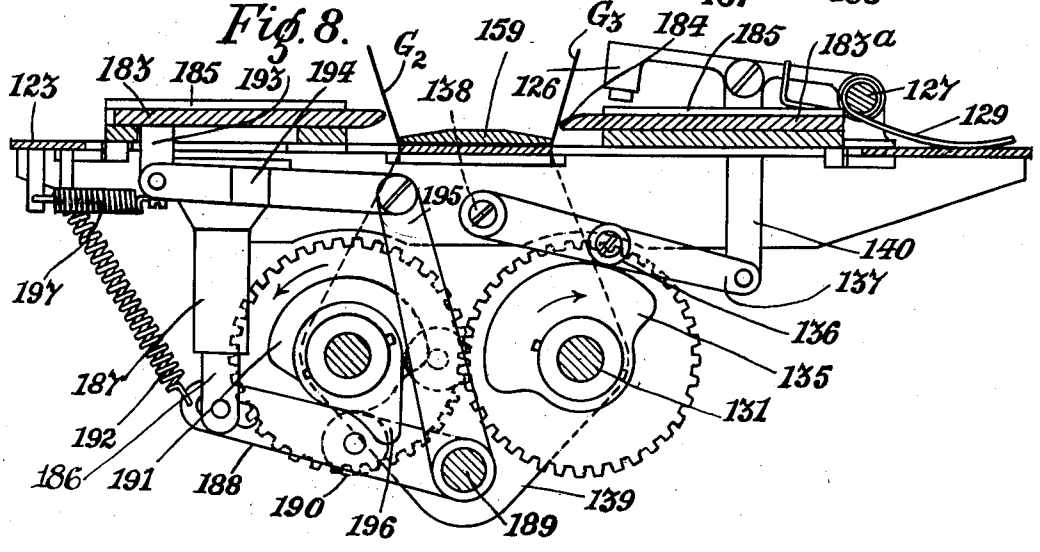


Fig. 8.



Anthony Angelo Ballatore INVENTOR.

per N. D. Thompson ATTORNEY

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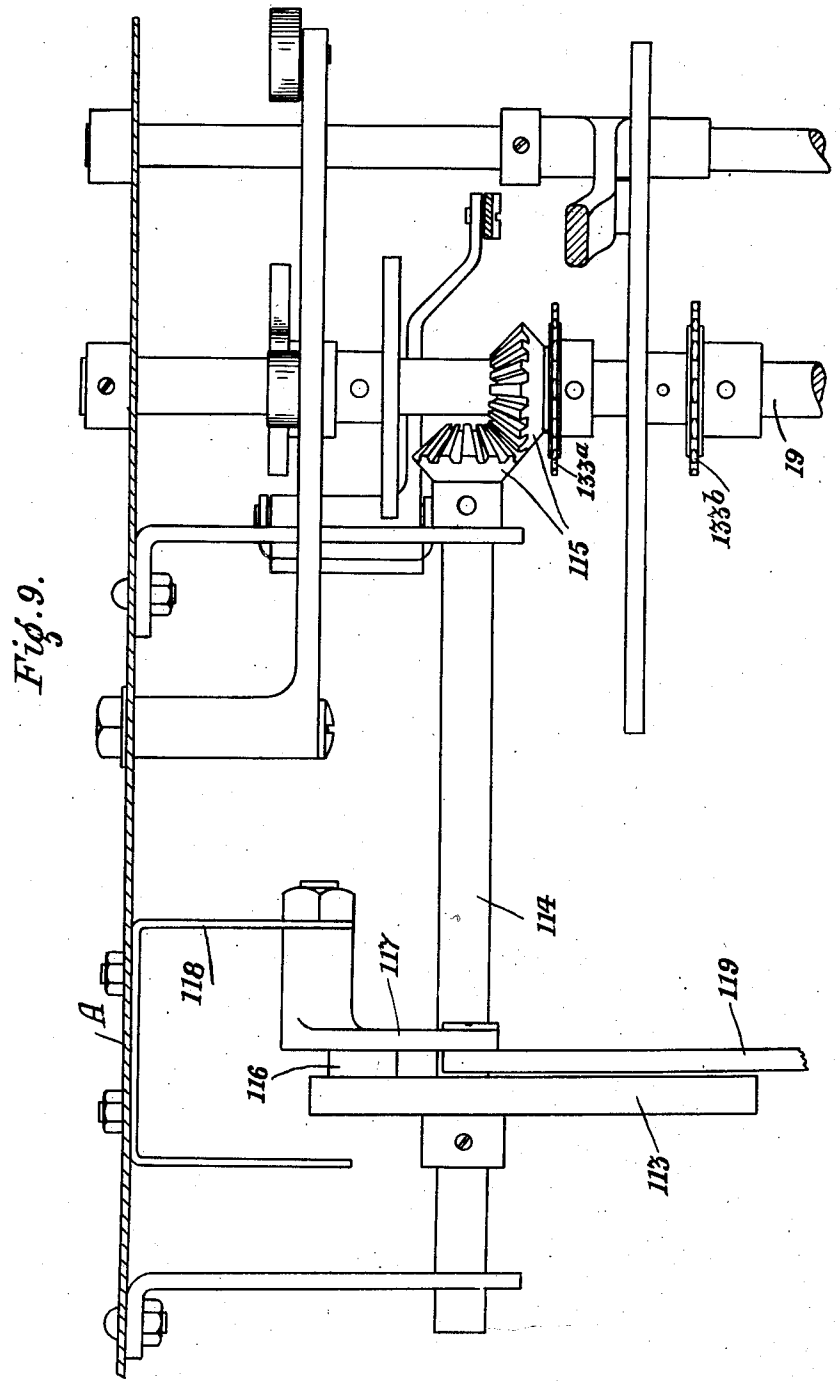


Fig. 9.

per Anthony Angelo Ballatore INVENTOR
N. D. Fitzpatrick ATTORNEY

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METHOD OF AND MACHINE FOR WRAPPING ENCLOSURES WITHIN ENVELOPES

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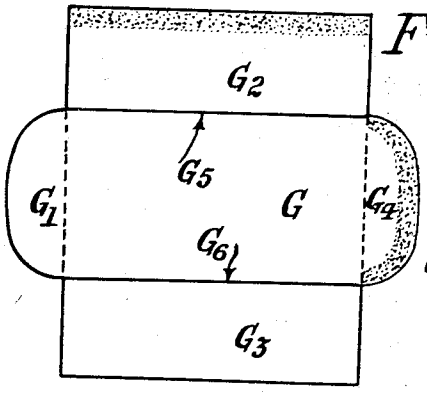


Fig. 11.

