Dec. 22, 1931. A. NOVICK 1,837,727

ENVELOPE MACHINE

Original Filed Sept. 27, 1924 2 Sheets-Sheet 1

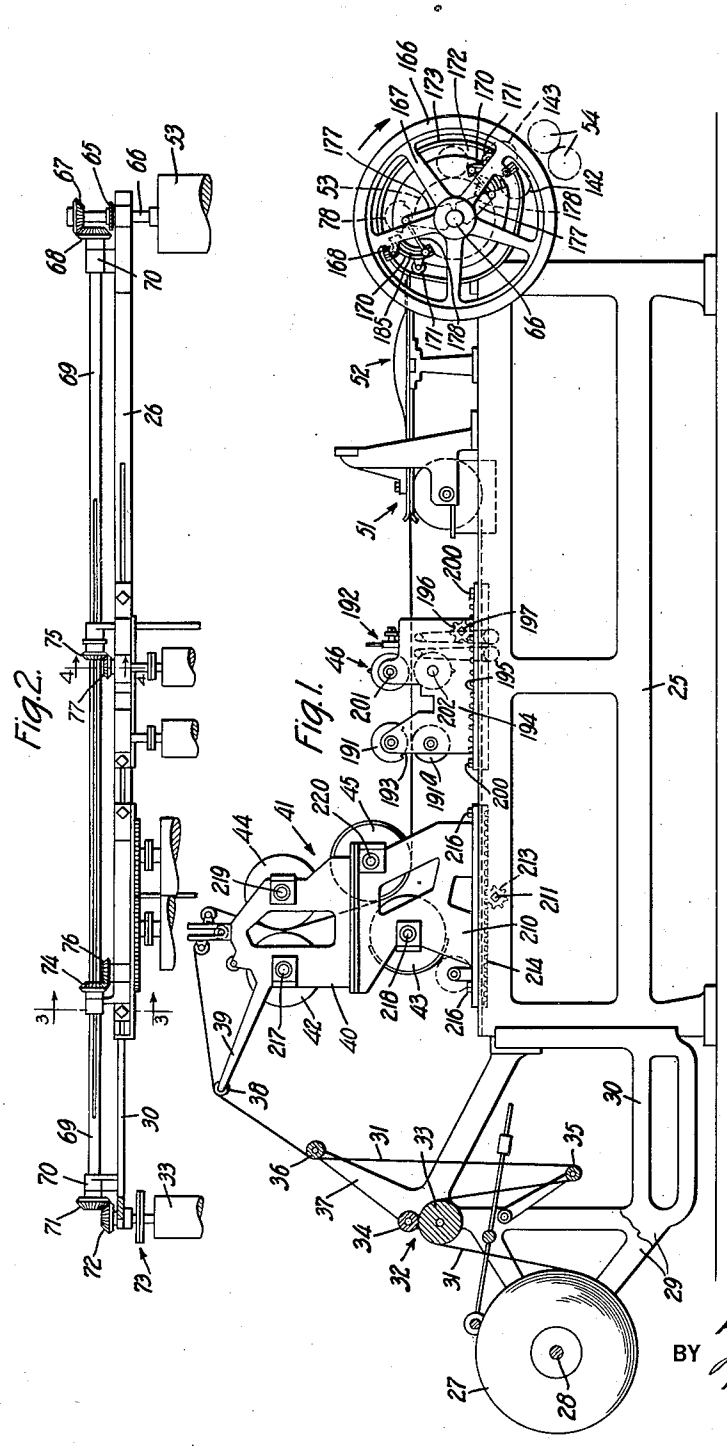


Fig. 2.

Fig. 1.

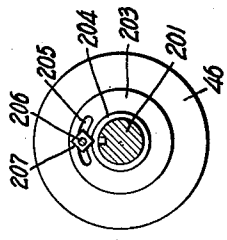


Fig. 5.

