

May 12, 1931.

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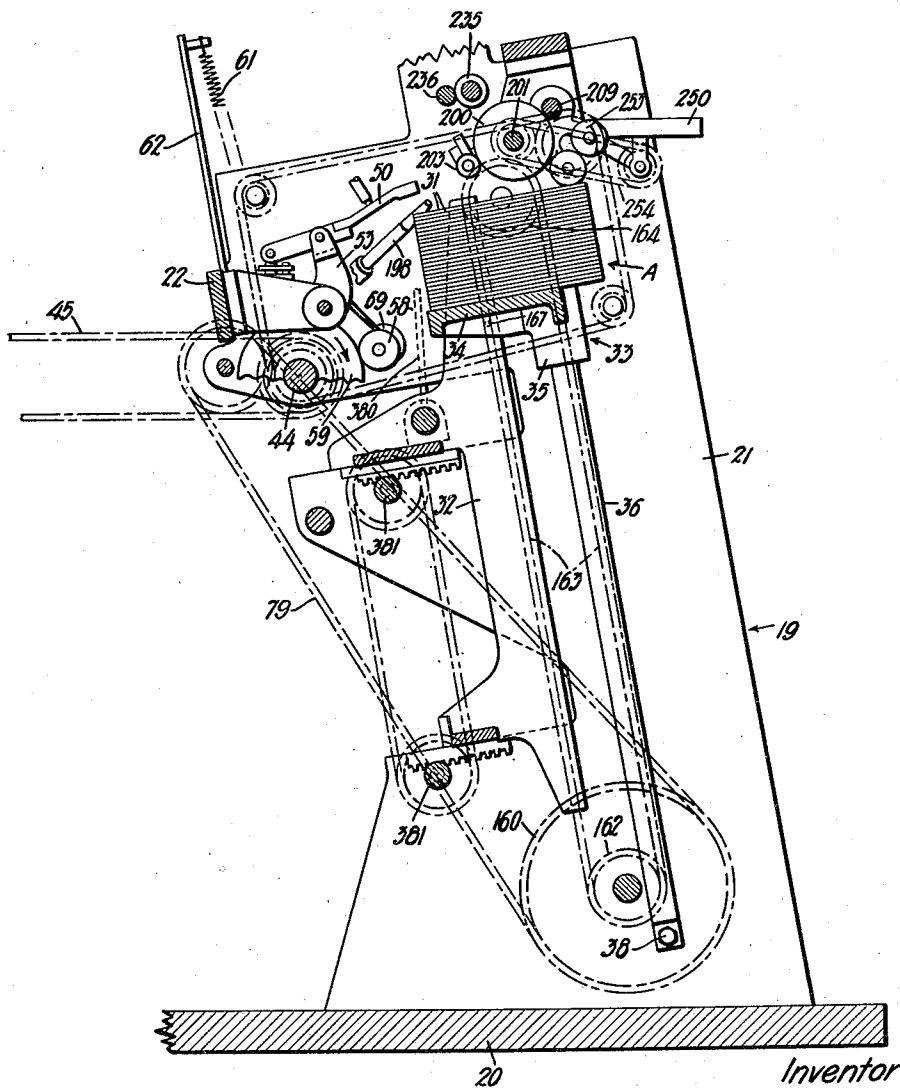
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ENVELOPE FEED MECHANISM

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7 Sheets-Sheet 1

Fig. 1.