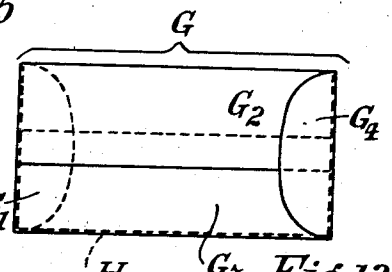
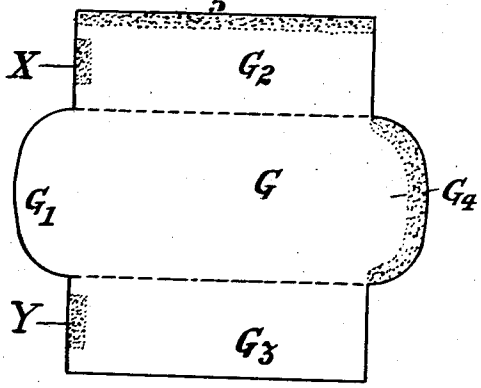


Fig. 12.

Fig. 13.



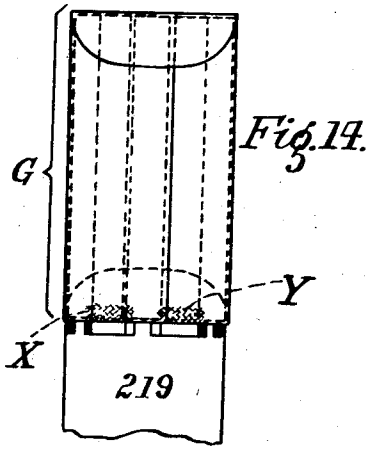


Fig. 14.

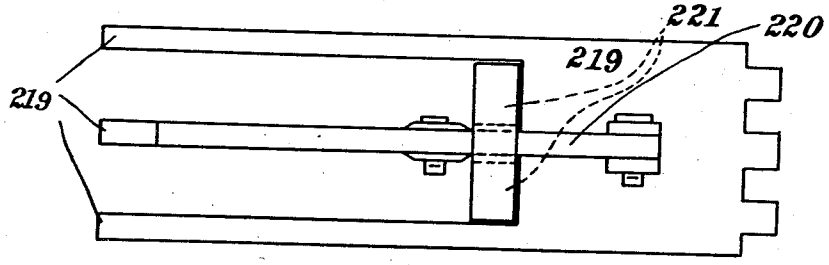


Fig. 15.

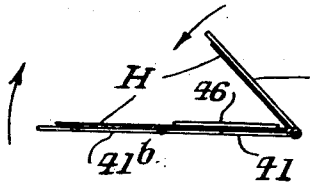


Fig. 10.

Anthony Angelo Ballatore INVENTOR.

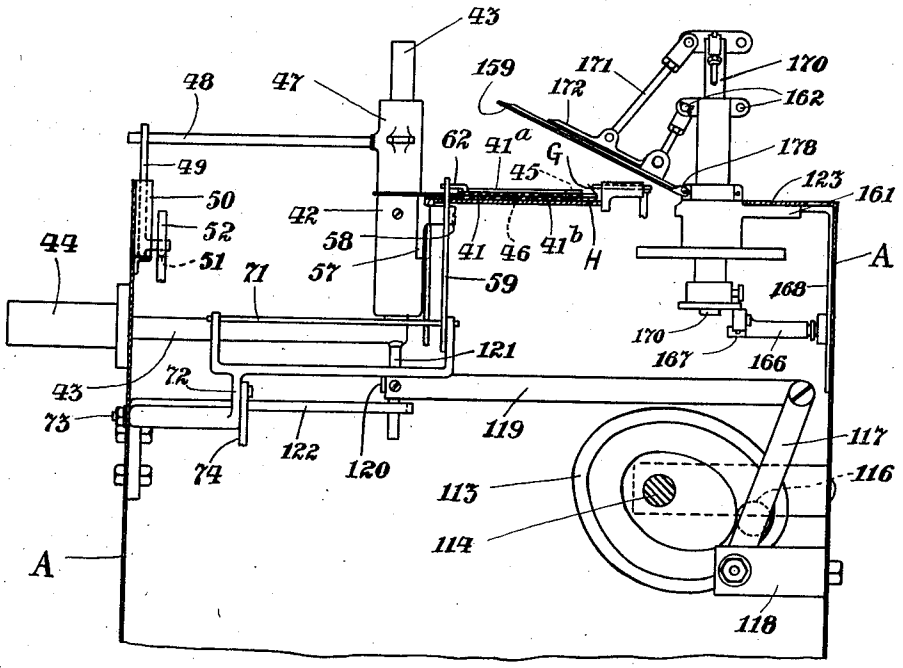
per A. D. Ballatore ATTORNEY.

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METHOD OF AND MACHINE FOR WRAPPING ENCLOSURES WITHIN ENVELOPES

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Fig. 16.



Anthony Angelo Ballatore INVENTOR

PER

ATTORNEY.

Patented Apr. 20, 1937 2,077,658

UNITED STATES PATENT OFFICE

2,077,658

METHOD OF AND MACHINE FOR WRAPPING ENCLOSURES WITHIN ENVELOPES

Anthony Angelo Ballatore, Downend, near Bristol, England

Application May 17, 1935, Serial No. 22,120
In Great Britain May 23, 1934

27 Claims. (Cl. 93—3)

This invention relates to a method of and machines for placing enclosures such as letters or circulars (hereinafter referred to simply as "enclosures") in envelopes.

According to this invention, an envelope blank is taken in the flat to a folding station ready to receive the enclosure which is laid upon the envelope blank and thereafter the envelope blank is folded upon and over the enclosure and, if desired, may be sealed, and removed ready for addressing.

Generally the enclosures require to be folded before being placed in the envelopes, in which case mechanism is provided for folding the enclosures and placing them on the envelope blanks before the same are folded.

The whole mechanism for performing the operations is automatic.

By means of the machine circulars and such like can be quickly folded, placed in envelopes, closed and removed ready for addressing.

The invention will now be described by way of example with reference to the accompanying drawings wherein—

Fig. 1 is a plan view of a machine in accordance with the invention, the lower mechanism being omitted for clearness.

Figs. 2 to 5 are sectional elevations respectively on the lines II—II; III—III; IV—IV and V—V of Fig. 1.

Fig. 6 is an inverted plan showing the mechanism underneath the envelope folding table.

Fig. 7 is a sectional elevation on the line VII—VII of Fig. 6.

Fig. 8 is a part side elevation of the envelope folding station.