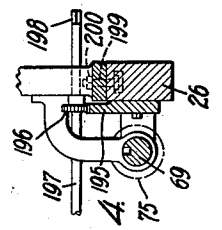


Fig. 4.

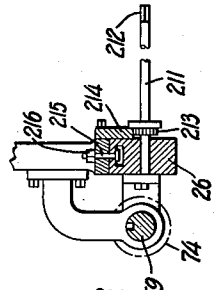


Fig. 3.

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Fig. 6.

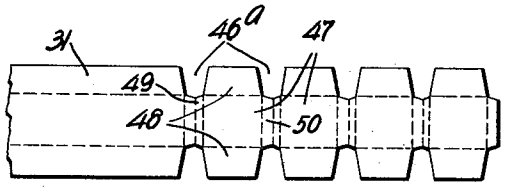


Fig. 7.

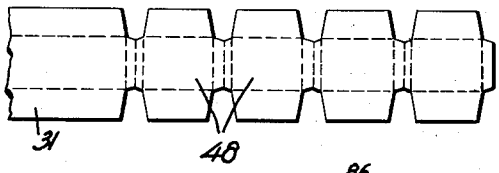
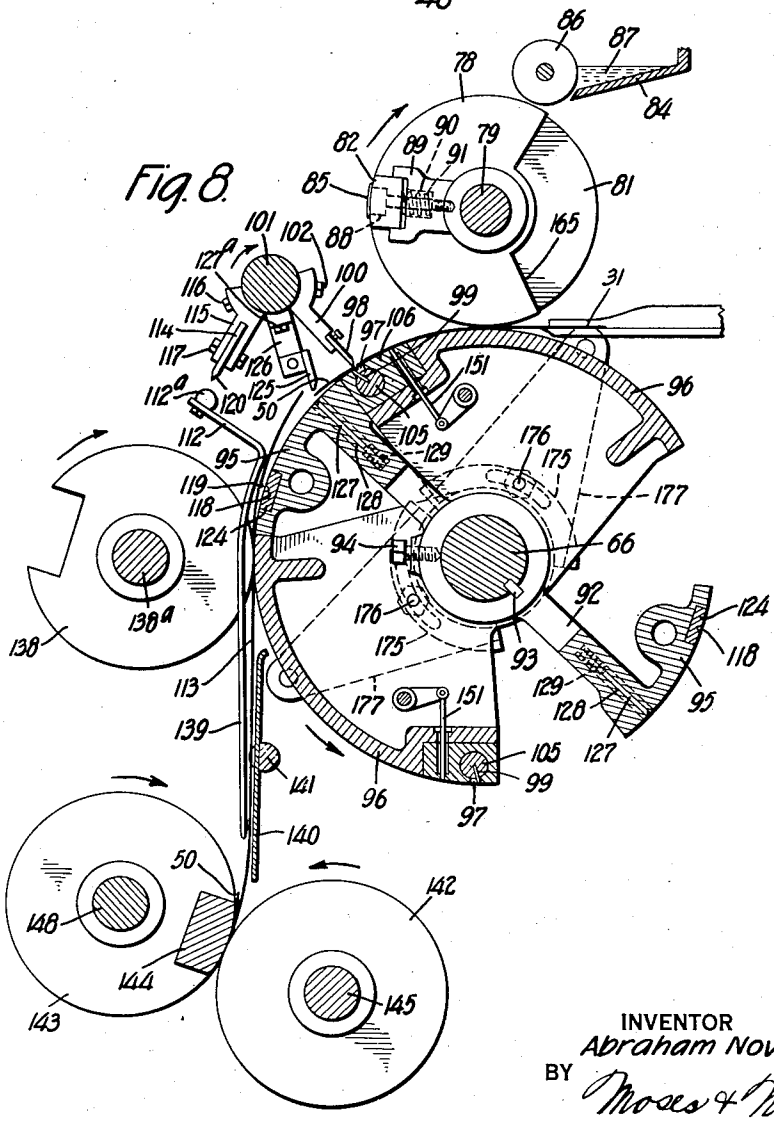


Fig. 8.