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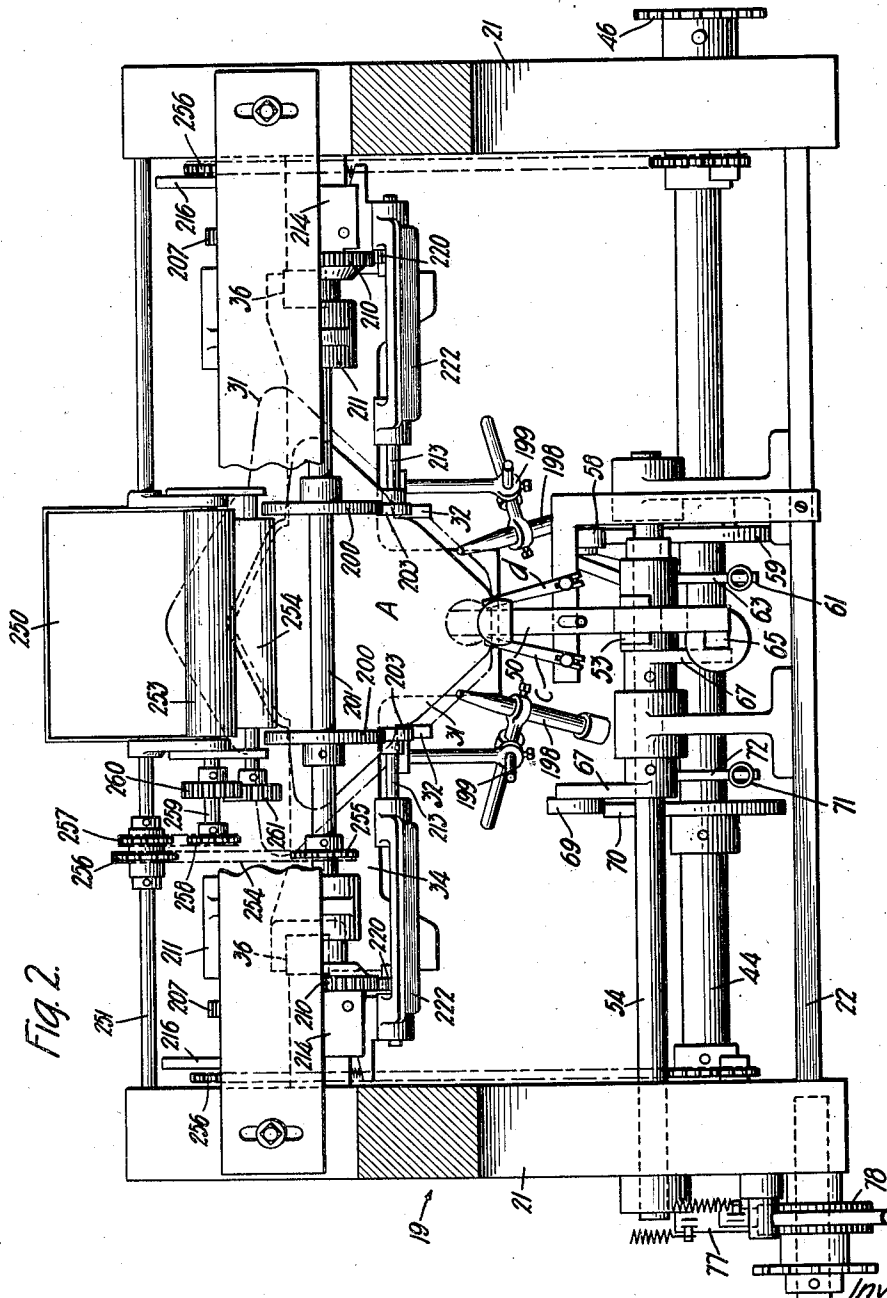
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ENVELOPE FEED MECHANISM

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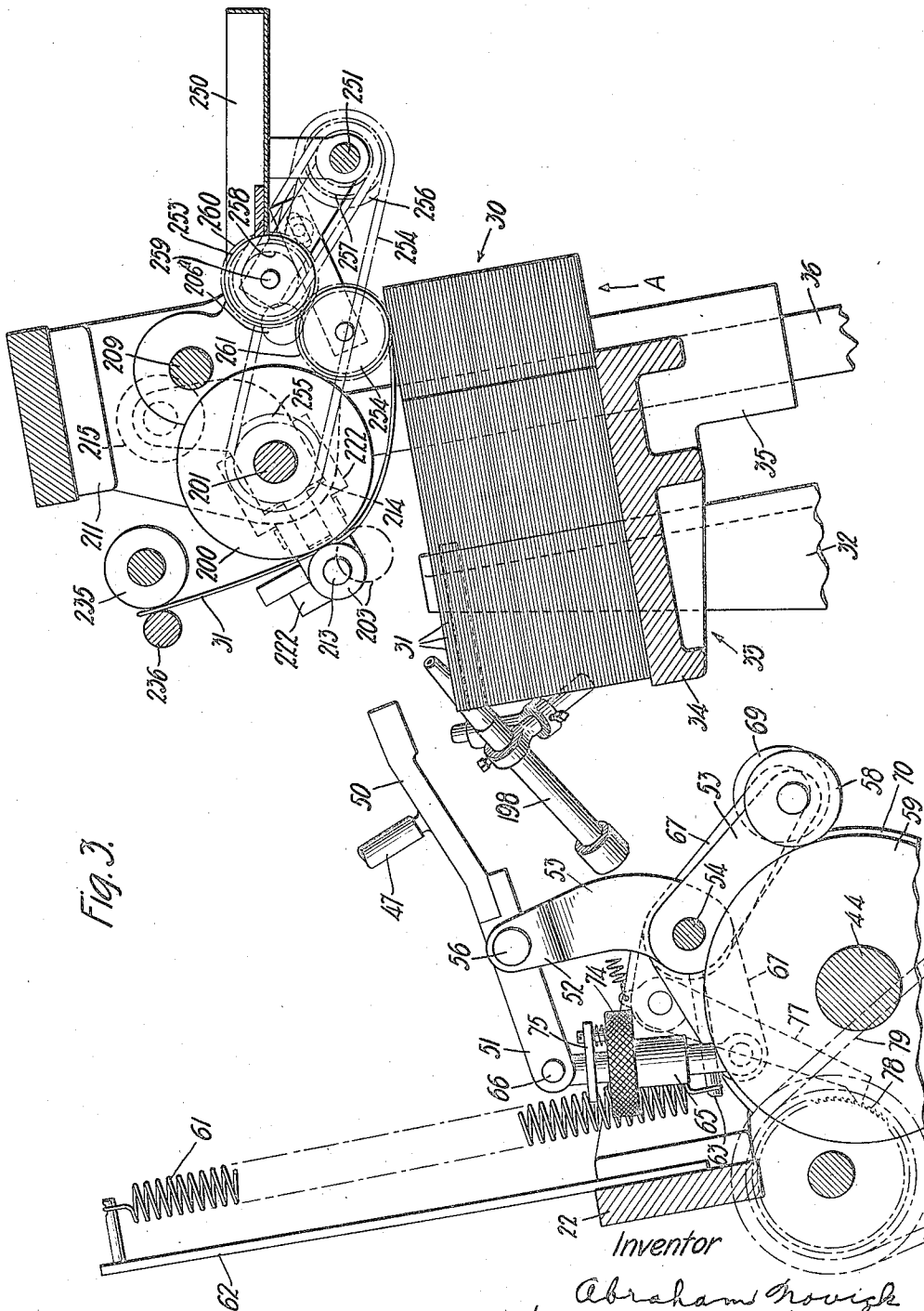
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7 Sheets-Sheet 3