Fig. 9 is a part plan view on the level IX—IX Fig. 2, but showing parts in front of the plane in which Fig. 2 is taken in Fig. 1.

Fig. 10 is a detail view of the folding mechanism.

Figs. 11 and 12 show respectively the envelope blank and the finished envelope.

Figs. 13, 14 and 15 show a modified envelope and former therefor.

Fig. 16 is a sectional view on the line XVI—XVI of Fig. 1 showing the mechanism for reciprocating the enclosure folding mechanism.

Referring to Fig. 1, A denotes the machine frame, B the enclosure supply station, C the enclosure-folding station, D the envelope-folding station, E the envelope blank supply station and F the folded envelope and enclosure delivery station.

As shown in Figs. 1 and 3 the enclosures H are stacked in a casing 2 upon a base plate 3 attached to a vertical rack 4 engaging a pinion 5 on shaft 6 on which is also mounted a ratchet wheel 7 engaged by two spring-urged pawls 8, 8a. Pawl 8a is pivoted on bell crank 9 having a slotted arm 9a engaged by pin 10 on link 11 which is pivoted at the top to an arm 12 (see also Fig. 1) connected to shaft 13 carrying the air suction head 14 which has two suction orifices 15, the head 14 being connected by a flexible pipe 14a to a suction pump 16 (see especially Fig. 4). The pump comprises a spring-urged movable cylinder 17 adapted to be moved up and down by the cam-operated rocker arm 18, the cam being mounted on the main cam shaft 19 extending across the machine. The lower end of lever 11 (Fig. 3) is pivotally connected to a pivoted lever 20 operated by cam 21 on a secondary camshaft 22 connected by chain (Fig. 1) to the main shaft 19. The cam 21 oscillates the lever 20 which, through link 11, causes the suction head 14 to descend and lift an enclosure, the timing of cams 21 and the pump-operating cam being such that the pump is operated to cause suction when the head 14 is lowered. At the same time the bell crank 9 is oscillated and thus feeds up the blanks H automatically through the pawl 8a, ratchet 7 and rack 4. The feed may also be manually adjusted by a hand wheel (not shown) on shaft 6.

The mechanism for transferring the enclosures H to the folding station C is shown best in Fig. 2 and comprises a fixed guide 21 with a dovetail channel 22 in which slides an arm 23 formed at its end into the upper jaw 24. The lower jaw 24a is formed on the end of lever 25 which is pivoted in one of the series of holes 26 in the arm 23 and has a pin and slot connection at 27 with the channel lever 28 which is pivoted at 29 to the guide 21. The lever 28 has an arm 30 which passes down through a hole 31 in the guide 21 and engages the roller 32 mounted at one end of a centrally pivoted rocking lever 33 having a similar roller at its other end engaging the cam 34 on shaft 19. The arm 23 and associated parts are reciprocated to and fro between the full line position shown in Fig. 2 to the chain dotted position by means of a cam 35 having a cam groove 36 in which engages the roller 37 on the lever 38 pivoted on a cross rod 39 and attached at its upper end by a link 40 to the arm 23 through one of the holes 26. The channel lever 28 is normally pulled down on to the guide 21 by the tension spring 41 so that the lower jaw 24a is forced up into contact with the upper jaw 24. However, just prior to coming into the position shown

in full lines the lower jaw is caused to lower by the rise 34a on cam 34 and is then allowed to rise when it reaches the position shown and grip an enclosure H which has just been lifted by the head 14. Similarly just prior to reaching the chain-dotted position shown in Fig. 2 the rise 34b on cam 34 causes the lower jaw to fall and leave the enclosure H at the folding station C.

The folding mechanism at the folding station C comprises (see Figs. 1, 2, and 10) a thin horizontal base plate 41 of rectangular shape mounted upon a sleeve 42 fixed upon the vertical shaft 43 which is bent at 90° and passes through the guide sleeve 44 (Fig. 1) fixed on the frame A. Plates 41a and 41b of the same size and shape as plate 41 are hinged to either side of the latter, all three plates having a curved cut-away 45. A thin plate 46, also having a cut-away 45 and of the same size and shape as plate 41, is mounted on a sleeve 47 which is slidably mounted on rod 43 but prevented from rotating thereon and is provided with a horizontal extension 48 which passes through a hole in the top end of a bar 49 slidably mounted in vertical guides 50 and having a pin at its lower end engaging slot 51 in the lever 52. Said lever is pivoted at 53 and provided with a downwardly extending arm 54 carrying a roller 55 engaging cam 56 on shaft 19. A plate 57 is attached to the sleeve 42 and carries two pins 58 serving as the pivots for beak-shaped levers 59 and 59a having closed slots 60, 60a in the lower arms and open slots 61, 61a in the upper arm, said latter slots being engaged respectively by the pins 62, 62a on the plates 41a, 41b. The slot 60a of lever 59a is engaged by cross pin 63 on the forked lever 64 which is pivoted on cross bar 65 and is connected by link 66 to lever 67 which is pivoted on cross rod 68 and carries a roller 69 engaging cam 70 mounted on secondary shaft 22 which also carries the previously described cam 21 for operating the enclosure-feed. The slot 60 of lever 59 is similarly engaged by the cross pin 71 extending between the arms of the forked lever 72 which is pivoted on a short shaft 73 attached to a gable of the frame A. The lever 72 is connected by link 74 to a lever 75 pivoted on cross rod 39 and carrying a roller 76 engaging a cam 77 on shaft 19. Spring 78 and 79 serve to keep the rollers 76 and 69 in contact with the respective cams and to urge the mechanism into the position indicated in Fig. 2.

The folding mechanism above described acts as follows:—

When the grippers reach the chain dotted position as shown in Fig. 2, the jaws release the enclosure which at the same time is clamped down upon the plate 41 by the plate 46 which, by virtue of the sharp fall 56a on the cam 56, is allowed to descend by gravity or spring and so clamp the enclosure substantially as shown in dotted lines in Fig. 1 from which it will be seen that the width of the enclosure is about three times the width of the plate 46. At the same time cam 70 commences to move lever 67 to the right (in Fig. 2) against the spring 79 and thereby cause lever 59a to act on the plate 41a and turn the latter through 180° and fold the right hand third of the enclosure onto the top of plate 46 (see Fig. 10). Then the cam 77 comes into action and, in a like manner, the left hand third of the enclosure is folded over by plate 41b onto plate 41a which has been previously folded over. Thus the enclosure is folded into three plies separated by the thin plates 46 and 41a and all lying between the plates 41 and 41b. The pins 62, 62a are relatively close to the hinge axes of the plates 41a, 41b so that the relatively limited angular movement of the levers 59, 59a is sufficient to cause said pins to move inwards past, and around, the hinge axes and cause the plates 41a, 41b to pass through a magnified angular movement of 180°.