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UNITED STATES PATENT OFFICE

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ENVELOPE MACHINE

Original application filed September 27, 1924, Serial No. 740,170. Divided and this application filed October 5, 1928. Serial No. 310,501.

This application is a division of my pending application, Serial No. 740,170, filed September 27, 1924, for envelope machines.

In said application disclosure is made of a machine in which envelopes are manufactured from a continuous web of envelope material supplied to the machine from a reel at the introductory end thereof.

The machine comprises instrumentalities for successively printing upon the web, forming cuts in the web, severing the web into individual envelope blanks and folding the blanks into finished envelopes. The blank severing mechanism of said machine operates to feed the web continuously but at variable speed and is adjustable to enable blanks of different lengths to be produced without altering the timing of any of the operating instrumentalities.

The severing of the web always takes place at a fixed point or station in the travel of the web and in order that the printing mechanism and the web notching mechanism may operate at properly spaced intervals upon the web irrespective of the lengths of blanks severed from the web, provision is made for adjusting the notching mechanism and the printing mechanism toward and from such point of severance so that each may be located at a distance from the point of severance, depending on the length of the blanks being severed. The present invention relates to this feature of the machine.

The mechanism for unreeling the web and delivering it to the operating instrumentalities, which is disclosed but not claimed herein, is disclosed and claimed in my pending application Serial No. 310,502, filed October 5, 1928, for web feeding mechanism.

The invention will be understood from the following description taken in connection with the accompanying drawings in which a preferred embodiment of the invention is illustrated.

In the drawings:

Figure 1 is a side elevation of the machine partly in section;

Figure 2 is a fragmentary top plan view of one side of the machine showing a countershaft and the connection to the various devices driven by it;

Figure 3 is a detail sectional view taken on the line 3—3 of Figure 2 and shows the means by which the printing device is adjustable along the machine;

Figure 4 is a detail sectional view taken on the line 4—4 of Figure 2 and shows the means by which the notching cutters may be shifted along the machine;

Figure 5 is a detail elevation of a portion of the web cutting mechanism;

Figure 6 shows a portion of the web cut out at its leading end to constitute a series of blanks;

Figure 7 is a view similar to Figure 6 but shows blanks of greater length as produced by a different adjustment of the parts of the machine;

Figure 8 is a sectional side view showing the web feeding cylinder and its associated parts, the parts being shown at the beginning of a cycle of movement.

Referring particularly to Figure 1, the machine comprises a main frame composed of side plates or frames 25 and 26 joined to each other by suitable cross bars. A web supply roll 27 is carried, at the rear of the machine on a shaft 28 detachably supported on rearward extensions 29 of brackets 30, which are secured to the main frames 25 and 26 of the machine. The web 31, which may be composed of paper, is conducted upwardly from the supply roll to web unrolling means 32, said web unrolling means comprising a main feed roller 33 and a co-operative feed roller 34, both feed rollers being supported on the brackets 30. The web passes downwardly from the feed rollers 33 and 34, and under and around a guide roller 35 in a pivoted frame, the function of which is hereinafter described. From the roller 35 the web is conducted upwardly over a guide roller 36 on the upwardly extending arms 37 of the brackets 30, and then over a guide roller 38 supported on arms 39 extending rearwardly from a frame 40 of printing means 41. In travelling through the printing means, the web passes down between type cylinders 42 and 43 and platens or printing cylinders 44 and

45, beneath the printing cylinder 45 to cutting means 46 where the side edges of the web are cut as shown at 46*a*, Figure 6, to form envelope blanks 47 comprising side flaps 48, a top flap 49 and a bottom flap 50. From the cutting means the web passes to a gummer 51, by means of which gum or paste is applied to one of the side flaps 48. The web then passes to a folder 52, which folds the side flaps 48 upon each other.