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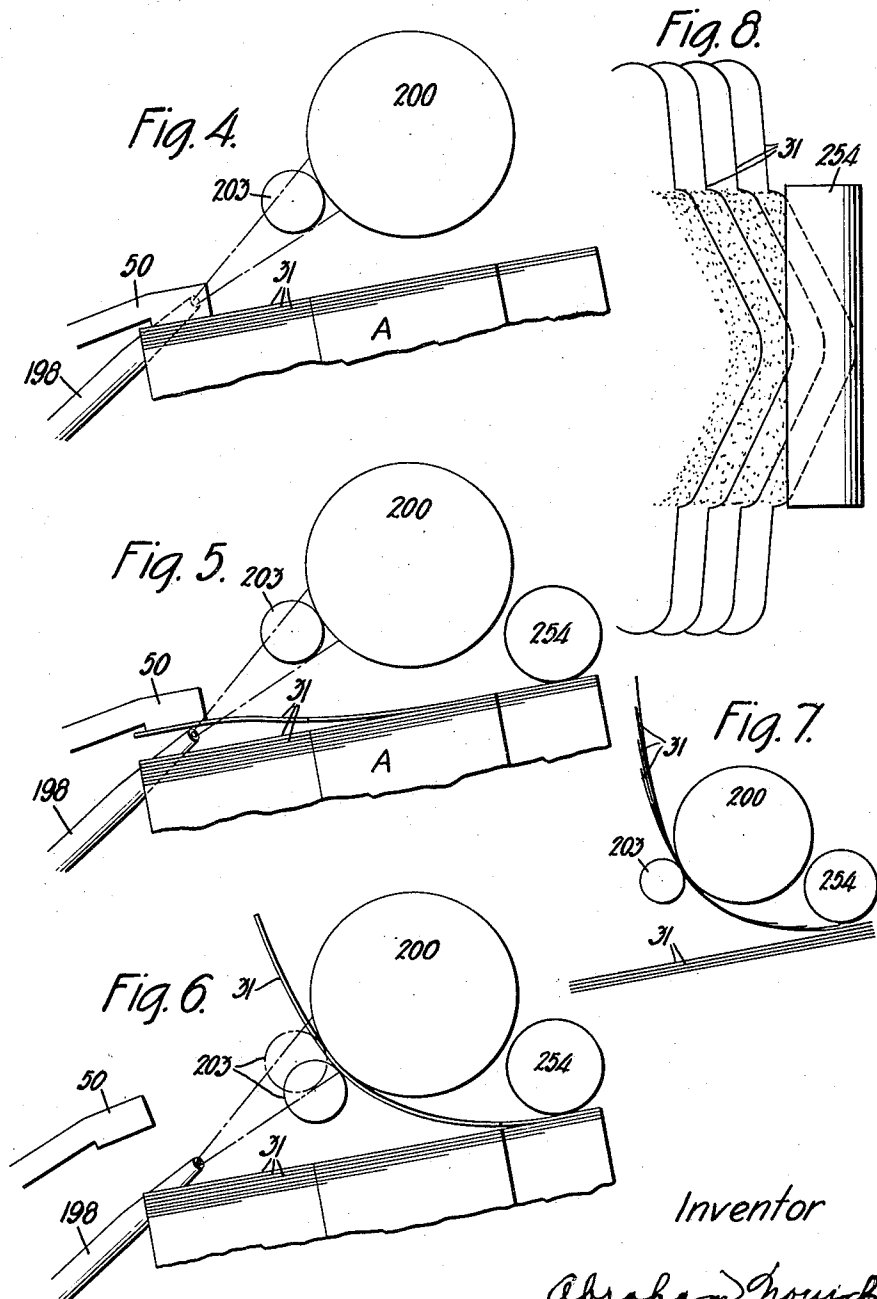
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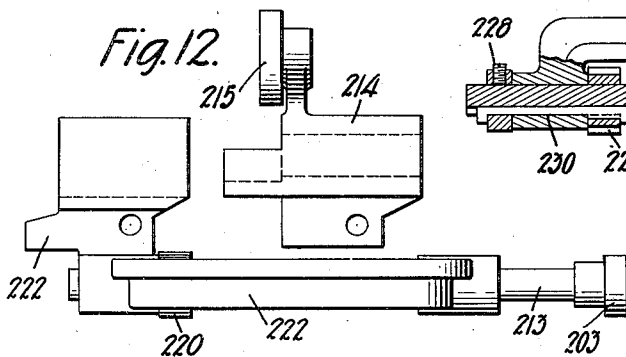
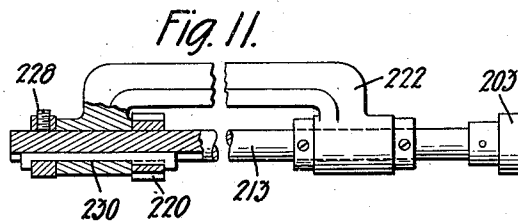
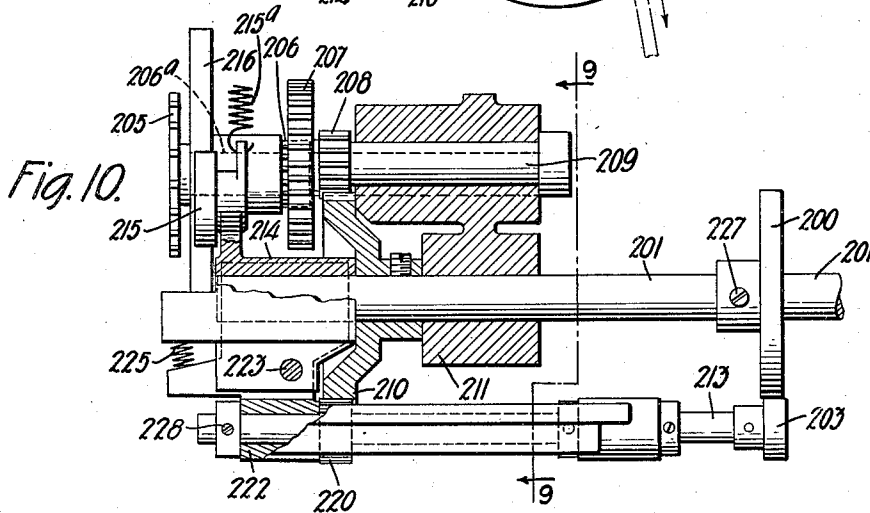
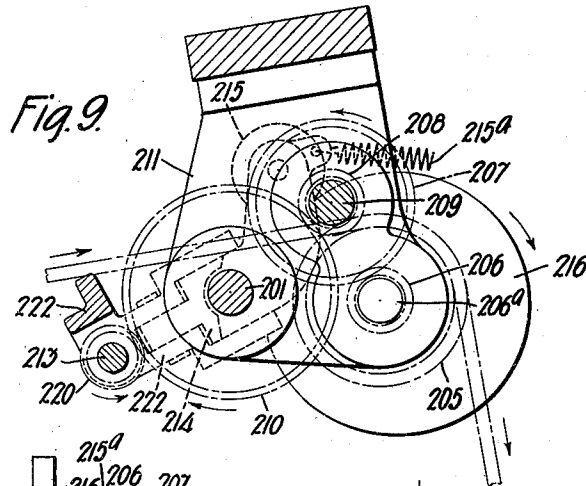
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ENVELOPE FEED MECHANISM