The mechanism for feeding the envelope blanks which is more particularly shown in Fig. 5 comprises a container 80 shaped to correspond with the envelope blanks G which as shown in Fig. 11 comprise a central part with two end flaps G1, G4 and two side flaps G3 and G2 which may be separated from the central part by two folding creases G5 and G6. The container has a vertical cut-away 81 through which the end flaps G4 of the blanks G project. The container 80 is supported on the frame A by a U-shaped bracket 83 and the blanks G are supported by a base plate 84 which has the same shape as the blanks and is carried by a rod 85 slidably mounted in suitable bearings not shown. The base plate is vertically adjustable to feed up the blanks and this is preferably achieved in known manner as, for example, by mechanism similar to that shown for feeding up the enclosures. The blank transferring mechanism comprises a stencil gummer 86 having a rubber gummer 87 underneath, of the shape indicated by dotted shade lines in Fig. 1. The gummer 86 is attached to a channelled slide member 88 embracing a horizontal guide bar 89 to which is attached a vertical bar 90 sliding in a channelled guide 91 supported on a cross rod 92. The slide 88 is attached by a link 93 to a lever 94 which is pivoted on the cross rod 95 and carries a roller 96 engaging the cam track 97 of a cam 98 mounted on the shaft 19. The vertical bar 90 carries at its lower end a pin 99 engaging a slot 100 in a lever 101 which is pivoted to the frame A and carries a roller 102 engaging a cam 103 on shaft 19.

When roller 102 is in engagement with the fall 104 of cam 103 the gummer 86 descends to its lowest position and gums the blank as indicated by shade lines in Fig. 11. On further rotation of the cam, in the direction indicated, the gummer 86 is lifted together with the blank G and remains at the same height during the concentric part 105 of the cam 103. While the rod 89 is held in the high position the gummer is quickly transferred to the left by the fall 106 of cam 98 operating on the roller 96 of lever 94. Before the end of this transferring movement the fall 107 of cam comes into operation so that the gummer is lowered and places the blank G on the enclosing station table where it is retained by mechanism described later, this position of the blank G being denoted by chain dotted lines in Fig. 1. The gummer is then rapidly returned partially by the rise 108 and then caused to dwell for a period by the concentric part 109, the purpose of this dwell being explained later. The remainder of the return motion is effected by the rise 109 and during this part of the return the abrupt rise 110 of cam 107 raises the gummer 86 to a height which permits the gummer 87 to roll over and receive gum from the gumming roller 111 which revolves in a gum tank 112 and is driven by chain 112a from the main shaft 19.

The envelope blank G is left at the enclosing station D just as the plate 41a is being folded over. As the plate 41b is being folded over the folding mechanism commences to move towards the enclosing station D, this movement being imparted by cam 113 (Fig. 9) on shaft 114 driven from

shaft 19 by bevel gearing 115. The cam is engaged by roller 116 on lever 117 which is pivoted at its lower end on bracket 118 attached to frame A. The lever is connected by link 119 to a collar 120 (Fig. 2) clamped on the end of rod 121 which is attached to the bottom of rod 43 and engages a slotted transverse guide 122 bolted to the frame A. The guide together with the sleeve 44 (Fig. 1) constitute the guides for the folding mechanism during its transverse motion, the cross members 71, 63 and rod 48 permitting this movement without disassociating the plates 41, 41a, 41b and 46 from their respective control mechanisms.

Referring now to the enclosing station which is more particularly shown in Figs. 1, 6, 7 and 8, it comprises a square table 123 having two T-shaped openings 124 and a substantially rectangular opening 125. As will be seen from Fig. 6 there are three parallel shafts 130, 131 and 132, the first of which is driven from the main shaft 19 by a chain engaging sprocket wheel 133 and sprocket wheel 133b in shaft 19 (Fig. 9). The three shafts are interconnected by gearing 134.

After the blank G has been brought in flat condition to the enclosing or envelope-folding station D as indicated in dotted lines in Fig. 1, it is clamped in position by two rubber tipped fingers 126 attached to shaft 127 which is mounted in bearings 128, the fingers 126 being normally urged downwards by torsion springs 129. The fingers are controlled by cam 135 (see Fig. 8) co-operating with a roller follower 136 on lever 137 which is pivoted at 138 to a depending flange 139 and connected at the other end by a link 140 to one of the fingers. The cam is mounted on shaft 131 and its shape is such that during about half of a revolution the fingers 126 grip the blank.

When the folding mechanism has been fully traversed across to the enclosing station D as shown in Fig. 16 the projecting end of the folded enclosure H is clamped down (the cutaway 45 permitting this) on to the envelope blank G by means of clamp plate 141 (see Fig. 7) slidably mounted in a horizontal brass guide 142 which has a depending rod 143 sliding in a sleeved bracked 144 and connected at its lower end to a lever 145 pivoted on the bracket 146 and carrying a roller adapted to engage a cam 147 attached to one of the gear wheels. A tension spring 148 is attached to the end of the lever 145. As shown in Fig. 7 the clamp 141 has a depending pin 149 which engages in a slotted lever 150 which is pivotally connected at 151 to the table 123 and provided with a torsion spring 157. The lever 150 is connected by a link 152 to a slightly curved lever 153 pivoted at 154 and carrying a roller 155 engaging the edge cam 156 on shaft 130. The action of the clamping member 141 is that the guide 142 is raised by means of the cam 147 and while in the raised position the edge cam 156 allows the levers 153 and 150 to move under the influence of the torsion spring 157 and thus move the clamp 132 outwardly as indicated in chain dotted lines in Fig. 7. Then an abrupt fall on cam 147 comes into action and the guide 142 and clamp 141 snap down suddenly under the action of spring 148. The rising of the guide 142 with the clamp 141 in the inner position lifts up the flap G_1 of the envelope around the knife edge 158 on the gummer 86, said knife edge being positioned next to the guide 142 for this purpose during the previously mentioned dwell in the return movement of the gummer and associated mechanism. The knife edge 158 is removed before the guide 142 snaps down, its place being taken by the end of the folded enclosure H which is coming across and ultimately arrives at the position as indicated in Fig. 7 and which serves to keep the envelope blank G flat on the table while the now emerging clamp 141 further folds the flap G_1 over and then quickly clamps it down over the end of the folded enclosure.

