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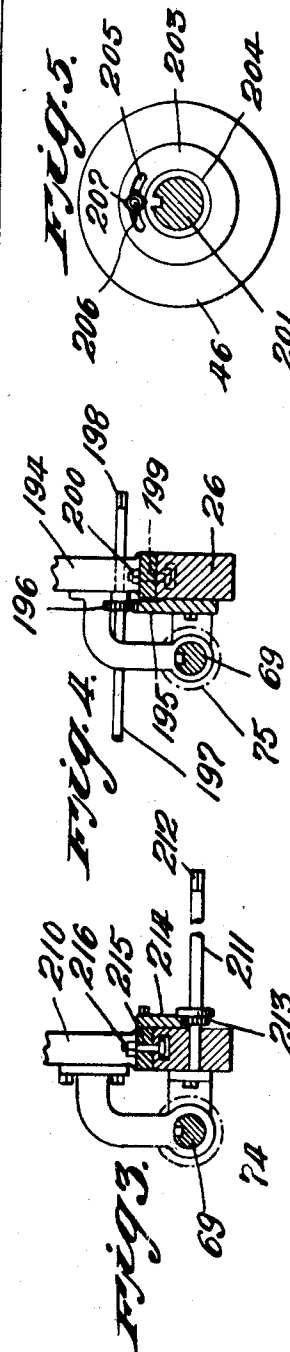
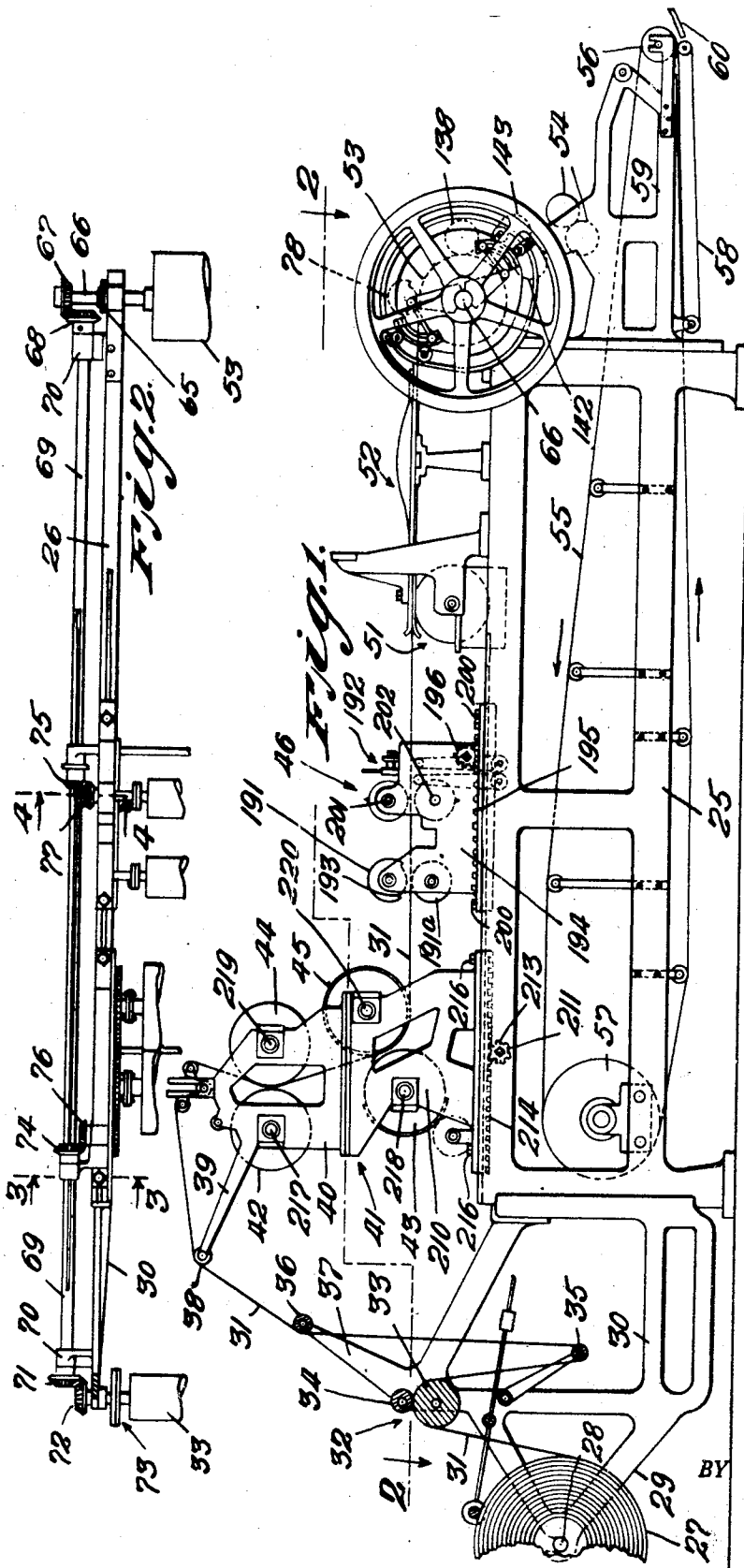
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1,691,027

ENVELOPE MACHINE

Filed Sept. 27, 1924

10 Sheets-Sheet 1



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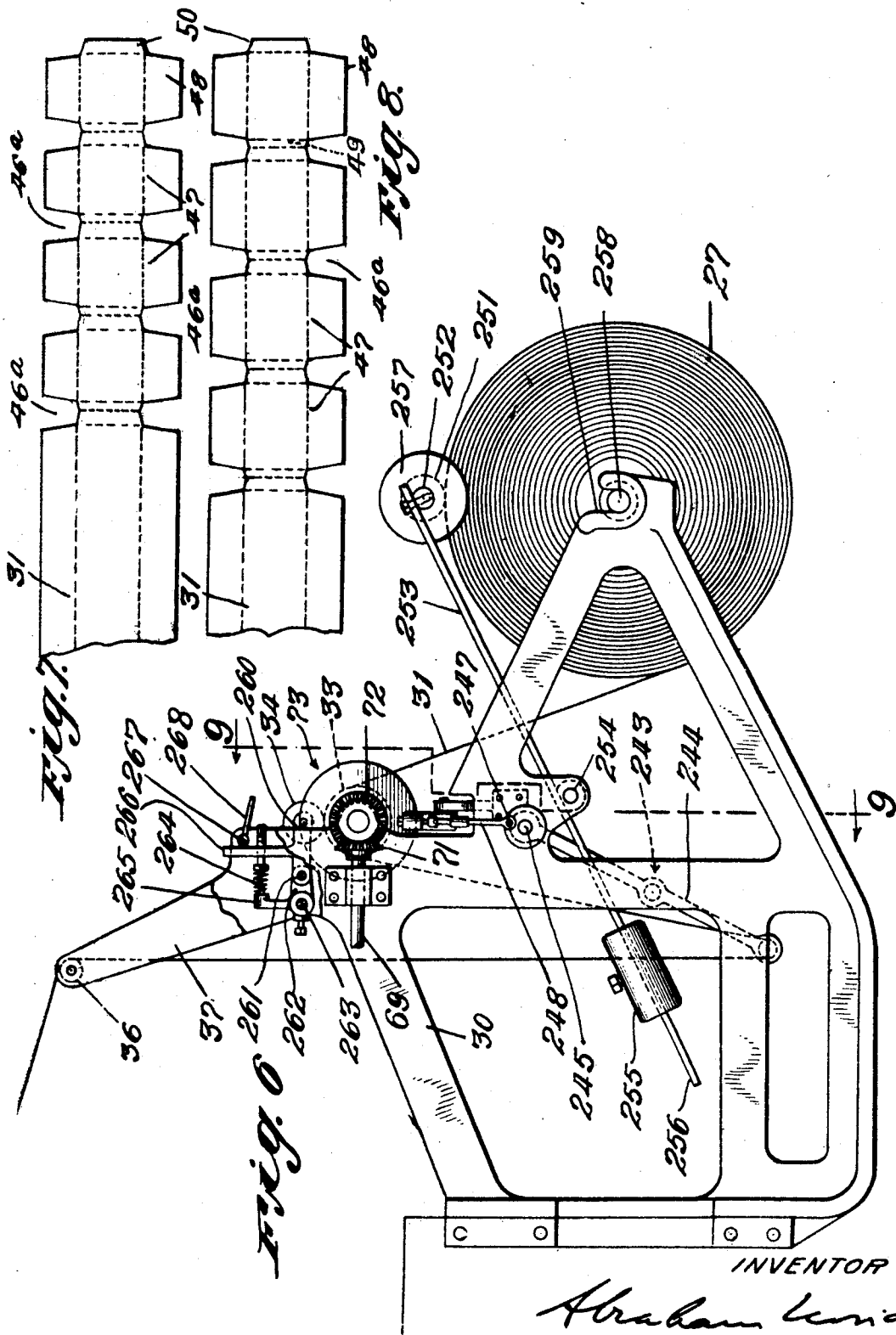
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10 Sheets-Sheet 2