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7 Sheets-Sheet 5



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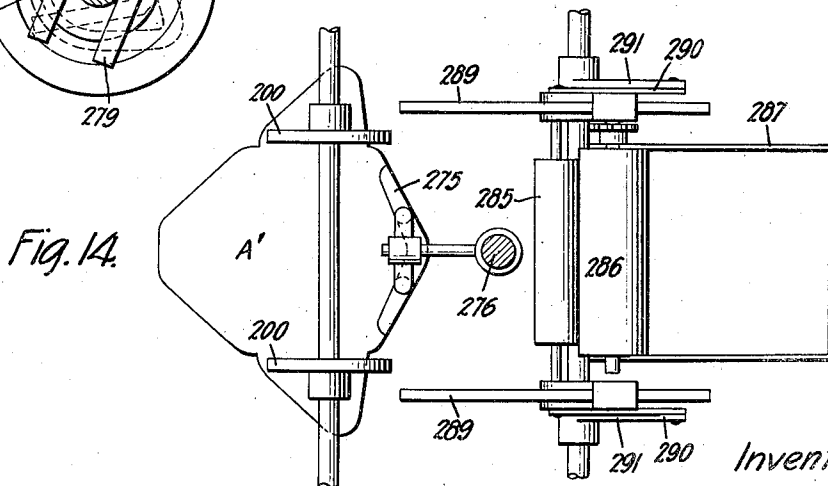
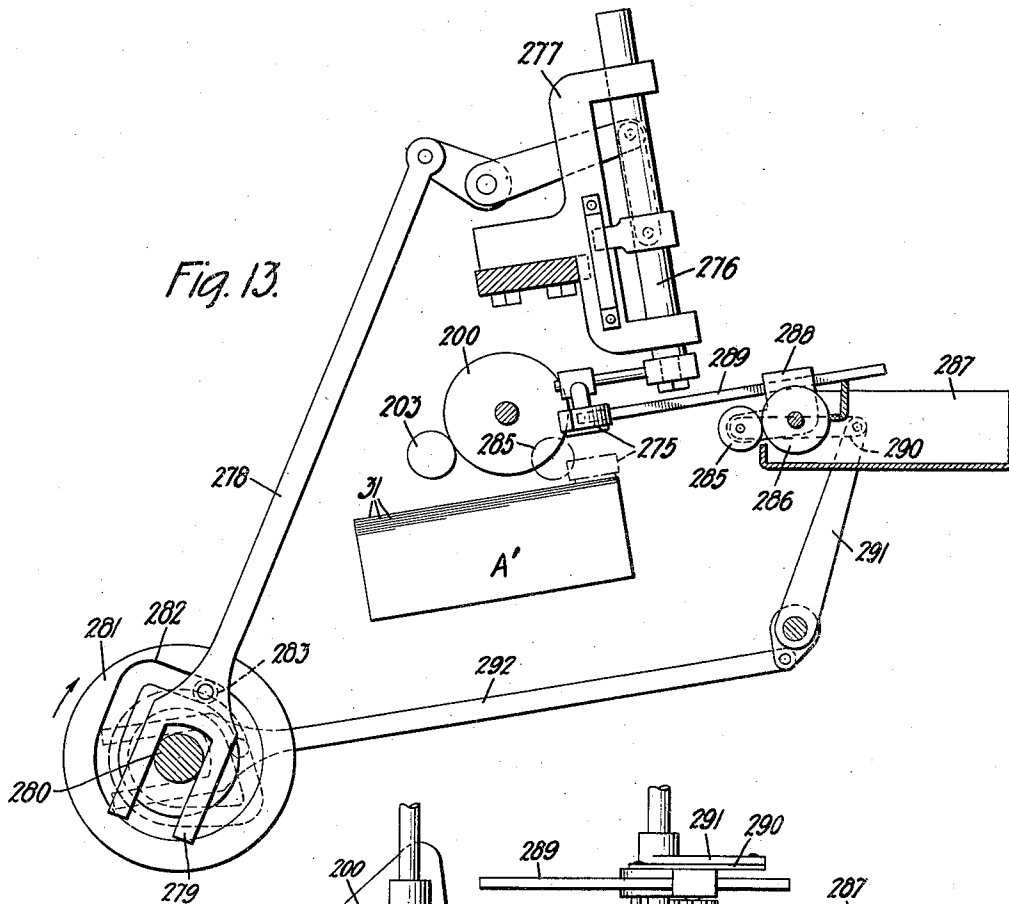
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ENVELOPE FEED MECHANISM