After the clamping action the cam 113 quickly returns the enclosure-folding mechanism to the folding station and during this return the cams 77 and 70 (Fig. 2) unfold the plates 41b and 41a and the cam 56 raises the plate 46 to allow the jaw 24, 24a to shoot through again and seize another enclosure.

After the envelope flap G and the folded enclosure have been clamped down the clamp 141 is quickly withdrawn and the guide 142 moved down with its top flush with the table 123 and one of the thin formers or carriers 159 of a turret mechanism descends, said mechanism as shown in Figs. 1, 6 and 7 comprising a hollow vertical sleeve 160 slidable in an outer ring 179 in a bearing 161 attached to the table 123 and having four pairs of lugs 162 at its top to which links 163 are pivoted, being pinned at their lower ends to spaced lugs 164 on the formers 159. A flanged collar 165 is grub-screwed to the lower end of sleeve 160 and its flange is engaged by a rocker lever 166 pivoted on shaft 167 mounted on bracket 168 which also serves to bear the ends of shafts 131 and 132. The other end of the lever engages a cam 169 which is similar in shape to cam 135 Fig. 8. A vertical shaft 170 is slidably located inside the sleeve 160 and is connected by links 171 to four clamp levers 172 pivoted to the lugs 164 on the formers 159. The lower end of shaft 170 rests upon one arm 173 (Fig. 6) of a bell crank lever whose other arm 175 has a roller 176 engaging cam 177 mounted on shaft 130. As shown in Fig. 7 the formers 159 are hinged at 178 to the ring 179 mounted in bearing 161 and having a maltese cross 180 (Fig. 6) formed at its lower end adapted to be engaged by roller 181 on the circular disc 182 whose circumference is adapted to fit into the arcuate parts 180a of the cross and hold same stationary when the roller is out of contact with the cross. The disc 182 is driven by bevel gearing from shaft 132. Each engagement of the roller 181 with the cross rotates the same in known manner through 90° so that each former 159 takes the place of the preceding one.

After the folded enclosure H and blank G have been pressed down by the former 159 as previously described the projecting side flaps G_2 and G_3 (see Figs. 1 and 8) are folded over by the folding mechanism which consists of two T-shaped members 183, 183a of which 183a is provided with spaced ridges 184 to prevent the nose of the T-folder from removing the gum from flap G_2. Said T-folders are slidably mounted in guides 185 each having a depending rod 186 sliding in a fixed sleeve 187 and pin-and-slot connected at its lower end to lever 188 pivoted on shaft 189 and which carries a roller 190 engaging cam 191. A tension spring 192 connected to lever 188 normally urges the rod 186 upwards. The folders 183, 183a each have a downward projection 193 connected by a link 194 to a lever 195 pivoted on shaft 189 and carrying a roller engag-

ing cam 196. The corresponding mechanism for folder 183a and its guide 185 is not shown in Fig. 8 but is the same as the mechanism shown except that the rise on the corresponding cam is broader and thus the folder 183a is actuated before 183. The cams 191 allow the guides 185 to rise under the influence of the springs 192 and then the cam 196 and the corresponding cam not shown respectively move the folders into the centre of the former 159 against the action of the springs 197. As previously mentioned the folder 183a slightly leads the folder 183 since it has to fold the flap G_3 underneath the gummed flap G_2. As will be seen from Fig. 8 the cam 196 (also the cam not shown) are shaped so as to give a rapid motion to the folders, particularly on the return movement, the reason being to allow the clamp levers 172 to descend quickly before the flaps G_2, G_3 have time to spring up. The levers 172 are allowed to descend under gravity or spring by an abrupt fall in the cam 177 (Fig. 6) and thus the longitudinal seam between the flaps is pressed down. The cam 169 (Fig. 6) then comes into action, raising the sleeve 160 and thus the formers 159 are lifted up about their hinges to about an angle of 45°, the clamp levers 172 also being lifted. The former 159 over which the flaps G_2 and G_3 have been folded lifts the envelope and folded circular with it. Then the pin 181 engages the maltese cross 182 and the whole turret assembly is rotated through 90° in the direction indicated by the arrow X in Fig. 1, the former or carrier 159 with the envelope and circular being turned round into alignment with withdrawal and folding jaws to be described. The cam 169 then allows the sleeve 160 to fall together with the formers 159, the cam 177 in the meantime coming into action and preventing the clamping levers 172 also falling, the relative movement of sleeve 160 and rod 170 being permitted by the pin and slot connection 160a (Fig. 7). The former 159 now at the envelope folding mechanism has the next envelope folded round it in the manner previously described.

The withdrawing mechanism is shown most clearly in Fig. 4 and comprises a lower jaw 198 formed on a horizontal bar 199 slidable in a channelled guide 200 mounted on a bracket 201. The upper jaw 202 is formed on a lever 203 pivoted to the bar 199. The lateral movement of the jaws 198 and 202 is controlled by a cam track 204 in which engages a roller 205 on lever 206 pivoted at its lower end on the cross rod 39 and attached at its upper end to a link 207 pivoted to the bar 199. The opening and closing movement of the jaws is controlled by a cam 208 engaging a roller 209 on the lever 210 which is pivoted to a bracket 211 and connected to a link 212 connected to one end of a channelled guide 213 pivoted to a bracket 214. The guide 213 is engaged by a roller 215 on the end of lever 203. The jaws are urged to the closed position by a tension spring 216. In action the jaws are moved forward by the cam 204 (which together with the cam 208 is driven by main shaft 19) towards the left in Fig. 4 and at the same time the jaw 202 is raised by the rise on cam 208. A dwell then occurs in the forward movement and when the former 159 with the envelope G thereon falls into horizontal position the gummed flap G_4 contacts with and is folded up by the top jaw 202 as indicated in chain dotted lines in Fig. 4, which together with the lower jaw is then moved quickly forward and closed to fold down the gummed flap G_4 and seize the end of the envelope. The jaws with the envelope are then rapidly withdrawn and towards the end of the return movement the jaws are opened slightly by the cam 208 and the envelope with folded enclosure is ejected by the ejector prongs 217 which engage in the slots 218 in the jaws (Fig. 1) and is delivered by the chute 222.

The finished product is therefore as shown in Fig. 12 an envelope with the side flaps G_2, G_3 folded and joined down the longitudinal seam and the end flap G_4 gummed down on top of said side flaps while the other end flap G_1 is folded inside, the enclosure being folded in three plies inside the envelope.