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ENVELOPE MACHINE

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10 Sheets-Sheet 3

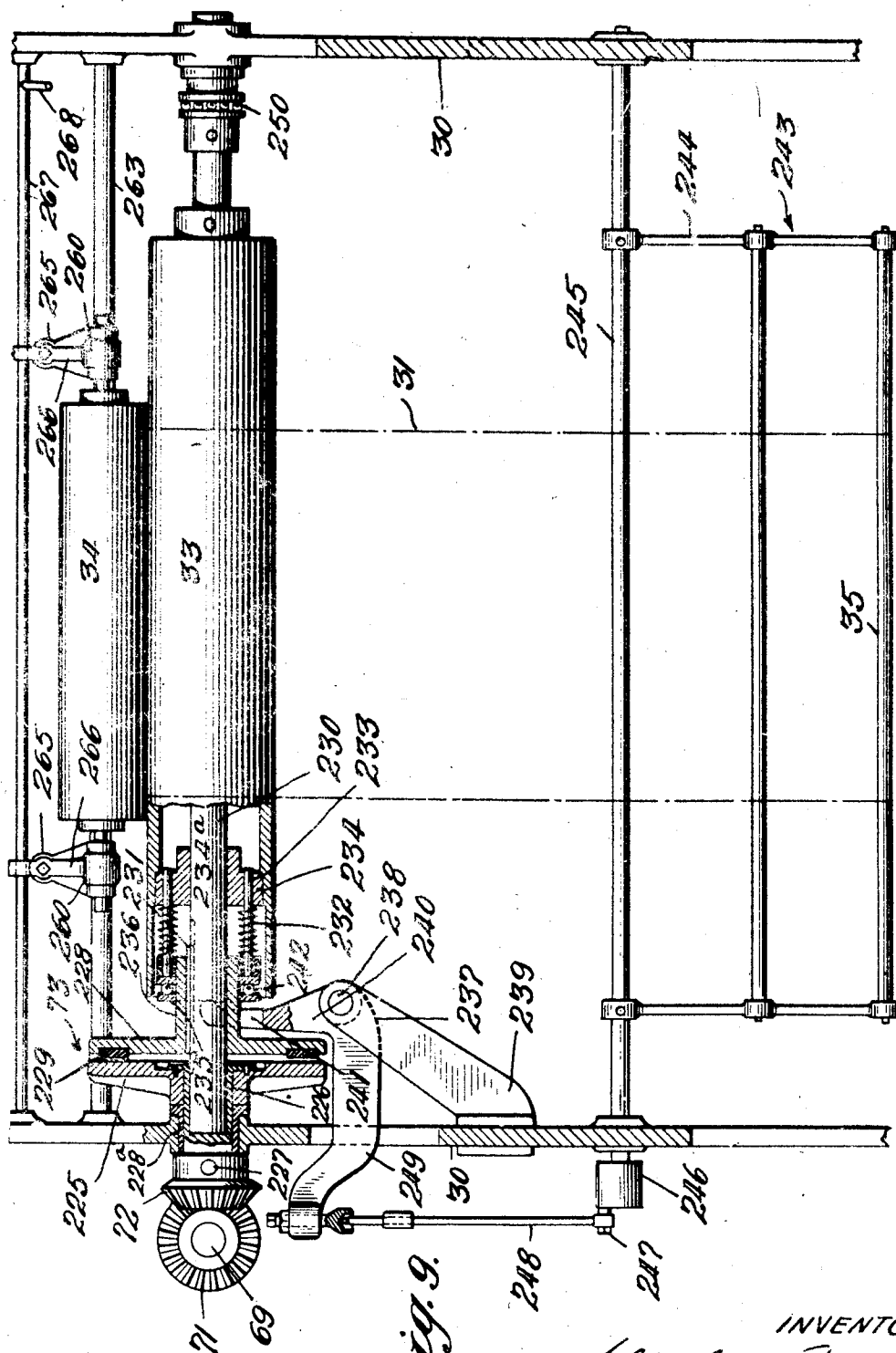


Fig. 9.

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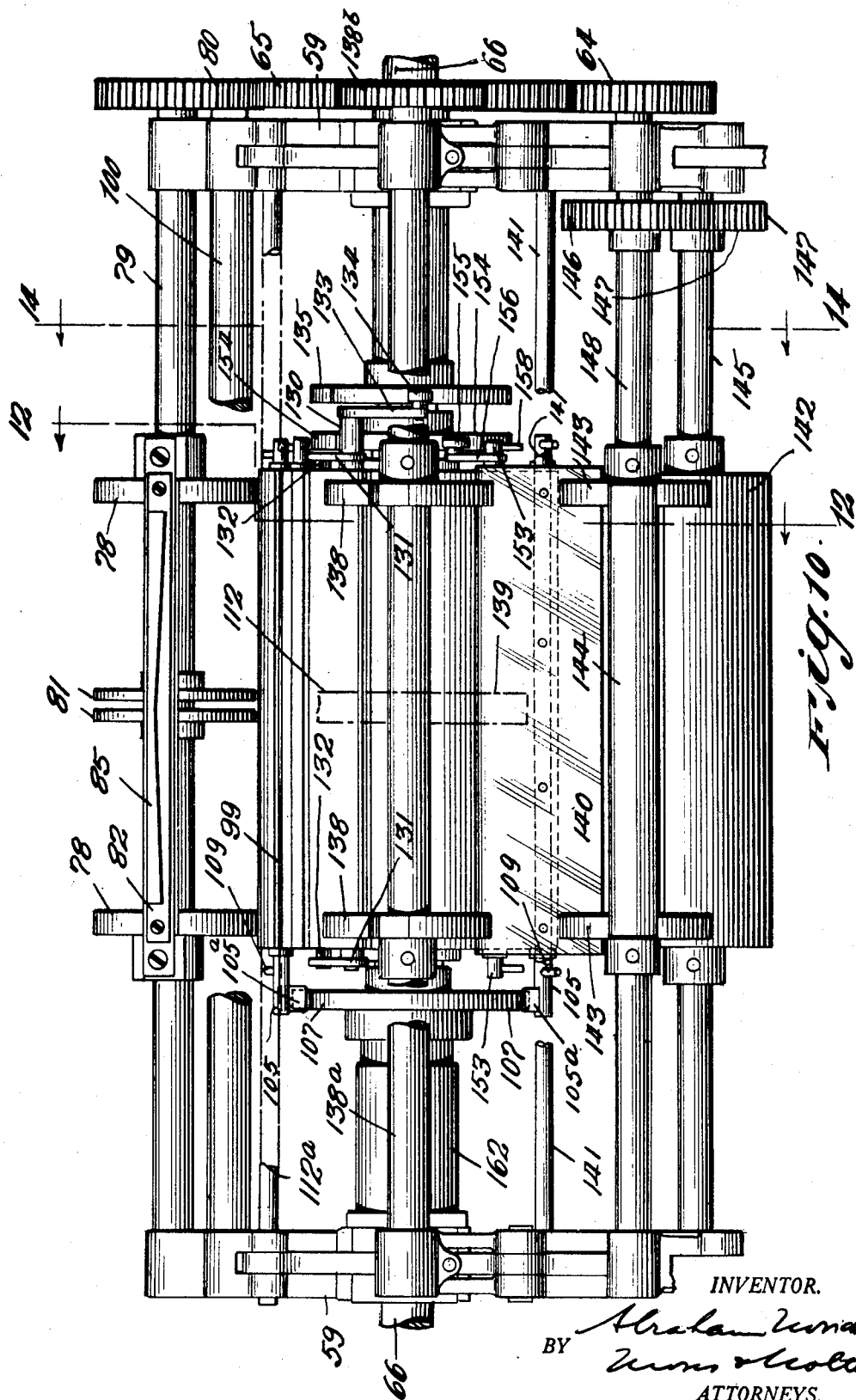
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ENVELOPE MACHINE