The web, although it is unrolled from the supply roll 27 by the feed rollers 33 and 34, is not pushed through the machine, but is drawn through the machine by a web feeding cylinder 53 upon which cylinder certain operations, hereinafter described, are performed on the envelopes. After each envelope is cut from the web, as explained later, it passes between two guides roller 54 and is transferred by suitable devices (not shown) to a drier belt (not shown).

The machine may be driven by any suitable source of power. A main driveshaft (not shown) drives a gear 65 secured to a shaft 66 of the web feed cylinder 53. On the cylinder shaft 66, Figure 2, there is mounted a bevel gear 67 meshing with a bevel gear 68 on a shaft 69 supported on brackets 70 secured to the right-hand side frame 26 of the machine and the bracket 30. The shaft 69 carries at its rear end a bevel gear 71 meshing with a bevel gear 72 which is effective to drive the feed roller 33 through the medium of a clutch 73. The shaft 69 is also provided with bevel gears 74 and 75 splined thereto and meshing with bevel gears 76 and 77 for driving the printing means 41 and the cutting means 46, respectively.

To assist the feeding cylinder 53 in drawing the web 31 through the machine, there are provided feed rollers 78, Figure 8 which bear against the surface of the cylinder. Said feed rollers are narrow, and in addition to feeding the web 31 they also serve to crease the side flaps 48 of the envelopes as the flaps come, in folded condition, from the flap folding device 52. The feed rollers 78 are secured to a shaft 79 suitably supported by the machine frame, said shaft 79 being driven from the gear 65 to rotate the feed rollers 78. The shaft 79 is provided with rollers 81 (Figure 8) to hold the side flaps down. These rollers are of a slightly smaller radius than the feed rollers 78 and do not grip the web as do said feed rollers.

As the bottom flap 50 passes between the feed rollers 78 and the cylinder 53, it is gummed. This is accomplished by means of a gummer bar 82, (Figure 8) supported in slots in the feed rollers 78 and carried around with said rollers and past a gum pot 84. The gummer bar 82 is provided with a gumming surface 85 disposed above the surface of the feed rollers, so that only said gumming surface 85 comes in contact with a gumming roller 86 which carries gum 87 from the pot 84 and delivers it to the surface 85 of the gummer bar. The parts are so timed that the gummer bar reaches the place of contact between the feed rollers 78 and the cylinder 53 at the right time to cause the gum thus received from the gummer roller 86 to be applied to the flap 50. The gummer bar 82 is supported on headed screws 88 (Figure 8) threaded into lateral extensions 89 of the feed rollers 78. Each of said screws is shouldered against the bottom of a hole 90 in the extension 89 to limit the inward movement of the screw. Within each hole 90 is contained a compression spring 91. These springs press the bar 82 outwardly against the heads of the screws 88, which heads arrest the outward movement of the bar to properly position the surface 85, slightly above the surface of the feed rollers 78. With this arrangement, the gummer bar 82 may yield slightly inwardly when gumming the flap 50, during the co-operative movement of the rollers 78 and the cylinder 53.

Before proceeding with the description of the sequence of events, a brief description of the feeding cylinder 53 will be given. Said cylinder is composed of a section 92 fastened to the shaft 66 by key 93 and set screw 94 (Figure 8) said section 92 being provided with two diametrically opposite sectors 95 which serve a purpose hereinafter described and will be referred to as relatively fixed sectors. The cylinder further comprises sectors 96 which are caused to travel at the same speed as the sectors 95 or may be caused to lag behind said sectors 95 for a purpose hereinafter described. The sectors 96 are referred to as relatively movable sectors. For the present, however, the sectors 96 will be treated as though they were integral with the sectors 95.

Continuing the description of the steps subsequent to gumming the flap 50, the web is next tucked into a longitudinal slot 97, (Figure 8) of the cylinder sector 96 by a tucker blade 98, and is gripped by a clamping bar or gripper 99 preparatory to folding the bottom flap 50. The tucker blade 98 is supported on a bracket 100 secured to a shaft 101 by screws 102. The shaft 101 is driven from the gear 65 in a clockwise direction, the drive gearing being proportioned to cause the free edge of the tucker 98 to travel at the same speed as the periphery of the cylinder.