By a few slight modifications an envelope, closed at both ends, may be produced. The modifications consist in arranging the stencil gummer to gum the envelope side flaps G_2, G_3 additionally as at X and Y (Fig. 13) and in replacing the formers 159 of the turret mechanism by the tri-pronged former 219 shown in Fig. 15 and in replacing clamp levers 172 by the cross shaped levers 220, the cross arm being provided with downward projections 221 which enter between the prongs and press down the gummed parts X, Y and so close the envelope. This type of former and clamp lever can be used also for producing the envelope as shown in Fig. 13, that is, with one end open.

Where the enclosure (which term includes booklets and the like) are of appreciable thickness or of a springy nature the long seam clamping levers 172, 220 may be electrically heated by means of resistance elements or the like to ensure that the seam dries quickly.

As shown, the delivery station F is arranged at 90° from the envelope folding station D but it will be understood that it could be arranged at 180° or 270°. In a high speed machine this would give greater time for drying of the seams.

The envelope blank folders 183, 183a are placed far enough apart in their outer positions to accommodate the broadest envelope contemplated, it being possible to fold narrower envelopes without adjustment of these folders because the seam is made centrally.

The turret mechanism may comprise a greater number than four formers 159 and associated parts. With a greater number a longer drying period could be obtained.

Preferably the folding mechanism for the enclosures is made readily detachable so that it may be easily replaced by mechanism suitable for enclosures of a different size. In like manner the enclosure and envelope containers, the envelope formers and the stencil gummer are preferably arranged so as to be readily detachable or adjustable.

An alternative arrangement to the above described envelope blank supply and gumming arrangement consists of an attachment which can replace the said arrangement. The attachment comprises a paper roll from which the paper strip is intermittently drawn by a pair of intermittently driven feed rolls. The strip then passes through a further pair of similarly driven rolls of which the upper carries a gumming stencil which is gummed by a gum roller mounted on a gum dish. The gummed strip is cut by a male and female die press which is operated in synchronism with the feed rollers by timed eccentric or cam means and the knives of which are the shape of the blank. An oval or other suitably shaped knife is provided at the centre of the

dies in the case of window envelopes. The knives carry small projections which project slightly beyond the knives and fit into corresponding grooves in the other element of the die, the purpose being to provide the creases whereby folding of the side and end blanks is facilitated. Small stripper fingers may be provided to push away the waste paper. The punching or cutting out station may be two or more cycles (blanks) from the gumming stage in order to give the gum time to get tacky. When the blank is cut it is seized by gripping jaws and conveyed to the folding and enclosing station D.

The machine as shown is power driven, and the drive may be applied to shaft 22 or shaft 19.

Various other modifications may be made without departing from the scope of the invention as claimed in the following claims:—

In the following claims the term "enclosure" includes letters, circulars, booklets and the like which may be placed in envelopes.

What I claim is:—

1. A machine for wrapping enclosures within envelopes comprising means for conveying an envelope blank to an envelope folding station, means for conveying an enclosure to said station, folding means for folding the blank around the enclosure to form an envelope with enclosure therein said folding means for the blank including a carrier at said station for the folded blank and enclosure and means for removing said carrier with the envelope and enclosure thereon to a delivery station.

2. A machine for wrapping enclosures within envelopes comprising means for conveying an envelope blank to an envelope folding station, means for folding an enclosure, means for conveying the folded enclosure to said station, folding means for folding the blank around the enclosure to form an envelope with enclosure therein said folding means for the blank including a carrier at said station for the folded blank and enclosure and means for removing said carrier with the envelope and enclosure thereon to a delivery station.

3. A machine for wrapping enclosures within envelopes comprising means for feeding enclosures, folding mechanism for said enclosures, means for conveying same to said mechanism, means for gumming and conveying an envelope blank to a folding station, retaining means for holding the blank there, means for conveying said folded enclosure to said station, retaining means for holding the enclosure there on said blank means for folding and forming the blank around the enclosure to give an envelope with the enclosure therein said folding means for the blank including a carrier at said station for the folded blank and enclosure and means for removing said carrier with the envelope and enclosure thereon to a delivery station.

4. A machine for wrapping enclosures within envelopes, formed from blanks consisting of side and end flaps and a face portion, comprising means for folding enclosures, means for gumming an end and side flap of an envelope blank, means for conveying said blank to a folding station, means for retaining the blank there, means for conveying the folded enclosure to said station, means for folding the ungummed end flap over said folded enclosure and retaining same, former means adapted to rest on said enclosure and blank, folding members for folding the side flaps over said former, means for transferring the former with the blank thereon, means for folding over the gummed end flap and means for withdrawing the envelope with the enclosure therein from said former.

5. A machine for wrapping enclosures within envelopes, formed from blanks consisting of side and end flaps and a face portion, comprising means for feeding enclosures, folding mechanism therefor, means for conveying enclosures from said feed means to said mechanism, means for gumming an end and side flap of an envelope blank, means for conveying said blank to a folding station, means for retaining the blank there, means for conveying the folded enclosure to said station, means for folding the ungummed end flap over said folded enclosure and retaining same, a former adapted to rest on said enclosure and blank, folding members for folding the side flaps over said former, clamp means for clamping the side flap seam down on the former, means for transferring the former with the blank thereon, means for folding over the gummed end flap and means for withdrawing the envelope with the enclosure therein from said former.

6. A machine for wrapping enclosures within envelopes formed from blanks consisting of side and end flaps and a face portion, comprising means for feeding enclosures, folding mechanism therefor, means for conveying enclosures from said feed means to said mechanism, means for gumming an end flap, the outer edge of a side flap and the top ends remote from the gummed end flap of the side flaps, means for conveying said blank to a folding station, means for retaining the blank there, means for conveying the folded enclosure to said station, means for folding the ungummed end flap over said folded enclosure and retaining same, former means adapted to rest on said enclosure and blank, folding members for folding the side flaps over said former, clamp means adapted to clamp down on the side flap seam and on the gummed ends of said flaps, means for transferring the former with the blank thereon, means for folding over the gummed end blank and means for withdrawing the envelope with the enclosure therein from said former.

7. For a machine for forming postal envelopes around their enclosure a removable folding mechanism comprising a thin central plate, two similar wing plates hinged to opposite sides thereof, a vertically reciprocable top former plate arranged above said central plate, means for raising and lowering said top plate, and means for folding said wing plates in quick succession inward through 180° to fold an enclosure into three plies round said former plate.

8. For a machine for forming postal envelopes around their enclosures removable folding mechanism comprising a thin central plate, two similar wing plates hinged to opposite sides thereof, a vertically reciprocable top former plate arranged above said central plate, a cut-away in the ends of said plates, cam means for raising and lowering said top plate and cam means for folding said wing plates in quick succession inwards to fold an enclosure into three plies round said former plate.