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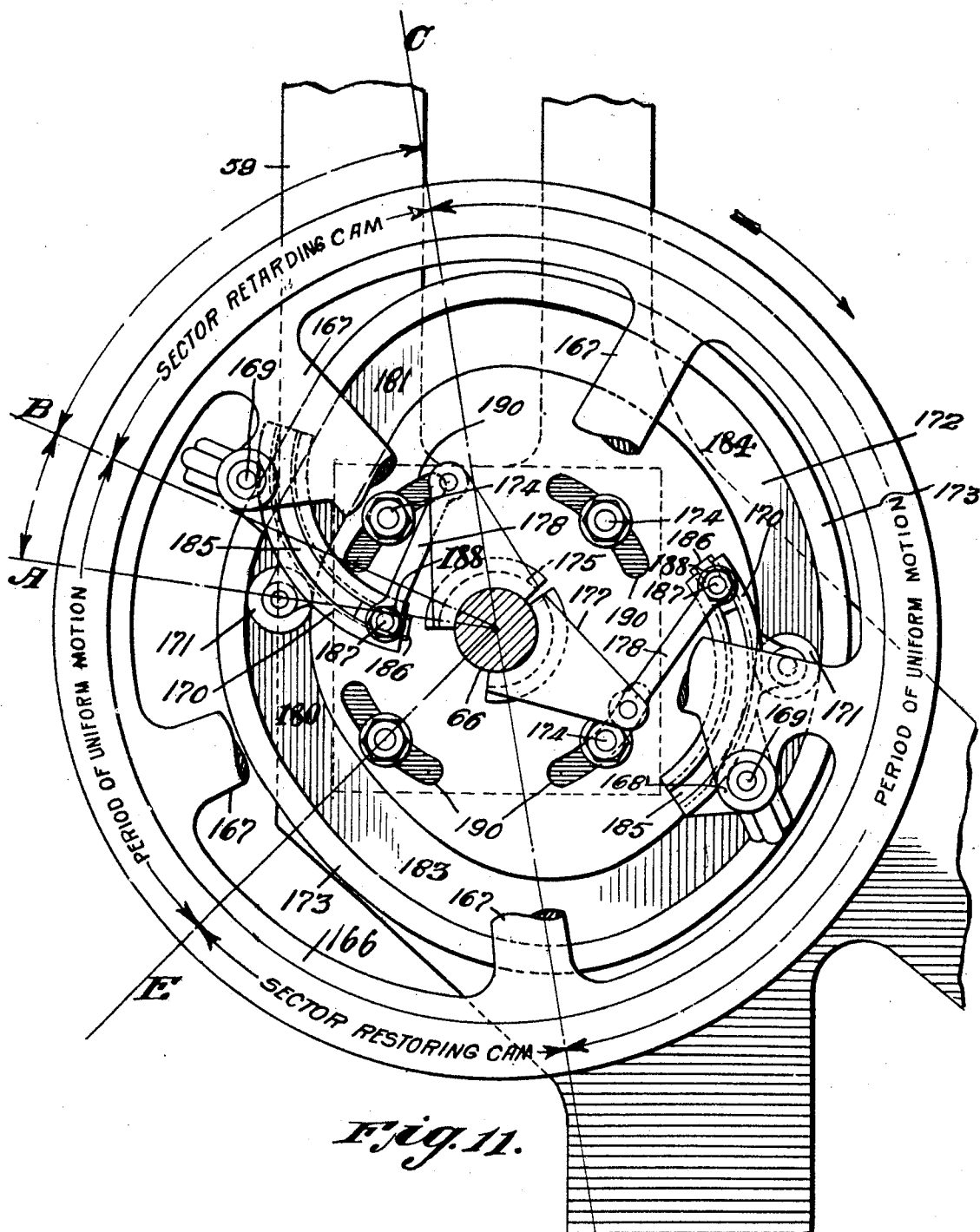
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10 Sheets-Sheet 5



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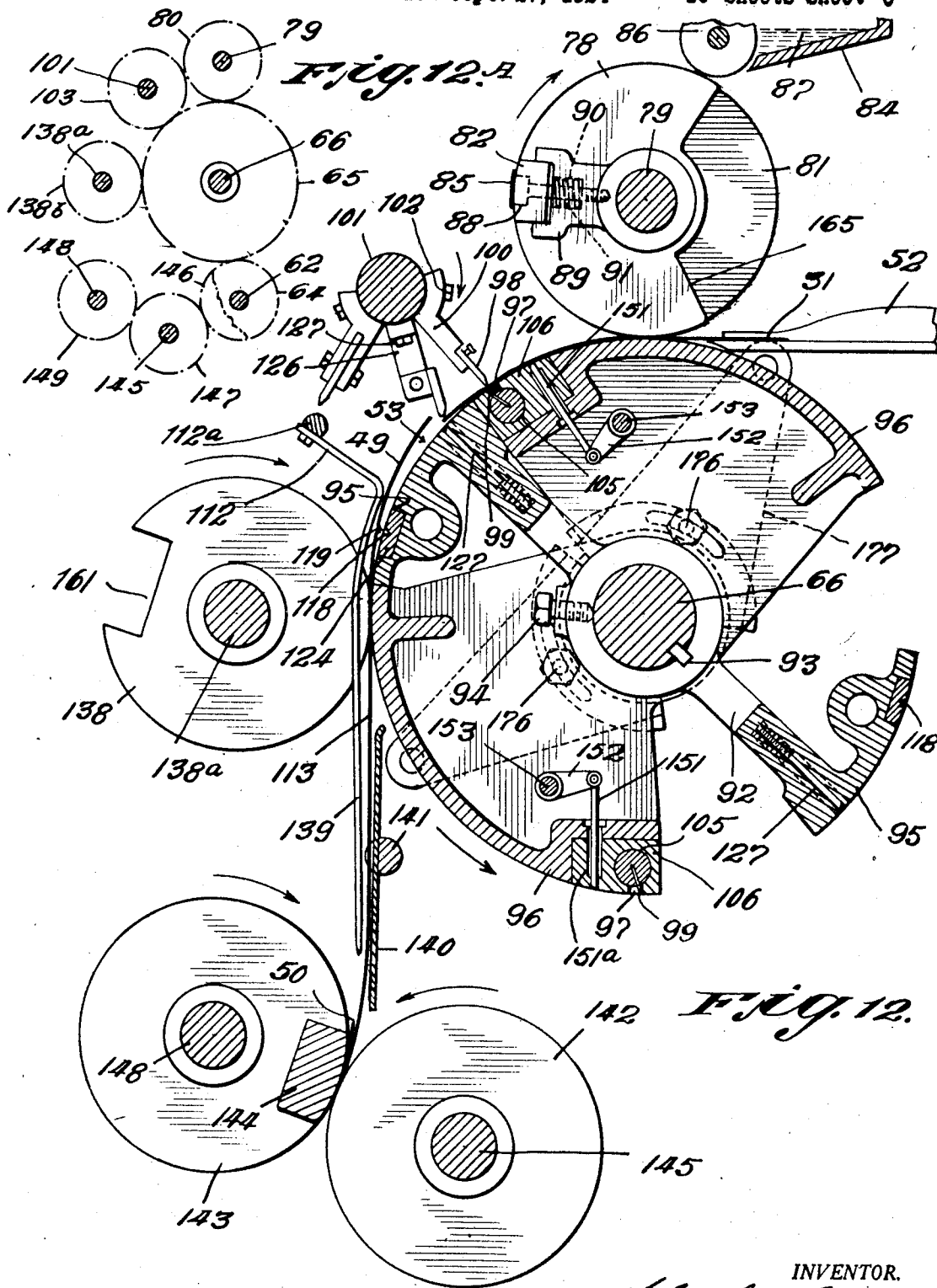
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10 Sheets-Sheet 6



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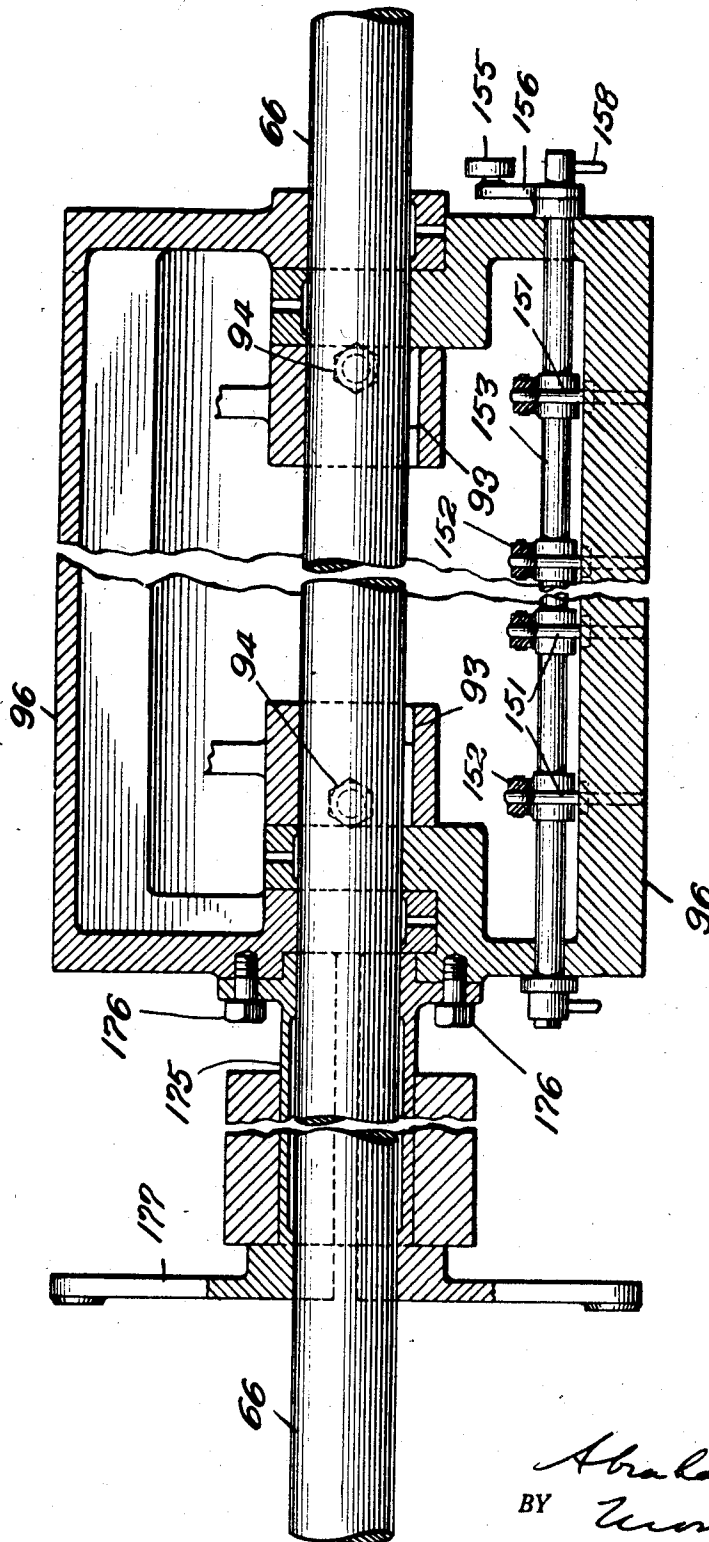
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Fig. 13.