The clamp bar 99 is secured to a shaft 105 which shaft is carried by a block 106, secured to the movable sector 96 of the feed cylinder, and may be oscillated back and forth in said block to grip the web 31 and also to release it. The shaft 105 is controlled in its rocking movements by a fixed cam (not shown).

After the web has been clamped by the gripper 99, the flap 50 stands away from the cylinder. As the cylinder 53 advances,

the flap 50 meets a folder bar 112 which folds the flap back on the partly completed envelope 113 of the web, the folder bar being supported on a fixed cross bar 112*a*.

The next operation on the envelope is to crease the top flap 49. To this end, there is provided a creaser bar 114 supported on brackets 115 secured to the shaft 101 by screws 116. The creaser bar 114 is pointed at 117 along its free edge to force the web 31 into a groove 118, formed in a separate bar 124, on the sector 95 of cylinder 53 to form a crease 119. The creaser bar 114 is so positioned on the shaft 101 as to always come into proper registration with the groove during the rotation of the cylinder. The creaser bar 114 is held on the bracket 115 by bolts 120 and is yieldingly supported.

After the envelope flap 49 has been creased, the envelope 113 is severed from the web 31. For accomplishing this, there is provided a pair of shears composed of a blade 125, fixedly supported by brackets 126 on the shaft 101, the brackets being secured to the shaft 101 by screws 127*a*. A second blade 127 is supported in a slot 128 in the cylinder sector 95, with its outer or cutting edge below or about flush with the surface of the cylinder. When the cylinder reaches a certain position in its rotation, however, the blade 127 is forced outwardly in the slot 128 and along side of the blade 125 by springs 129, thus shearing the envelope blank 113 from the web 31. The blade 125 is so positioned on the shaft 101 that it is brought into registration with the blade 127 at the proper time.

As the envelope advances downwardly over the cylinder 53, it is assisted by feed rollers 138 on a shaft 138*a*, suitably supported by the machine frame. Said rollers 138 bear against the front of said cylinder. The envelope is guided downwardly from the cylinder 53 between an extension 139 of the flap folding bar 112, and a guide plate 140 carried by a rod 141 supported by the machine frame. Said extension 139 and the guide plate 140 direct the envelope between a cylinder 142 and feed rollers 143 one of said rollers being located at each end of the cylinder 142. The feed rollers 143 carry a bar 144 which is effective to press the gummed bottom flap against the body of the envelope to seal it.

The flap sealing cylinder 142 is mounted on a shaft 145. Said cylinder is driven in a counter clockwise direction, as viewed in Figure 8. The feed rollers 143 are secured to a shaft 148, said shaft being driven in a clockwise direction, as viewed in Figure 8.

It will be understood that the pitch diameters of the various driving gears are such that the surface speed of the various devices described is the same as the surface speed of the feed cylinder 53.

As the envelopes leave the cylinder 142, they are fed between rollers 54 and transferred to a drier belt. If desired, one of said rollers may be provided in a well-known manner, with a gummer bar to gum the top flap 49 of the envelope.

The feed cylinder 53, being provided with two movable sectors 96 as well as two relatively fixed sectors 95, two envelopes are produced at each single revolution of said cylinder. Each cylinder sector 96 is provided with one gripper 99, and a set of web releasing pins 151, which are operated at certain positions in the rotation of the feed cylinder 53, to push the envelopes clear of the face of the cylinder and thereby facilitate feeding of the envelopes away from the cylinder.