9. A machine for forming envelopes around their enclosures comprising means for conveying an envelope blank to a folding station, means for depositing an enclosure on said blank, folding mechanism for folding and forming the envelope blank around said enclosure and a former in position, means for raising and lowering said former and means for transferring same in stages

to different radial positions, and gripper means at a subsequent stage for gripping and removing the envelope and its enclosure from the former.

10. A machine for forming envelopes around their enclosures comprising means for conveying an envelope blank to a folding station, means for depositing an enclosure on said blank, folding mechanism for folding and forming the envelope blank around said enclosure and a former in position, a turret mechanism comprising a plurality of such formers disposed radially, means for raising and lowering said formers and means for rotating the formers in stages between each raising and lowering movement to different radial positions, gripping means at a subsequent stage or position of the former for gripping and stripping said envelope and enclosure from the former.

11. A machine for forming envelopes around their enclosures comprising means for conveying an envelope blank to a folding station, means for depositing an enclosure on said blank, folding mechanism for folding and forming the envelope blank around said enclosure and a former in position; a turret assembly comprising a plurality of such formers in radial assembly, means for raising and lowering said formers, means for rotating the formers in stages between each raising and lowering movement to different radial positions, clamp members attached to said formers for clamping the folded envelope and means for raising and lowering said clamps and gripping means at a subsequent position of the former for gripping and stripping said envelope and enclosure from the blank.

12. A machine for forming envelopes around their enclosures comprising means for conveying an envelope blank to a folding station, means for depositing an enclosure on said blank, folding mechanism for folding and forming the envelope blank around said enclosure and a former in position, a turret assembly comprising a plurality of such formers hinged to a ring member, an inner sleeve within said ring, link means connecting said formers and said sleeve, cam means for raising and lowering said sleeve, a clamp member hinged to each former, a vertical rod within said sleeve, means connecting said clamp member and said rod, cam means for raising and lowering said rod and means for rotating the formers in stages so that a former assumes the previous position of the preceding former; and gripping means at a subsequent position of the former for gripping and stripping said envelope and enclosure from the blank.

13. A machine for forming envelopes around their enclosures comprising means for conveying an envelope blank to a folding station, means for depositing an enclosure on said blank, folding mechanism for folding and forming the envelope blank around said enclosure and a fork shaped former in position, a turret assembly comprising a plurality of such formers of fork shape hinged to a ring, an inner sleeve within said ring, means connecting said formers and said sleeve, cam means for raising and lowering said sleeve, a clamp member hinged to each former, projection means on said clamp adapted when the latter is lowered to pass between the forks of the former and seal the end of the envelope, a vertical rod within said sleeve, means connecting said clamp member and said rod, cam means for raising and lowering said rod and means for rotating the formers in stages so that a former assumes the previous position of the preceding former, and gripping means at a subsequent position of the former for gripping and stripping said envelope and enclosure from the blank.

14. A machine for forming envelopes from blanks consisting of a face portion and side and end flaps around enclosures, comprising enclosure-folding mechanism which comprises a base of hinged plates, a top former plate timed to fall and hold an enclosure, and means for turning the hinged plates to fold the enclosure round said former plate; means for traversing the folding mechanism as a whole towards envelope folding mechanism which comprises means for folding over an end flap of the blank and retaining the folded enclosure, a plurality of radially arranged formers, folding members for folding the side flaps round a former and means for rotating the former with the envelope thereon to another position opposite gripping means which comprises jaws for folding over the end flap, gripping the envelope and stripping same together with the enclosure from the former.

15. A machine for forming envelopes from blanks consisting of a face portion and side and end flaps around enclosures, comprising enclosure-folding mechanism which comprises a thin central plate, two similar wing plates hinged to opposite sides thereof, a vertically reciprocable top former plate arranged above said central plate, means for raising and lowering said top plate, means for folding said wing plates successively inward to fold an enclosure into three plies and means for moving said folding mechanism as a whole towards envelope folding and transferring means which comprises a turret assembly including radially arranged formers, means for rotating said formers from a folding station to a removing station, vertically and laterally movable clamp means at said folding station for folding over an end flap of the blank and clamping the folded circular, folding members for folding the side flaps over the former; and gripping means at the removing station for folding over an end flap and removing said envelope and enclosure.

16. A machine for forming envelopes from blanks consisting of a face portion and side and end flaps around enclosures, comprising enclosure-folding mechanism which comprises a thin central plate, two similar wing plates hinged to opposite sides thereof, a vertically reciprocable top former plate arranged above said central plate, a cut-away in the ends of said plates, cam means for controlling vertical movement of said top plate and cam means for folding said wing plates successively inwards through 180° to fold an enclosure into three plies cam means for traversing said folding mechanism as a whole towards envelope folding and transferring means comprising a turret assembly including radially arranged formers, means for rotating said formers from a folding station to a removing station, clamp means at said folding station for folding over an end flap of the blank and clamping the folded enclosure and folding members for folding the side flaps over the former; and gripping means at the removing station for folding over and removing said envelope and enclosure.

17. A machine for forming envelopes around enclosures to be enclosed thereby from blanks consisting of side and end flaps and a face portion, comprising folding mechanism which comprises a base of hinged plates, a top former plate timed to fall and hold an enclosure on said base, and means for turning the hinged plates through

180° to fold the enclosure round said former plate and means for traversing the folding mechanism as a whole with the folded enclosure, means for conveying enclosures to said mechanism, means for gumming an end and side flap of an envelope blank, means for conveying said blank to a folding station, means for retaining the blank there, means for folding the ungummed end flap over said folded enclosure when traversed and retaining same, former means adapted to rest on said enclosure and blank, folding members for folding the side flaps over said former, means for transferring the former with the blank thereon, means for folding over the gummed end blank and means for withdrawing the envelope with the enclosure therein from said former.

18. A machine for forming envelopes around enclosures to be enclosed thereby from blanks consisting of side and end flaps and a face portion, comprising folding mechanism which comprises a thin central plate, two similar wing plates hinged to opposite sides thereof, a vertically reciprocable top former plate arranged above said central plate, means for raising and lowering said top plate, means for folding said wing plates successively inward through 180° to fold an enclosure into three plies and means for moving said folding mechanism as a whole with the folded enclosure, means for conveying enclosures to said mechanism, means for gumming an end and side flap of an envelope blank, means for conveying said blank to a folding station, means for retaining the blank there, means for folding the ungummed end flap over said folded enclosure and retaining same, former means adapted to rest on said enclosure and blank, folding members for folding the side flaps over said former, means for transferring the former with the blank thereon, means for folding over the gummed end blank and means for withdrawing the envelope with the enclosure therein from said former.