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7 Sheets-Sheet 6



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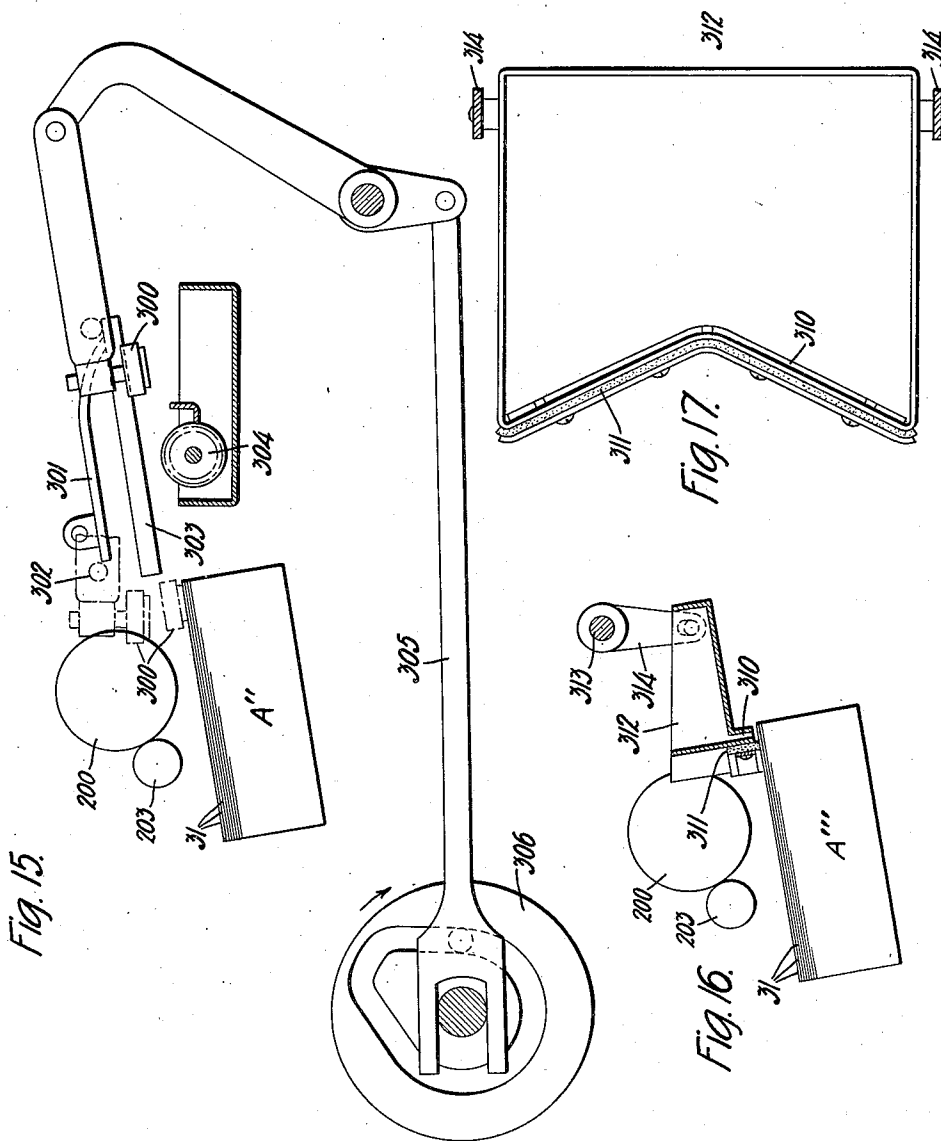
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ENVELOPE FEED MECHANISM

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7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE

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ENVELOPE FEED MECHANISM

Application filed October 21, 1926. Serial No. 143,047.