Provision is made by the present invention, as previously stated, to enable the machine to be set, without the removal or substitution of any parts, to produce envelopes of different lengths. It is for this purpose that the feed cylinder 53 is composed of movable and relatively fixed sectors. When the machine is set to produce the longest envelopes which can be made thereby, the movable sectors 96 rotate as an integral part with the fixed sectors 95, and each sector 96 is set as far as possible ahead of the cooperating sector 95 in the direction of rotation of the cylinder 53. In order to produce shorter envelopes, the movable sectors 96 are caused to lag behind at a certain period in the rotation of said cylinder, so as to shorten the distance from the gripper 99, which determines the bottom of the envelope, to the groove 118 of the succeeding sector 95, which groove determines the top of the envelope. This lagging of the movable sector 96, or in other words the extent of movement of said movable sector 96 towards the following fixed sector 95, may be varied, according to the desired length of envelopes, by adjustable devices, hereinafter described.

To produce the smallest envelopes the upper movable sector 96 and the succeeding fixed sector 95 are at the start in their greatest separated relationship, the web is being fed by the feed rollers 78, and the free end of the web is about to be tucked into the gripper 99 by which the web is secured to the cylinder. A little after the fixed sector of the cylinder passes the position shown in Figure 8, the movable sector 96 starts lagging; in other words, the movement of said cylinder sector 96 is retarded, but the fixed sector 95 continues at constant speed. The slow speed of the movable sector 96 continues until the sector 95 meets the movable sector, after which the movable sector 96 again moves at the constant speed of the cylinder. It should be understood that the web 31 is fed by the feed rollers 78, until the web has been attached to the movable sector 96, after which the speed of the sector 96 slows down. In order that the feed rollers 78, which are driven at the same

surface speed as the constant surface speed of the cylinder 53, may be ineffective while the web is being drawn by the lagging sector 96, the feed rollers 78 are cut away at 165, so that said feed rollers become ineffective immediately prior to slowing down of the sector 96 and the corresponding slowing down of the web 31. After the cylinder sector 96 has fallen back sufficiently with respect to the constant speed of the cylinder to produce the desired length of envelope, said sector 96 engages the sector 95 and again moves at the constant cylinder speed.

The feed rollers 78 then re-engage the web, and the gripper 99 is then automatically opened, thereby releasing the leading end of the web from the cylinder so that the partly finished envelope at the end of said web may be conducted downwardly away from the cylinder. Thereafter the envelope is severed from the web by shear blades 125 and 127. By this time, the movable sector 96 shown in the upper position in Figure 8 will have reached the position occupied by the lower sector 96 in that figure. Before the said movable sector 96 is brought to the top of the cylinder again, it is caused to travel faster for a time than the fixed sectors 95 of said cylinder, so as to move away from the following fixed sector 95 and be in readiness for another cycle of operations.

The connection between the cylinder shaft 66 and the movable cylinder sections 96 are shown in a general way in Figure 1. To the shaft 66 is secured a fly wheel 166 which rotates in the direction of the arrow, and is provided with spokes 167. Two of the spokes are provided with lugs 168. To each lug, there is pivotally connected a lever 170. Said lever 170 is caused to oscillate back and forth about its pivot during the rotation of the fly wheel. This is brought about by means of a roller 171 on said lever 170, which roller engages in a groove 172 of a cam plate 173 fixedly supported by the machine frame. Each movable cylinder sector 96 is provided with an extension 175 secured thereto by a bolt 176. The outer end of each extension 175 is provided with an arm 177 to which the adjacent lever 170 is connected by a link 178. Thus the oscillation of the levers 170 is transferred to the movable sectors 96 of the cylinder to move the same with reference to the fixed sector 95 in the manner heretofore described.

In Figure 1 the parts are set for the shortest envelope which the machine can produce. To enable the machine to be set for the longest envelopes, each sector oscillating lever 170 is provided with a groove 185 and the corresponding link 178 is adapted to be connected pivotally in various positions of adjustment along this groove so that a smaller movement may be imparted to the movable sector 96 when the lever 170 is rocked as hereinbefore described.