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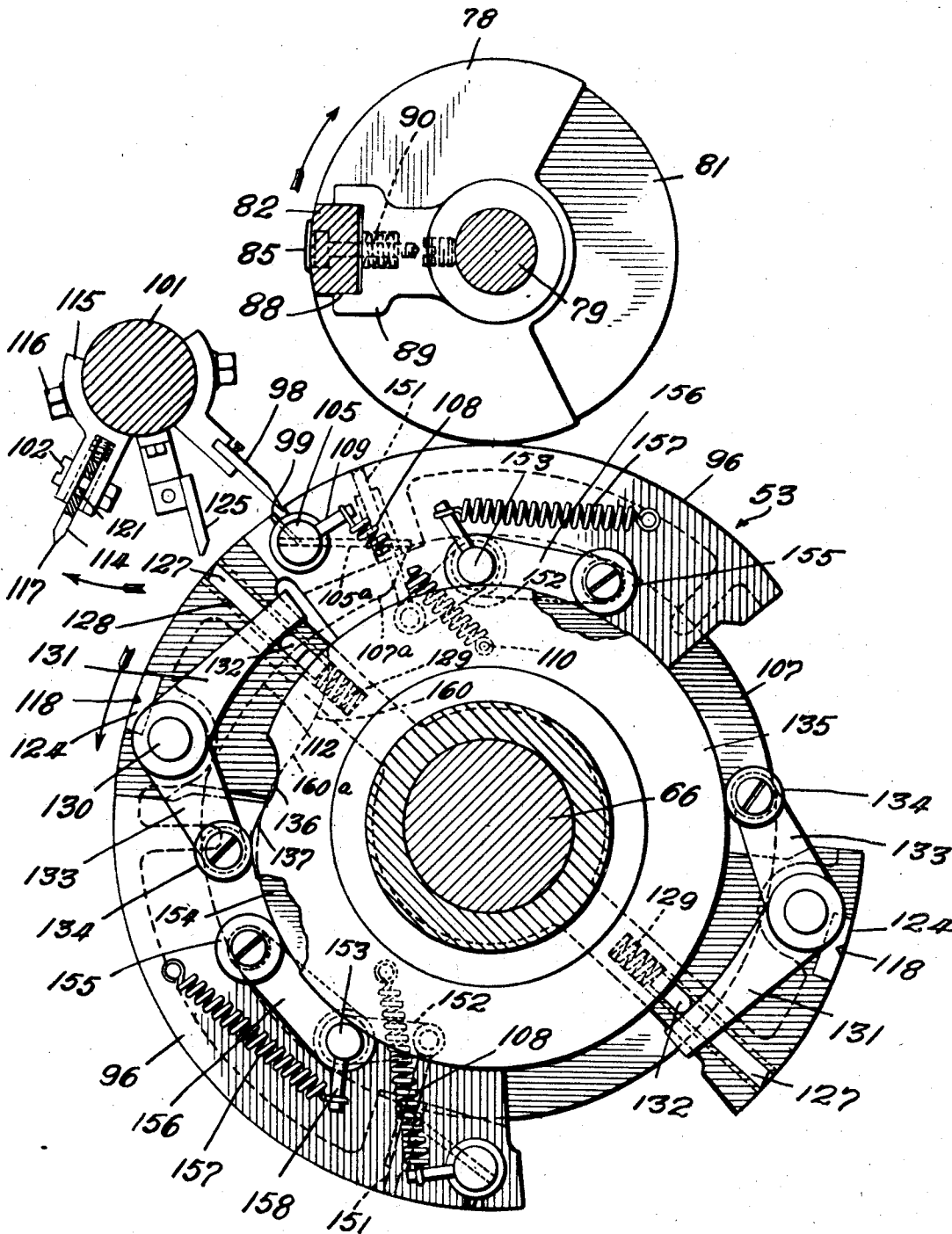


Fig. 14.

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Fig. 16.

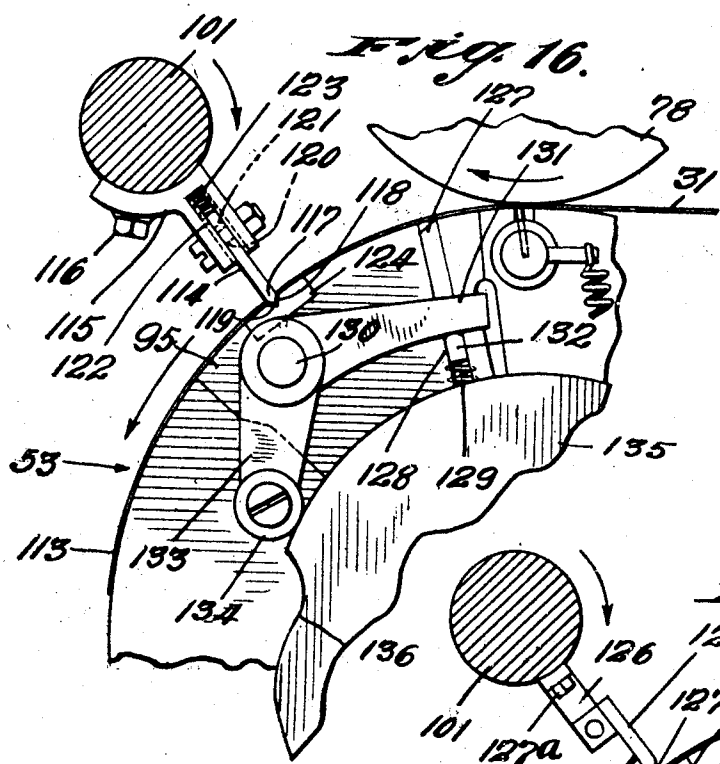


Fig. 17.

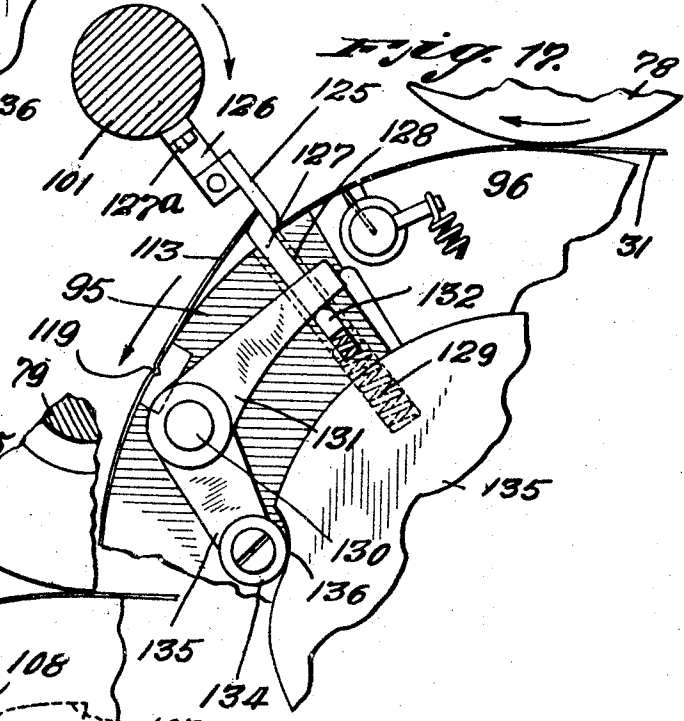
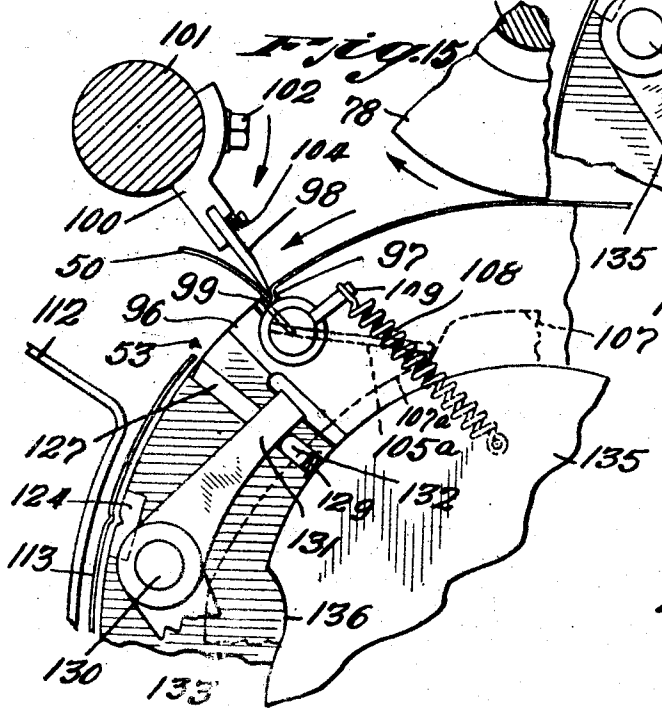


Fig. 15.