This invention relates to feeding mechanisms, and is of particular application for feeding blanks to envelope making machines. In general my present invention seeks to accomplish a feeding operation consisting in first separating a blank from the top of a stack, gumming the sealing flap of the blank, and conveying the blanks in succession from the pile in fan-shape formation. It has been proposed to gum the sealing flap of the uppermost blank as the same was removed from the stack. The present invention, in addition to this feature contemplates feeding of the blanks from the stack in overlapping or fan-shaped relation. Various types of gumming mechanism may be employed, as for example, the roller, dab, wiper and box types.

A further feature of my invention is the provision of improved means consisting of compressed air nozzles for transferring the blank from the sucker to the conveying mechanism. Improved means are also provided for gripping the blank which is thus presented to the conveying mechanism and to permit its removal from the feeding mechanism.

A further feature consists in the provision of means for gumming the sealing flaps of the blanks that have been removed from the stack whereby a gumming device of the ordinary roller type may be used, the blank being gummed serving to shield the one beneath it from the application of excess area of gum. However, it is a feature of the present invention that various types of gumming devices may be employed if desired.

The present invention makes use of a number of features described and claimed in my copending application No. 105,046. In the device disclosed in the said application, the blanks are removed by means employing a sucker which separates the topmost blank from the stack and conveys it into engagement with a pair of cooperating conveyor bands or chains. The latter convey the blanks now in overlapping or fan-shaped relation to the usual transporting rollers, after which the blanks may either be given a gumming operation on the sealing flaps or else fed directly into the envelope folding mechanism.

In the present invention the end of the topmost blank is pulled away from the stack or pile by means of a sucker as in my copending application referred to. When the sucker has raised the end of the blank a certain distance, the suction is cut off and the blank is subjected to the influence of one or more streams of air which blow it against a pair of rotating cylindrical elements, whereupon it is gripped against said elements by means of a pair of cooperating auxiliary roller elements which automatically move over the blank. By the means thus far described the blank is now effectively held by the roller elements on opposite sides thereof by which it is conveyed between a pair of feed rollers. Before, however, the blank has travelled more than a portion of its length, a new blank has been seized and positioned in a similar manner so that it lies for a major portion of its length upon the first mentioned blank. In this way a fan-like band of overlapping envelope blanks, with the sealed flaps gummed, is formed, it being understood that the distance between successive blanks ordinarily is equal to the gummed area on the sealing flaps. In this formation the band of envelopes is dried in the usual way, after which they are fed to the envelope making machine.

In the accompanying drawings I have shown an illustrative embodiment of my invention. In these drawings:

Figure 1 is a side elevational view of the assembled machine, certain parts being in section;

Figure 2 is a plan view of the machine;

Figure 3 is a side elevational view of the upper portion of the machine on a larger scale than Fig. 1;

Figures 4, 5 and 6 are diagrammatic views showing the progress of a sheet as it is removed from the stack;

Figure 7 is a diagrammatic view showing the band of overlapping envelopes formed by the said mechanism;

Figure 8 is a view largely diagrammatic showing the gumming operation carried out in the gumming device shown in the assembled machine;

Figure 9 is a view of the mechanism for

gripping the blank after one end of same has been lifted from the stack and is a view taken along section line 9—9 of Fig. 10;

Figure 10 is a view of the mechanism shown in Figure 9, but seen from the top;

Figures 11 and 12 are detailed views of the portion of the mechanism shown in Figs. 9 and 10.

Figure 13 is a view of a plunger type of gummer capable of use in the machine of my invention;

Figure 14 is a plan view of same;

Figure 15 is a view of still another type of gummer;

Figure 16 is a view of a still further type; and

Figure 17 is a plan view of the gummer shown in Fig. 16.

It will be convenient to describe different parts of the machine under different headings as follows:

a—The frame and mechanism for holding the pile of blanks, for elevating the stack as the blanks are fed off, and for adjusting the said mechanism for different sizes of envelope blanks.

b—The sucker and operating mechanism therefor.

c—Mechanism for gripping the blank, the end of which has been lifted by the sucker, and for feeding it from the stack.

d—The gumming mechanisms.