The cutters 46 are of the cylindrical type and are driven at the same constant surface speed as the cylinder 53. Accordingly, the cutters are so arranged that they always act on the web while the web is being fed at the constant cylinder speed by the said cylinder and the feed rollers 78. While the cutters 46 are active on the web, it is also fed by additional rollers 191 and 191*a*. Suitable chip removers 192 are located near the cutters so that the chips as they come with the web from the cutters may be removed from the web. The feed roller 191 is also provided with a depression 193 so that said feed roller may be free of the web when it lags in producing shorter envelopes.

The cutters 46 are always a definite distance, measured in envelope blank lengths, away from the feed cylinder, said distance depending upon the length of the envelopes being produced. This distance may be substantially four envelope lengths. By an inspection of Figures 6 and 7, it will be seen that the fourth envelope blank is farther from the leading end of the web in Figure 7 than is the fourth envelope blank in Figure 6. Consequently when the machine is to be set for long envelopes, the cutters 46 must be positioned farther away from the cylinder 53 than for short envelopes. To provide for such adjustment of the position of said cutters, they are supported on a carriage 194 slidingly mounted on the upper faces of the side frames 25 and 26 of the machine frame, as shown in Figures 1 and 4. Said cutter carriage may be adjusted to the proper position by a rack 195 secured to side frame 26 and a pinion 196 meshing with said rack, the pinion 196 being secured to a shaft 197 which is journaled in the carriage 194 and may be rotated by a handle attachable at the outer end 198 of said shaft. When the shaft 197 is rotated, the pinion 196 thereon travels along the rack 195, thus moving the carriage 194. To assist in properly locating the cutter carriage, there may be provided a graduated scale and a pointer, one of which may be secured to the carriage, the other being secured to the machine frame. After the carriage has been adjusted to the desired position, it may be secured in place by bolts 199 and nuts 200 arranged as shown in Figure 4. The feed rollers 191 and 191*a* and the chip removing devices are also supported on the carriage 194, so as to be adjustable with the cutters 46.

To enable the cutters 46 to be adjusted on their shafts 201 and 202 so that they may cooperate properly with each other and at the proper time, the connection of each cutter to its shaft comprises a flange 203 provided with a hub 204 which is splined to the shaft, (Figure 5). The flange has a slot 205 concentric with the axis of the shaft, through which a

threaded stud 206 on the side of the cutter may extend, said stud having a nut 207 thereon to clamp the cutter tight against the flange. It will be understood that after loosening the nut 207, the cutter may be rotated slightly relatively to shaft 201 and flange 203 to procure the desired adjustment, after which the nut may be again tightened.

In order that the printed matter may appear in the proper position on the envelopes, the printer 41 is also adjustable according to the length of envelopes. For this purpose, the printer comprises a carriage 210, Figures 1 and 3, which is also slidingly supported on the upper faces of the side frames 25 and 26 of the machine frame. Said carriage is adjustable by means of a shaft 211 revolubly supported on the machine frame, the end 212 of said shaft being formed to receive a detachable operating handle (not shown). The shaft 211 has secured thereto a pinion 213 meshing with a rack 214 which is secured to the printer carriage 210; and rotation of the pinion then serves to move the carriage to the proper position. The printer carriage 210 may be fastened in position, after adjusting, by bolts 215 and nuts 216 arranged as shown in Figure 3. The printer carriage may also be provided with a scale and pointer (not shown) to assist in setting the printer according to the lengths of the envelopes. The type cylinders of the printer are so arranged that the printing takes place while the web is being fed at the constant speed of the feed cylinder 53, and so that the web is free while no printing is being done, so that the web may lag, in the manner hereinbefore described, without interference by the printing cylinders.