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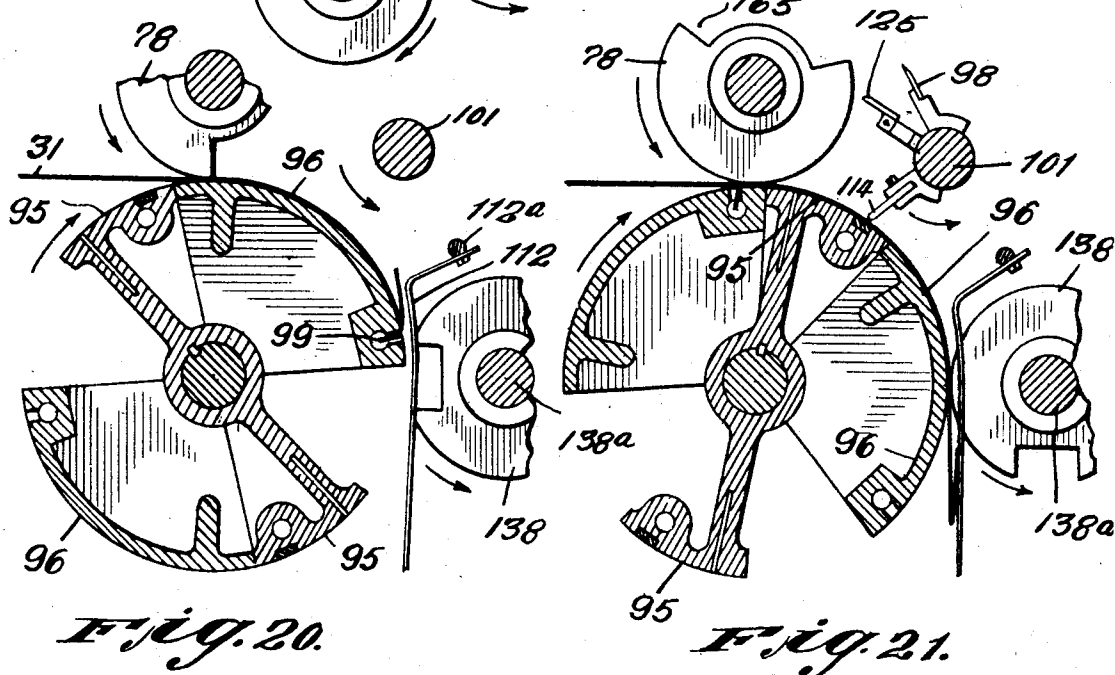
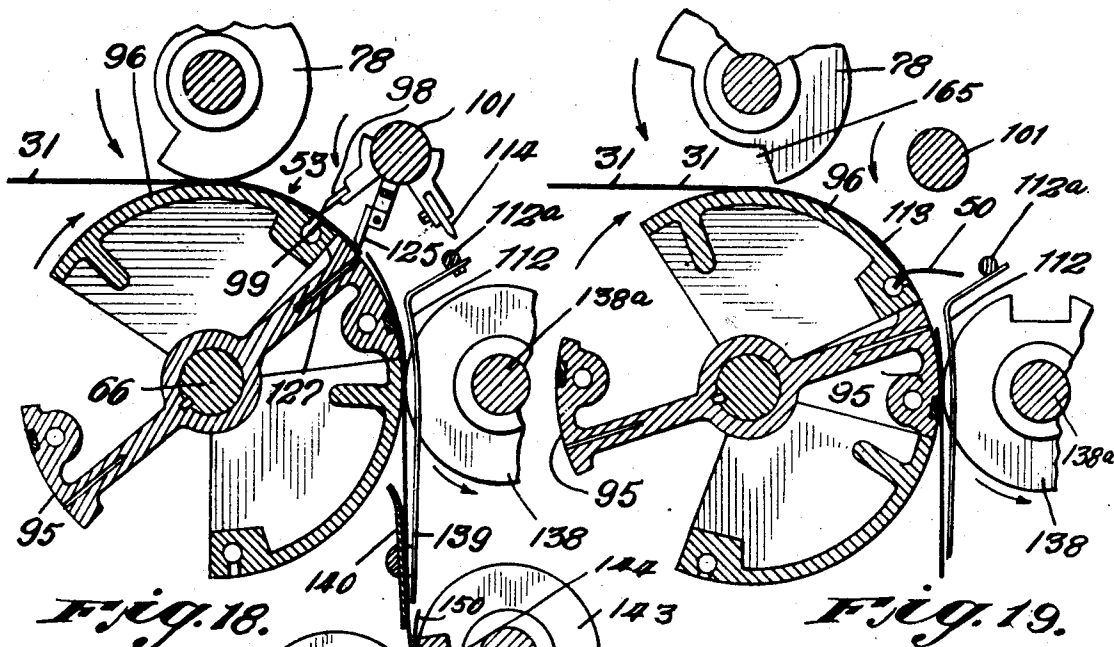
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10 Sheets-Sheet 10



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UNITED STATES PATENT OFFICE.

ABRAHAM NOVICK, OF FLUSHING, NEW YORK, ASSIGNOR TO F. L. SMITHE MACHINE CO., INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ENVELOPE MACHINE.

Application filed September 27, 1924. Serial No. 740,170.

This invention relates to improvements in envelope making machines of the continuous web type.

In the past, in machines of this kind which have been used to produce envelopes of different lengths, it has been necessary to change the speed of the machine, so as to feed the web at different rates for various sizes of envelopes; and such changes in the speed of the machine have been effected by changing certain gears in the web feeding mechanism. An object of the present invention is to provide improved means whereby the machine may be more easily and readily set to produce envelopes of different lengths.

Another object of the invention is the provision of new and improved means for unrolling the web from the supply roll, so as to ease the drawing of the web through the machine by the web feeding instrumentalities.

Other objects of the invention relate to the improvement of certain features of construction which will be hereinafter described and pointed out in the appended claims.

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, and in which 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 counter shaft and the connections 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 cutters may be shifted along the machine; Figure 5 is a detail elevation of a portion of the web cutting mechanism; Figure 6 is a fragmentary side elevation of the machine showing the web unrolling mechanism; Figure 7 shows a portion of the web cut out at its leading end to constitute a series of blanks; Figure 8 is a view similar to Figure 7, but shows blanks of greater length, as produced by a different adjustment of the parts of the machine; Figure 9 is a vertical section taken on the line 9—9 of Figure 6, some of the parts being broken away; Figure 10 is a front elevation showing the web feeding

cylinder and its associated devices; Figure 11 is a left-hand side view showing the flywheel of the web feeding cylinder shaft and the connections between said flywheel and the movable sectors of said cylinder; Figure 12 is a sectional side view showing the web feeding cylinder and its associated parts, the section being taken on the line 12—12 of Figure 10, and the parts being shown at the beginning of a cycle of movements; Figure 12^a is a diagrammatic view of gearing by which certain parts of the machine are driven; Figure 13 is a sectional front view taken substantially on the line 13—13 of Figure 11; Figure 14 is a vertical section taken on the line 14—14 of Figure 10, and shows the cam for controlling the operation of the knife and the cam for controlling the operation of certain pins to push the envelope away from the cylinder; Figure 15 is a fragmentary side view of the web feeding cylinder showing the leading end of the web being tucked into a groove in the cylinder ready to be fastened to said cylinder by a gripper carried thereby; Figure 16 is a view similar to Figure 15 and shows the top flap of a partly finished envelope being creased; Figure 17 is a view also similar to Figure 15, and shows the partly finished envelope being severed from the web; Figure 18 is a view similar to Figure 12 but viewed from the other side, and shows the position of parts at the beginning of a cycle, and the web about to be tucked into a groove preparatory to fastening it to the movable sector of the web feeding cylinder, the web being still gripped by a feed roller; Figure 19 is a view similar to Figure 18, but shows the feed roller ineffective, and the web gripped by the movable sector and advanced thereby at the normal speed; Figure 20 is a view similar to Figure 19, but shows the movable sector slowed down to cause it to fall back toward the succeeding fixed sector of said cylinder; Figure 21 shows the end flap about to be creased, and the next succeeding movable sector moved to effective position preparatory to the beginning of another cycle.

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 rear-

ward 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 7, 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 guide rollers 54 and is transferred by suitable devices (not shown) to a drier belt 55 running constantly in the direction of the arrows over pulleys 56 and 57. While the envelopes are carried by said belt, the gum applied to the top flap 49, in a manner hereinafter described, dries before the envelopes are removed from the machine. Suitable well-known guiding means (not shown) holds the envelopes on said belt, until they are delivered to a conveyor belt 58, supported on brackets 59 secured to the main frame of the machine. The envelopes are then delivered by said conveyor belt 58 to a platform 60 beyond the guide roller 56.