Mechanisms *a* and *b* have been described in connection with my previously filed application No. 105,046, above mentioned, so that they will need less extended description here. However, such description of these parts will be given as will be necessary to an understanding of the machine as a whole.

a—The frame and mechanism for holding the pile of blanks, for elevating the stack as the blanks are fed off, and for adjusting the said mechanism for different sizes of envelope blanks

The machine includes a frame 19, Figure 1, comprising a base plate 20 from which arise side plates 21 rigidly secured by tie bars, one of which is indicated by 22, Fig. 2. A pack 30 of flat articles or sheets, such as envelope blanks 31 is supported at their edges on ways or bars 32 slightly inclined to the vertical suitably held in the frame 19. Supporting the bottom of the stack of blanks, there is provided a carriage or elevator 33 including a cross-bar 34 having bearing blocks 35, one at each end to embrace guide bars 36 upon which the carriage slides, the bars 36 being secured to the side plates 21 by means of bolts 38, Fig. 1.

The ways 32 may be separated or brought closer together by the operation of a handle 380 which operates a rod having right and left ended screw thread portions, as is common in this type of adjustment, and which is

more fully described in my copending application referred to. Adjustment of the ways 32 in a direction longitudinally of the machine, i. e. to and from the sucker so as to accommodate different lengths of blanks is accomplished by mechanism for that purpose denoted generally by 381 which, as it forms no part of the present invention, and is described in said copending application, need not be gone into in greater detail here.

The mechanism for raising the carriage 33 consists of a sprocket 160 located at the bottom of Figure 1, two smaller sprockets 162 mounted on the same shaft as sprocket 160 and on either side of said larger sprocket 160, sprockets 164 at the top of the machine corresponding to and connected with sprockets 162, by chains (one of which, 163 being seen in Fig. 1), and pins 167 secured in said chains and engaging the carriage 34. Thus rotation of sprocket 160 by mechanism to be later described will raise or lower the carriage 33, and a parallel feed of the carriage will be maintained.

b—The sucker and operating mechanism therefor

The sucker mechanism now to be described is in some respects similar to that shown in my copending application.

It differs therefrom in that herein it serves the dual function of lifting the end of the topmost sheet and acting as a feeler for regulating the upward feed of the carriage 33 bearing the stack of blanks.

Referring to Figures 1, 2 and 3, as well as to the diagrams of Figures 4, 5 and 6, it will be evident that the sucker must move forwardly of the pack (as seen from Figure 3), as well as downwardly. To accomplish this compound movement, the sucker now designated 50 is pivotally mounted in a bifurcation 52 of a bell crank 53. The latter will be given a rotary movement about its shaft 54 which, as will be evident, will have the effect of throwing the sucker 50 forward, as well as downward, to a slight extent. To give the requisite downward movement of the sucker, means are provided for rotating the sucker about its pivot, now designated 56, in the bifurcation of bell crank 53. The mechanism for accomplishing these movements may now be gone into in detail. Returning to the means accomplishing the forward movement of the sucker, the end of bell crank 53 opposite the pivot 56 is provided with a cam follower or roller 58, bearing against the face of cam 59. The roller 58 is caused to follow the face of the cam by the action of a spring 61 acting against a suitable support 62 and at its lower end against a lever 63 attached to bell crank 53. The mechanism for accomplishing the downward movement of the sucker comprises a link 65 pivoted at its upper extremity (pivot 66)

to the end of arm 51, bearing sucker 50 and its lower end connected to a bell crank 67 by means of a pivot 68. Bell crank 67 has at its other end a follower or roller 69 contacting with a cam 70 also on shaft 44. Roller 69 is caused to follow its cam 70 by means of a spring 71 arranged similarly to spring 61, spring 71 operating through a lever 72 as shown best in Figure 2. It will now be evident that movement of bell crank 67, due to cam 70, will rock the arm 51, bearing sucker 50, about the pivot 56, and thus give the sucker the requisite up and down movement independent of any such movement imparted by the bell crank 53. This movement is adjustable owing to the nature of link 65, which, as partially shown in Figure 3, is adjustable in length by means of an internally threaded sleeve having a knurled head 74, rotation of which will either shorten or lengthen the link as a whole. In order to prevent accidental rotation of the head 74, a friction device 75 of known type is provided which bears against said head.

The arrangement of cams 59 and 70 is such that the sucker is ordinarily permitted to contact with the top of the stack due to the action of springs 61 and 71, the cam followers standing away from their respective cams at such time.

The movement of the sucker is utilized to regulate the feeding of the stack of blanks 33 upwardly to compensate for their removal. This control is brought about as follows: In contradistinction to bell crank 53, which is free of shaft 54, bell crank 67 is secured thereto so that rocking of the shaft caused by bell crank 67 is transmitted to a pawl 77, mounted thereon, actuating ratchet 78. Movement of ratchet 78 is transmitted by means of chain 79 to sprocket 160 which, as previously described, actuates the mechanism in advancing carriage 33 upward. A holding pawl (not shown) is provided for ratchet 78. It will be understood that in the ordinary case, the pawl 77 will travel back and forth a number of times before it rides over a tooth in the ratchet and imparts movement thereto.