It should be understood that the top set of rollers 42 and 44 of the printer may be used for one color of ink, while the lower set of rollers 43 and 45 may be used for ink of another color, so that two-colored printed matter may appear on the envelopes; and that the rollers of each set are driven to rotate at a surface speed equal to that of the constant surface speed of the feed cylinder 53, suitable gearing being provided between the shaft 69 and the shafts 217, 218, 219 and 220 of the rollers 42, 43, 44 and 45, respectively. When a single set of printing rollers is used, it is merely necessary to adjust the printer carriage 210 as above described, according to the size of envelope desired. When a second set of printing rollers is used, it is further necessary to make an adjustment of said set. This is done by mounting the type roller 42 on its shaft in a manner similar to the way the cutter 46 is mounted on its shaft, as illustrated in Figure 5, so that the type roller 42 may be set circumferentially about the shaft 217 to bring the type thereon into action sooner or later, according to the length of envelope. In this way, the printed matter produced by rollers 42 and 44 may be caused to register properly with the printed matter produced by rollers 43 and 45.

Assuming the distance from the feed cylinder 53 to the cutters 46 to be four envelope lengths, the distance from the cutters to the nearest set or first set of printing rollers to be two envelope lengths, and the distance between the first set and second set of printing rollers to be one envelope length, and that it is desired to set the machine to produce envelopes one inch longer, the following adjustments must be made. The cutters 46 must be moved four inches farther away from the feed cylinder, the printer must be moved two inches farther away from the cutters or, in other words, six inches farther away from the feed cylinder, and the printing roller 42 must be revolved about the shaft 217 to set the type back one inch relatively to the rotation of said shaft.

The surface speed of the printing rollers is equal to the constant surface speed of the feed cylinder 53, and the printing is done while the web is being fed at constant speed. The type extends circumferentially over a portion of the printing cylinders only, and after each printing operation of said rollers the web is free of said rollers and may lag due to the falling back of the movable cylinder sectors 96 which occurs during the production of shorter envelopes.

Although I have herein shown and described only one form of mechanism embodying the invention, it will be understood that many changes and modifications may be made therein within the scope of the following claims without departing from the spirit and scope of the invention.

What I claim is:

1. The combination of means to continuously feed a web, means to vary the length of web section fed within a definite period of time, a cutter to act on the web, and means to adjust said cutter towards and away from the feeding means according to the length of web section fed by said feeding device within said period.

2. The combination of means to continuously feed a web, means to vary the length of web section fed within a definite period of time, a cutter to act on the web, a carriage to support said cutter and means to adjust said carriage towards and away from the feeding means to set the cutters according to the length of web section fed by the feeding device within said period.

3. The combination of means to feed a web, means to vary the length of web section fed within a definite period of time, a cutter to act on the web, a carriage to support said cutter and means to adjust said carriage towards and away from the feeding means to set the cutters according to the length of web section fed by the feeding device within said period, means

to drive the feeding means and said cutter, and a sliding connection between said cutter and said driving means.

4. The combination of mechanism to feed a web at a normal rate of speed, a second mechanism to feed said web, means to change the web from the control of the first feeding mechanism to the control of the second feeding mechanism while both feeding mechanisms are running at the same speed, and means to change the speed of the second named feeding mechanism after the web is under its control, a cutter to act on the web, said cutter being so arranged and timed with respect to said feeding mechanisms that said cutter acts on the web while the latter is being fed at normal speed, and so that said cutter is free of said web when the web is fed at changed speed.

5. The combination of means to continuously feed a web, means to vary the length of web section fed within a definite period of time, a printer, a carriage to support said printer, and means to adjust said carriage to move the printer towards or away from the web feeding means according to the length of web section fed by said feeding device within said period of time.

6. The combination of means to continuously feed a web, means to vary the length of web section to be fed within a definite period of time, a cutter to act on said web, a carriage to move said cutter, means to adjust said carriage to move said cutter towards or away from the feeding means according to the length of web section fed, a printer, a carriage to support said printer, and means to adjust the printer carriage to move the printer towards or away from the feeding means according to the length of web section fed within the definite period of time.

7. The combination of means to continuously feed a web, a cutter adjustable towards and away from the printer, a printer adjustable towards and away from the feeding means, and means to feed the web from a source of supply according to the demand.

In testimony whereof I have affixed my signature to this specification.

ABRAHAM NOVICK.