The machine may be driven by any suitable source of power, through means which rotates a main drive shaft 62. As shown in Figures 10 and 12^a, the drive shaft 62 has secured thereto, at the outside of the right hand bracket 59, a pinion 64 meshing with 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 which clutch is operated in a manner hereinafter described. 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 is provided a pair of feed rollers 78, Figures 10, 12 and 14 to 21, 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 in the brackets 59 of the machine frame, said shaft 79 having secured thereto a pinion 80 (Figure 10) meshing with the gear 65 so that the latter may drive the shaft 79 to rotate the feed rollers 78. The shaft 79 is further provided with a pair of rollers 81 (Figure 10) 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 (Figures 10 and 12) 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; the gum thus received from the gummer roller 86 is applied to the flap 50. The gummer bar 82 is supported on headed screws 88 (Figure 12) 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 first be given. Said cylinder is composed of a section 92 fastened to the shaft 66 by key 93 and set screw 94 (Figures 12 and 13) 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, Figures 12 and 21, 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 revolvably supported in the brackets 59 of the machine frame, and has secured thereto, at one end, a gear 103, Figure 12^A, meshing with the gear 65 to drive the shaft 101 in a clockwise direction, the 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 tucker blade 98 may yield against the tension of springs 104 (Figure 15) so that it may be freed from the slot 97 without straining during a further rotation of the cylinder 53, and after the web has been gripped by the clamp bar 99. The shafts 79 and 101 are far enough apart so that the gears 80 and 103 do not interfere with each other.

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. To rock the shaft 105 to its effective position to grip the web by the clamp bar 99, said shaft is provided at one end with an arm 105^a (Figure 14) which arm follows the periphery of a fixed cam disc 107, the periphery of said disc being for the greatest part concentric with the axis of the cylinder shaft 66 against which periphery the arm 105^a is held by the tension of a spring 108 connected to an arm 109 extending from the other end of the shaft, the other end of said spring being connected to a pin 110 on the cylinder sector 96. The cam disc 107 is provided with a depression 107^a into which the arm 105^a swings to allow the clamping bar 99 to be drawn to its effective position by the spring 108. As the rotation of the cylinder 53 continues, the arm 105^a rides up the cam 107 thereby oscillating

the shaft 105 against the tension of the spring 108 and opening the gripper 99 to release the web or partly completed envelope thereof, for a purpose hereinafter described.

After the web has been clamped by the gripper 99, the flap 50 stands away from the cylinder as in Figures 15 and 19. 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 on the brackets 59 of the machine frame.

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 (Figures 14 and 16). The creaser bar 114 is pointed at 117 along its free edge to force the web 31 into a groove 118 on the sector 95 of cylinder 53 to form a crease 119, Figure 17. 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 (Figures 14 and 16) passing through elongated slots 121, thereby allowing the bar 114 to move inwardly in a slot 122 in the bracket 115 when said creaser bar co-operates with said cylinder. Springs 123 are provided, against which the creaser bar may yield, said springs being effective to press the creaser bar outwardly until it is arrested by the bolts 120, after the creaser bar leaves the cylinder 53.

The groove 118 may be formed in a separate bar 124 for convenience in making and also so that, when the groove becomes worn, the bar 124 may be readily replaced by a new one, instead of replacing the cylinder sector 95. The bar 124 may be secured to the sector 95 by any suitable means such as screws. The block 106 which carries the gripper rock-shaft 105 may also be secured to the cylinder sector 96 by screws (not shown), so that it may also be readily machined and replaced when it becomes worn.

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 (Figures 14 to 17), 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 alongside of the blade 125 by springs 129 as shown in Figure 17, thus shearing the envelope 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, the shaft 101, it will be remembered, being rotated through the medium of pinion 103 on said shaft, which pinion is driven by the gear 65 on the cylinder shaft 62, as shown in Figure 12^A. To control the outward and inward movements of the cylinder blade 127, there is supported in the cylinder sector 95 a shaft 130 having arms 131 secured thereto, one at each end. The arms 131 overlie and cooperate with lateral extension 132 of the blade 127. The right hand end of the shaft 130 (see Figure 10 as well as Figures 14 to 17) has secured thereto an arm 133 having a roller 134 engaging the periphery of a fixed cam plate or disc 135. The periphery of the cam disc 135 is mostly concentric with the cylinder shaft 66, (Figure 14) but has a depression 136 into which the roller 134 rides at each revolution, thereby allowing the blade 127 to be forced outwardly in the slot 128 by the springs 129, to sever the envelope from the web. As the cylinder continues in its rotation, the roller 134 rides up on the cam surface 137 of the cam disc 135, thereby rocking the shaft 130 and drawing the blade 127 back into the slot 128 by means of the arms 131 on said shaft 130. The blade 127 is held in this position until the roller 134 again reaches the depression 136 in the cam disc 135.

As the envelope advances downwardly over the cylinder 53, it is assisted by feed rollers 138 on a shaft 138^a, (Figures 10, 12 and 15 to 21), suitably supported on the brackets 59 of the machine frame, said shaft being driven by a gear 138^b (Figure 12^A) secured to said shaft and meshing with the gear 65. Said rollers 138 bear against the front of said cylinder. The envelope is guided downwardly from the cylinder 53 between an extension 139 (Figure 12) of the flap folding bar 112, and a guide plate 140 carried by a rod 141 supported on the brackets 59 of the machine frame. Said extension 139 and the guide plate 140 direct the envelope between a cylinder 142 and feed rollers 143 (Figures 10 and 12) 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 journaled on the brackets 59 of the machine frame. Said cylinder is driven in a counter clockwise direction, as viewed in Figure 12, by means of a gear 146 (Figures 10 and 12^A) secured to the main drive shaft 62, said gear 146 being located at the inside of the bracket 59 of the machine frame (Figure 10) and meshing with a gear 147 secured to the shaft 145. The feed rollers 143 are secured to a shaft 148 suitably

journaled on the bracket 59, said shaft being driven by a gear 149 in a clockwise direction, as viewed in Figure 12, by the gear 149 secured to the shaft 148 and meshing with the gear 147 secured to said shaft 145.

It will be understood that the pitch diameters of the gears 65, 80, 103, 138^b, 146, 147 and 149 are such that the surface speed of the various devices driven by said gears 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 by suitable mechanism not shown to the drier belt 55, as previously described. 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 web 31 in passing over the various rollers in the machine often becomes charged with static electricity, and the leading edge thereof tends to adhere to the feed cylinder after it passes the front feed rollers 138. To overcome any such action, means is provided for pushing the leading edge of said web (that is the partly finished envelope 113) away from the cylinder 53, so that it passes down over the guide plate 140. This means for pushing the web away or releasing it from the surface of the cylinder, comprises a series of plungers or pins 151, (Figures 12 and 13) carried in holes 151^a in each movable sector 96 of the feed cylinder 53. Each plunger 150 is connected to the outer end of an arm 152 all of the arms 152 in each movable sector 96 being secured to a rock shaft 153 supported in the ends of the movable sector 96. The plungers are normally in retracted position with their free ends below the surface of the feed cylinder 53, so as not to interfere with the web 31. They are held in said position by a fixed cam disc 154 (Figure 14) the surface of which is for the greatest part concentric with the axis of the cylinder shaft 66. Said cam disc 154 is engaged by a follower comprising a roller 155 on an arm 156 secured to the plunger operating shaft 153. A spring 157 connected at one end to a pin 158 secured to the shaft 153, yieldingly holds the roller 155 against the periphery of the cam disc 154, the other end of the spring 157 being connected to a pin 159 fixed to the cylinder sector 96. The pins 150 are forced out beyond the surface of the cylinder sector 96 by the spring 157, to free the web, when the roller reaches a depression 160 in the periphery of the cam disc 154. This occurs just as the leading edge of the web leaves the position of contact between the feed rollers 138 and the cylinder 53, so that said web passes down over the guide plate 140. As the projected pins 150 advance towards the guide plate 139, they are retracted before reaching said plate. The retraction of said pins is accomplished by the cam surface 160^a of

the cam disc 154 which the roller 155 ascends, thereby rocking the shaft 153 against the tension of the spring 157 and drawing the pins 150 into the cylinder. The feed rollers 138 are cut out at 161 (Figure 12) so as not to interfere with the freeing of the web from the cylinder 53.

The cam disc 107 (Figure 10) which controls the gripper 99 may be secured to the bracket 59 by a sleeve 162 fastened to said bracket. The disc 107 and sleeve 162 may be built up of semicylindrical halves secured to each other so that said sleeve and said disc may be assembled about the cylinder shaft 66, after the latter has been mounted in the machine frame. The cam discs 135 and 154 may be constructed in a similar way and are secured to the right-hand bracket 59 of the machine frame.

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 150, which are operated at certain positions in the rotation of the feed cylinder 53, in the manner hereinbefore described.

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.