19. A machine for forming envelopes around enclosures to be enclosed thereby from blanks consisting of side and end flaps and a face portion, comprising folding mechanism which comprises a thin central plate, two similar wing plates hinged to opposite sides thereof, a vertically reciprocable top former plate arranged above said central plate, means for raising and lowering said top plate, means for folding said wing plates successively inward through 180° to fold an enclosure into three plies and means for moving said folding mechanism as a whole with the folded enclosure, a stencil gummer for gumming an end and side flap of an envelope blank, means for moving said gummer with blank to a folding station, means for retaining the blank there, means for folding over the ungummed end flap and gripping the end of the folded enclosure while the folding mechanism recedes, former means adapted to rest on said enclosure and blank, folding members for folding the side flaps over said former, means for transferring the former with the blank thereon, means for folding over the gummed end blank and means for withdrawing the envelope with the enclosure therein from said former.

20. A machine for forming envelopes around enclosures to be enclosed thereby from blanks consisting of side and end flaps and a face portion, comprising enclosure means for gumming an end and side flap of an envelope blank and conveying it to a folding station, means for retaining the blank there, folding members for said side flaps, a thin former plate, means for raising and lowering said plate and means for raising and inwardly moving said folding members over the former when in a lowered position to fold the side flaps, means for rotating the former in its raised position with the blank thereon opposite to gripping means, the former being lowered and the gummed end flap folded over and seized by said gripping means which retracts the envelope and enclosure.

21. A machine for forming postal envelopes around enclosures to be enclosed thereby from blanks consisting of a face portion and side and end flaps, comprising automatic feed means for the enclosures, gripper jaws for conveying the enclosure to folding mechanism which comprises a thin central plate, two similar wing plates hinged to opposite sides thereof, a vertically reciprocable top former plate arranged above said central plate, a cut-away in the ends of said plates, cam means for raising and lowering said top plate and cam means for folding said wing plates successively inwards through 180° to fold the enclosure into three plies and cam means for traversing said folding mechanism as a whole, a stencil gummer for gumming an end and side flap of a blank and conveying the blank to a folding station, means for gumming said gummer, cam-operated catch means for retaining the blank at said station, a vertically and horizontally movable clamp for folding the ungummed end flap over said enclosure and thus retaining same, a turret assembly including a plurality of hinged radial former plates, means for raising and lowering said plates; vertically and horizontally movable folder members for folding the side flaps over the former in the lowered position, a clamp lever connected to each plate for clamping said side flaps, means for raising and lowering said levers, a maltese cross device for rotating said turret assembly when the formers are raised so that the former with the envelope thereon is brought into line with a removing device comprising gripping jaws, cam means for reciprocating said jaws so that when the former falls the gummed end flap is bent up by said jaws, cam means for opening and closing said jaws, and ejector means for ejecting the envelope and enclosure, said last cam means causing the jaws to fold over and gum down the gummed end flap and to release the envelope when the second last cam means moves the jaws towards said ejector means.

22. A machine for forming postal envelopes around enclosures to be enclosed thereby from blanks consisting of a face portion and side and end flaps comprising automatic feed means for the enclosures, gripper jaws for conveying the enclosure to folding mechanism which comprises a thin central plate, two simliar wing plates hinged to opposite sides thereof, a vertically reciprocable top former plate arranged above said central plate, a cut-away in the ends of said plates, cam means for raising and lowering said top plate and cam means for folding said wing plates successively inwards through 180° to fold an enclosure into three plies and cam means for traversing said folding mechanism as a whole, a stencil gummer for gumming an end and side flap of a blank and the ends of said side flaps remote from the gummed end flap and conveying the blank to a folding station, means for gumming said gummer, cam-operated catch means for retaining the blank at said station, a vertically and horizontally movable clamp for

folding the ungummed end flap over said folded enclosure and thus retaining same, a turret assembly including a plurality of hinged radial formers of fork shape, means for raising and lowering said formers, vertically and horizontally movable folder members for folding the side flaps over a former in the lowered position, a clamp lever connected to each former for clamping said side flaps, means for raising and lowering said levers, projections on said levers adapted to enter between the prongs of said formers and press down the gummed ends of said side flaps, a maltese cross device for rotating said turret assembly when the formers are raised, so that the former with the envelope thereon is brought into line with a removing device comprising gripping jaws, cam means for reciprocating said jaws so that when the former falls the gummed end flap is bent up by said jaws, cam means for opening and closing said jaws, and ejector means for ejecting the envelope and enclosed circular, said last cam means causing the jaws to fold over and gum down the gummed end flap and to release the envelope when the second last cam means moves the jaws towards said ejector means.

23. A machine for wrapping enclosures within envelopes comprising means for conveying an envelope blank to an envelope folding station, and folding means for folding the blank around the enclosure to form an envelope with enclosures therein, former means at said station round which the blank is folded and means for removing said former means with the envelope and enclosure thereon to a delivery station.

24. A machine for wrapping enclosures within envelopes comprising means for conveying an envelope blank to an envelope folding station, means for folding an enclosure, means for conveying the folded enclosure to said station and folding means for folding the blank around the enclosure to form an envelope with enclosure therein, former means at said station round which the blank is folded and means for removing said former means with the envelope and enclosure thereon to a delivery station.

25. A machine for wrapping enclosures within envelopes comprising means for feeding enclosures, folding mechanism for said enclosures, means for conveying said enclosures to said mechanism, means for gumming and conveying an envelope blank to a folding station, retaining means for holding the blank there, means for conveying said folded enclosure to said station, retaining means for holding the enclosure there on said blank and means for folding and forming the blank around the enclosure to give an envelope with the enclosure therein, former means at said station round which the blank is folded and means for removing said former means with the envelope and enclosure thereon to a delivery station.

26. A machine for wrapping enclosures within envelopes comprising means for conveying an envelope blank to an envelope folding station, means for conveying an enclosure to said station, and folding means for folding the blank around the enclosure to form an envelope with enclosure therein, an assembly of circularly spaced carriers for the envelope and enclosure at the folding station, and means for rotating said assembly to remove the carrier at the folding station to a delivery station and for bringing the next carrier into position at the folding station.

27. In a machine for wrapping enclosures within envelopes comprising means for conveying an envelope blank to an envelope folding station, means for conveying an enclosure to said station, and folding means for folding the blank around the enclosure to form an envelope with enclosure therein, an assembly of circularly spaced formers round one of which the envelope blank at the folding station is folded, and means for rotating said assembly to remove the former at the folding station to a delivery station and for bringing the next former into position at the folding station.

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