In Figures 18 to 21, there is illustrated a sequence of operations of the cylinder 53 and associated devices when the machine is set to produce the smallest envelopes. Beginning at Figure 18, it will be seen that the upper movable sector 96 and the succeeding fixed sector 95 are 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. When the fixed sector of the cylinder reaches the position in Figure 19, 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, as shown in Figure 20, 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, as shown in Figure 18, 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 as shown in Figure 19, 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 as shown in Figure 20 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 in the manner previously described, thereby releasing the leading end of the web from the cylinder so that the partly finished envelopes at the end of said web may be conducted downwardly as shown in Figure 21. During the further movement of the web 31, the upper flap of the envelope is creased by the creaser bar 114, which operation is about to take place when the parts are in the position shown in Figure 21; and thereafter the envelope is severed from the web by shear blades 125 and 127, as shown in Figure 18. By this time, the upper movable sector 96 of Figure 18, will have reached the position occupied by the lower one 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 is best shown in Figures 11, 12 and 13, and will now be described. To the shaft 66 is secured a fly wheel 166 at the left hand end of said shaft and outside the bracket 59. Said fly wheel rotates in the direction of the arrows, and is provided with spokes 167. Two of the spokes are provided with lugs 168. To each lug, there is pivotally connected, at 169, a

lever 170. Said lever 170 is caused to oscillate back and forth about the pivot 169 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 secured to the bracket 59 of the machine frame, by bolts 174. 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 as the fly-wheel rotates.

The movement of the movable cylinder sectors 96, as controlled by the cam disc 173, will now be described. Let it be assumed that the sectors 95 and 96, which compose the cylinder 53, are in the position shown in Figures 12 and 18, and the fly wheel to be in the corresponding position as shown in Figure 11. While the cylinder shaft rotates through the arc A—B, Figure 11, which corresponds with the movement from the position of Figure 18 to the position of Figure 19, the web is tucked into the clamp 99, in a manner previously described, by the tucker blade 98, and the movable cylinder sector 96 moves at the constant speed of the cylinder 53, the roller 171 travelling at this time in a portion 180 of the cam groove 172, which is concentric with the axis of the cylinder shaft 66. When the position of the parts shown in Figure 19 is reached, the feed roller 78, which it will be remembered has a surface speed equal to the constant surface speed of the cylinder, runs free of the web 31. Further rotation of the cylinder shaft 66 from the position shown in Figure 19, causes the movable cylinder sector 96 to lag or slow down with respect to the fixed sectors 95 of the cylinder, this being brought about by the cam portion 181 of the groove 172 in the cam disc 173, extending from the radial line B to the radial line C, in Figure 11. Said cam portion 181 of the groove 172 swings the lever 170 in a clockwise direction, through the medium of the roller 171 on said lever. The lever pulls on the link 178, connected to the arm 177, and rocks the movable sector 96 corresponding thereto in the direction opposite to the rotation of the fly wheel 166. When the roller 171 reaches the end of the cam portion 181 at the radial line C, Figure 11, the sectors of the cylinder occupy the position shown in Figure 20, from which position the upper movable cylinder sector 96 again moves at the constant speed of the cylinder through the angular distance C—D which is about one-half revolution of the cylinder. While the movable sector 96 is rotating from the position of the upper one in Figure 20 to the position of the lower

one in said figure, it travels at the constant speed of the cylinder 53, owing to the fact that the roller 171 of the corresponding sector oscillating lever 170 travels in a concentric portion 184, Figure 11, of the cam groove 172, extending between the radial lines C and D. When the sectors 96 and 95 shown at the top of Figure 19 have reached the position shown at the bottom of Figure 20, the roller 171 of the sector oscillating lever 170 associated with the said movable sector 96 stands on the radial line D, Figure 11, at the beginning of a cam portion 183 of the groove 172 extending from the radial line D to the radial line E. The cam portion 183 rocks the lever 170 in a direction opposite to the direction of movement caused by the cam portion 181 extending from radial line B to radial line C, and thus speeds up the sector 96 to move it towards the preceding fixed sector 95 ready for a new cycle of operations and also ready to assist in feeding the web while a cycle of operations is being completed, as shown in Figure 21. After the movable sector 96 has caught up to the fixed sector 95, as just described, said sector 96 then moves at the speed of the fixed sector 95 through an arc corresponding to the arc between radial lines E and A, owing to the fact that during this time the roller 171 of the lever 170 travels in a concentric portion of the cam groove 172, as shown in Figure 11. When the movement is complete, the parts of the cylinder are again in the position shown in Figure 18. When movable sector 96 has resumed the constant speed of the cylinder, after lagging behind from the position shown in Figure 19 to that shown in Figure 20, the feed roller 78 re-engages the web 31 to assist in feeding said web. Subsequent to such re-engagement of said web, its leading edge becomes released from the gripper 99, in a manner previously described, owing to the engagement of the arm 105^a with the cam 112 at the proper time, as shown in Figure 14. This enables said leading edge of the web to pass down between the guide bar 139 and the guide plate 140, as shown in Figures 12 and 21.

In Figure 11 the parts are set for the shortest envelope which the machine can produce. To enable the machine to be set for larger envelopes, each sector oscillating lever 170 is provided with a groove 185 which is T-shaped in cross-section and has a slidable T-shaped block 186 therein to which the corresponding link 178 is connected, thereby permitting the connecting point between said link and said oscillating lever to be moved nearer the fulcrum of the latter, so that a smaller movement is imparted to the movable sector 96 when the lever 170 is rocked as hereinbefore described. Each link 178 is held connected to its block 186 by means of a bolt 187 and a nut

188 in such a manner, that, when the nut is drawn tight, the block is clamped in place on the lever 170, thus fixing the point of connection of the link 178 with the lever 170, the link 178 being, however, free to swing about said point of connection. Thus, in order to change the point of connection between an oscillating lever 170 and its link 178, it is only necessary to loosen the nut 188 and slide the block 186 to the position in the groove 185 corresponding with the desired length of envelope. To assist in setting the link 178 in the proper position, each lever 170 may be provided with a series of graduations corresponding to the various size of the envelopes. It will be understood that the extent of angular oscillation of the levers 170 is always the same, but by connecting the links farther away from or closer to the fulcrums 169, the movable sectors 96 are caused to lag more or less respectively behind the fixed sectors 95, to produce shorter and longer envelopes, as hereinbefore described. It should further be understood that each movable sector 96 oscillates back and forth between the two fixed sectors 95, the movable sector always starting from a position close to the preceding fixed sector and moving toward the succeeding fixed sector varying extents in accordance with the setting of the connecting bolts 187 and corresponding with the desired length of envelope. Thus when the fixed sectors reach the position in Figure 20, and the machine is set to a larger size envelope, there will be a gap between the effective movable sector 96 and the succeeding fixed sector 95, in other words the sector 96 will not have lagged behind the sector 95 to the extent indicated in Figure 20. Due to the fact that there may exist this gap between a movable sector 96 and the succeeding fixed sector 95, the opening of the gripper 99, to release the leading end of the web, does not take place until the feed roller 78 cooperates with the fixed sector 95. By the time the feed roller reaches the end of a fixed sector 95, the following movable sector 96 has advanced towards said fixed sector, as shown in Figure 21, to form a continuation of the sector 95 and thus assist in feeding the web. When the link 178 is set with the point of connection 187 close to the fulcrum 169 of the lever 170, no oscillation of the sector 96 will be effected. It is with this setting of the link that the longest envelopes are produced.

The groove 185 in each oscillator lever 170 is arc-shaped, the arc having a radius equal to length of the link 178 (Figure 11). Said groove is arc-shaped so that when the parts are in the position shown at the left side of Figure 11, the link 178 may be adjusted to any position relatively to the lever 170 without disturbing the position of the movable segment 96 shown at the top of Figure 18, in which position the tucker blade 98 is co-operating with the gripper slot 97. To enable

the arms 177 to be properly adjusted relatively to the movable sectors 96, the extension 175 of each arm is provided with slot 189 through which the bolt 176 passes. To allow a fair degree of adjustment of the cam plate 173 while assembling the machine, said cam plate is provided with slots 190 through which the bolts 174 pass.

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 feed 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 7 and 8, it will be seen that the fourth envelope blank is farther from the leading end of the web in Figure 8 than is the fourth envelope blank in Figure 7. 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 slidably 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 its outer end 198. 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 190 and 191 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 co-

operate 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.

To avoid undue tension or strain on the web as it is drawn through the machine, there is provided the web unrolling means 32 (Figure 1) previously mentioned, said means comprising a main feed roller 33 which is driven by the shaft 69 through the medium of gears 71 and 72 and the clutch 73, as shown in Figures 2 and 9. The clutch 73 as shown in Figure 9, comprises a driving disc 225 secured to a sleeve 226 attached to the gear 72 by a screw or pin 227, the sleeve rotating in a bushing 228* in the bracket 30 of the machine frame. The clutch further comprises a disc 228 having a gripping surface 229 which may be composed of leather or any other suitable material and which may be readily replaced when it becomes worn. The feed roller 33 is secured to a shaft 230 which is journaled at one end in the bracket 30, the other end of said shaft being supported in the sleeve 226 so as to run freely therein. The disc 228 is connected to the shaft 230 by means of a spline 231 so that it may slide longitudinally of said shaft. The clutch may be closed by springs 232 suitably supported on pins 233 between a bushing 234 secured to the interior of the feed roller 33

and a collar 234* which lies against a thrust bearing 242 abutting against a flange 235 secured to a hub 236 of the clutch disc 228.

The clutch 73 is opened by a bell-crank 237, pivoted at 238 on a bracket 239 secured to the machine frame bracket 30. One arm 240 of the bell-crank is forked at 241 to straddle the hub 236 and engage the flange 235. By swinging the bell-crank about its pivot to cause the forked end 241 to move rightwardly in Figure 9, the disc 228 is moved away from the disc 225, against the tension of the springs 232, to open the clutch and stop the rotation of the feed roller 33, so as to stop unrolling of the web 31, for a purpose hereinafter described. When the bell-crank is swung in the opposite direction, the springs press the disc 228 against the disc 225, thereby causing the feed roller 33 to revolve with the shaft 69. The bell crank 237 is operated by clutch controlling means 243 including a frame 244 secured to a rock shaft 245 supported in the brackets 30. The frame 244 carries at its free end the guide roller 35 around which the web 31 is conducted from the rollers 33 and 34. It will be seen, (Figure 6) that the roller 35 lies in a bight formed in the web. This bight increases and decreases in length, as described later, and causes the clutch controlling frame 244 to swing about the pivotal bearing of the shaft 245 thereby causing the clutch 73 to close and open, the operative connection from the rock shaft 245 to the bell crank 237 being a collar 246 provided with a crank pin 247 connected to the lower end of a link 248, the upper end of which link is adjustably connected to the arm 249 of the bell-crank 240.

From the foregoing it will be understood that, when shortening of the web bight raises the frame 244 (Figure 6), the crank pin 247 is moved in a clockwise direction to pull downwardly on the link 248 thereby swinging the bell crank 237 in a counter clockwise direction (Figure 9) and allowing the clutch to be closed by the springs 232; and that the clutch is opened by the lowering of the clutch controlling frame when the web bight lengthens.

The surface speed of the feed roller 31 is slightly greater than the constant speed of the feed cylinder 53 and as a result the web is unrolled faster than it is drawn through the machine by the feed cylinder 53. This causes the bight in the web to increase so as to permit the clutch controlling frame 243 to drop by gravity, thereby operating the bell-crank 249 and thus opening the clutch 73. Upon the opening of said clutch, the feed roller 33 stops, and accordingly the unwinding of the web stops temporarily. As the advancement of the web continues beyond the temporarily stopped feed roller 33, the bight decreases. This swings the clutch controlling frame 243 upwardly about its pivot, and pulls down-

wardly on the link 248 attached to the bell-crank 237. The bell-crank is thus swung away from the end thrust bearing 242, thereby permitting the clutch 73 to be closed by the springs 232. Upon the closing of the clutch, the feed roller 33 is again rotated and again unwinds the web from the supply roll 27. Thus, when the machine is running, the clutch controlling frame 243 oscillates continually up and down to effect the unwinding of the proper amount of web from the supply roll 27. It will be seen that there is a longitudinal pressure exerted on the feed roller shaft 230 by the bell-crank. Consequently there is provided a roller bearing 250 to receive the end thrust of said shaft 230 in order to keep friction at a minimum.

The momentum of the supply roll 27 has a tendency to unwind the web after the feed roller has stopped. Any such tendency is overcome, however, by suitable braking means comprising weighted friction rollers 251, Figure 6, which bear on the periphery of the roll 27. Said friction rollers are supported on a shaft 252 carried by arms 253 on a rock shaft 254 pivotally supported on the machine frame brackets 30. To regulate the pressure of the friction rollers 251 against the supply roll 27, there is provided a counter weight 255 adjustably supported on an arm 256 secured to the rock-shaft 254. The friction rollers 251 are provided with flanges 257 so as to keep the roll from moving endwise on the supporting rod 258 and to keep the web in alignment with various devices which operate on the web in the machine. The supply roll 27 may be slipped onto the shaft 258 which may be reduced at its ends to be received in open slots 259 formed in the brackets 30.

The upper feed roller 34 is carried by two arms 260 pivoted at 261 on brackets 262 secured to a cross bar 263 secured to the machine frame brackets 30. Springs 264, interposed between upwardly extending arms 265 of the brackets 262 and extensions 266 of the arms 260, press the feed roller 34 against the feed roller 33. The feed roller 34 may be lifted out of engagement with the feed roller 33, so that the leading edge of the web may be passed through said feed rollers, when threading in a web from a new supply roll 27, by means of a bar 267 eccentrically mounted in the brackets 30 and provided with a handle 267 for rotating it, said bar when rotated engaging with the two extensions 266 of the arms 260 which support the roller 30.

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. In combination, a plurality of feeding

mechanisms for a web, one of said feeding mechanisms operating always at the same speed and the other being capable of operating at variable rates of speed, and means for changing the web from the control of one feeding mechanism to the control of the other feeding mechanism while both of said mechanisms are operating at the same speed.

2. The combination of mechanism operating at a predetermined, uniform speed to feed a web at a given rate of speed, a second mechanism capable of feeding said web at a different rate of speed, 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.

3. The combination of mechanism operating at a predetermined, uniform speed 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, means to change the speed of the second named feeding mechanism after the web is under its control, means to cause the second feeding mechanism to resume the normal speed, and means for reverting the control of the web to the first-named feeding mechanism.

4. The combination of mechanism operating at a predetermined, uniform speed 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, means to change the speed of the second named feeding mechanism after the web is under its control, and means to sever a portion from the web after said second feeding mechanism has resumed its normal speed.

5. The combination of mechanism operating at a predetermined, uniform speed 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, means to change the speed of the second named feeding mechanism after the web is under its control, and means to vary the changed speed of the second feeding mechanism to vary the length of the portion to be severed from the web.

6. In a web feeding device the combination of a feed cylinder comprising a fixed section and a movable section, a feed roller

to cooperate with said cylinder to feed the web at a normal rate of speed, means to cause said movable section to move at the same rate of speed as the relatively fixed section while the web is being fed at normal speed, means to attach the web to the movable section, said feed roller becoming ineffective after the web is attached to the movable section, and means to change the speed of the movable section after the feed roller becomes ineffective.

7. In combination, a web feeding device including a feed cylinder, said cylinder comprising a fixed section and a movable section, a feed roller to cooperate with said cylinder to feed the web uniformly at a predetermined normal rate of speed, a shaft, said fixed section being secured to said shaft, means comprising a link and a lever to connect the movable section with said shaft, and a cam element for controlling said lever.

8. In combination, a web feeding device including a feed cylinder, said cylinder comprising a fixed section and a movable section, a feed roller to cooperate with said cylinder to feed the web at a normal rate of speed, a shaft, said fixed section being secured to said shaft, means comprising a link and a lever to connect the movable section with said shaft, and a cam element for controlling said lever to cause said movable section to move at the same rate of speed as the fixed section while the feed roller is effective, means to attach the web to said movable section while the web is being fed at normal speed, the feed roller becoming ineffective after the web is so attached, said cam element being effective after the web is attached to cause the movable section to lag, means to sever the web, said cam element being effective to cause the movable section to resume its normal position with respect to the fixed section after the web has been severed, and means to adjust the link relatively to said lever to vary the extent of lag of the movable section according to the length of web portion to be severed.

9. In combination, positive feed mechanism for advancing a web at a normal rate of speed, and positive feed mechanism for advancing the web at a variable rate of speed, and means whereby said mechanisms are alternately rendered effective for operation on said web, said web being fed for a short period by both feeding mechanisms while the web is being changed from one feeding mechanism to another.

10. In combination, positive feed mechanism for advancing the web at normal speed, a positive feed mechanism for advancing the web at a different rate of speed, means for causing said second feed mechanism to operate at times at the normal rate of speed, and means for rendering said second mechanism operative for feeding the web during said

period of normal speed operation, and for thereupon rendering said first speed mechanism inoperative to act on the web.

11. In combination, a plurality of positive
5 feed mechanisms, the first for advancing the web at normal speed, and the other for advancing the web at a different speed, means for causing said other feed mechanism to operate at times at normal speed, and means effective
10 during said period of normal speed operation for rendering said second mechanism effective for operating on the web, and for rendering said first mechanism ineffective for operating on the web.

12. In combination, a plurality of feed
15 mechanisms for positively advancing the web, the first of said mechanisms being operable at normal speed and the second of said mechanisms being operable both at said normal and
20 a variable speed, means operable during a period of normal speed operation of said second mechanism for rendering the second mechanism effective and the first mechanism ineffective on the web, and means permitting
25 the adjustment of said variable speed.

13. In combination, a plurality of feed

mechanisms, one for operating on the web only at uniform, normal speed and the other for operating on the web at different speed, means for causing said second mechanism to
30 operate periodically at normal speed, means operable during a period of normal speed operation to transfer the feeding of the web from said first mechanism to said second mechanism, means for restoring said second
35 mechanism to operate at said normal speed, and means effective for then transferring the feed of the web from the second mechanism to the first mechanism.

14. In combination, a mechanism operating
40 always at uniform, normal speed for advancing a web at a normal rate of speed, means associated therewith for feeding the blank at variable rate of speed, and means
45 for at times causing said variable mechanism to lag behind the said normal mechanism, and means for transferring the feed operation from one mechanism to the other.

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

ABRAHAM NOVICK.