The lifted blank, at the instant of being released by the sucker, is to be transferred to the conveying means and for accomplishing this, a pair of air nozzles, 198, 198 are provided being carried in adjustable brackets 199, 199.

c—Mechanism for gripping blank, the end of which has been lifted by the sucker, and for feeding it from the stack

Referring to Figures 7, 8 and 9 as well as Figures 2 and 3, cylindrical feeding or gripping elements 200 are mounted on a shaft 201. Cooperating with each gripping element 200 is a roller 203 which serves to hold the blank against said element 200. Mechanism

is provided for rotating said gripping elements, for moving elements 203 back and forth a short distance in an orbit along the periphery of element 200 so as to receive the blank therebetween, as follows: Sprocket 205 at either side drives gripping elements 200 through the following gear chain pinion 206 on the same shaft 206a as sprocket 205, reducing gears 207 and 208 on shaft 209 gear 210 on shaft 201, bearing the gripping elements 200. A bracket 211 secured to the framework of the machine holds shafts 209 and 201. The means for accomplishing the orbital motion of the roller 203 will now be described. A shaft 213 bearing the roller 203 is mounted for rotation in bracket 214, itself revolvably mounted on the same shaft, 201, with elements 200. Attached to said bracket 214, is a cam follower 215 which is actuated by cam 216 on the shaft 206 driven by sprocket 205, the follower 215 being held against the cam 216 by a spring 215a. In this manner movement of the bracket 214 occasioned by the cam follower 215 causes the shaft 213 bearing element 203 to revolve for a limited distance about the axis of shaft 201. Shaft 213 will also revolve about its own axis by means of a pinion 220 engaging the gear 210. In order to provide for slight movement of the gripping roller 203 away from the face of the larger gripping element 200, said shaft 213 bearing said element 203 has its bearing in a bracket 222 which is swivelly joined to bracket 214 above mentioned by means of a pin 223, brackets 214 and 222 having cooperating shoulders as shown most clearly in Figure 9. A spring 225 (Fig. 10) working against oppositely disposed edges of the said brackets 213 and 222 constantly urges the roller 203 against the gripping element 200. Provision is made for adjusting both the gripping elements 200 and 203 longitudinally of their respective shafts so as to accommodate different sized envelope blanks. In the case of gripping elements 200, they are held in adjusted position by means of set screws 227, while the shaft 213 bearing the element 203 is adjustable longitudinally of its holding bracket 222 by means of a set screw 228, (Fig. 10). Key and keyway collectively denoted by 230 allow adjustment of shaft 213 in a longitudinal direction, without disturbing the position of pinion 220, transmitting motion of rotation about its own axis to same. The cam follower 215 is constrained to follow cam 216. The blank thus caught between the opposed gripping members 202 and 203 will be caused to travel upward into engagement with feeding rollers 235 and 236 (Fig. 3).

d—Gumming mechanism shown in the assembled machine

This mechanism is most clearly shown in

Figures 2 and 3, and as there shown it is of the roller type. The gum or adhesive is contained in a box or container 250 which is pivotally supported on shaft 251. The gum is fed from the container 250 by means of a rotary feeder member or doctor 253 to an applying roller 254 contacting with the topmost blank of the stack A. The driving mechanism for the gumming device comprises a sprocket 255 on shaft 201, sprockets 256 and 257 on shaft 251, a sprocket 258 on a shaft 259 carrying the roller 253 and gears 260 and 261 which serve to drive the application roller 254 from shaft 259.

As has been previously stated the part which it is desirable to gum at this time is the sealing flap of each blank, and accordingly blanks are stacked in the holding carriage with the seal flaps directly beneath the application roller. It will be noted that such a roller applies a gummed area which will be straight across the envelope flaps, whereas the flap itself is of triangular shape. Due to the preferred operation of the machine, however, an area of gum is applied which follows the contour of the flap by the expedient of "fanning out" the blanks to the top of the pile so that each blank acts as a mask for the one beneath it, and results in gum being applied only to the exposed margins of the sealing flaps. This is shown diagrammatically in Figure 8.

e—Operation of machine

The operation of the machine will be apparent from the foregoing, but it may be of aid in understanding of the invention to briefly capitulate the various steps here. A stack of blanks A having been placed in the machine, the ways 21 are adjusted in accordance with the size of blanks so as to grip same with a requisite degree of firmness. The carriage 33 is adjusted so as to bring the topmost blank within the operating range of the sucker. The pivoted gumming mechanism is allowed to rest upon the top of the stack A. The machine having been set in operation, the sucker 50 descends, and by virtue of the timed suction therein, picks up the end of the topmost blank. As the sucker bearing the blank reaches the top of its travel the suction is broken by mechanism not described whereupon the blank is moved by means of air blasts from the nozzles which may be in operation continuously. The force of these jets or blasts of air causes the paper to be blown against the cylindrical feeding elements 200. Just prior to the time when the blank has reached the elements 200, the cooperating rollers 203 have been retracted up along the periphery of the elements 200, thereby allowing the wings *aa* of the blank—see the blank shown in full and dotted lines in Fig. 2—to clear said rollers. As soon as time has elapsed sufficient for the blank to have con-

tacted with the elements 200 the rollers are caused to travel down and grip the wings. The rotation of the elements 200 and 203 being continued, the blank is gradually fed upward and out of the machine. Before, however, the blank has travelled more than a short distance, the feeding of another blank has been accomplished which then is caused to lie upon the major portion of the first mentioned blank, the process of feeding being continued in this way until a continuous band of blanks has been formed. This band may now be conducted into a drying chamber. During the operation the fingers *c* and *d* shown in Figure 2, operate to steady the stack of blanks and aid in preventing more than one blank from being withdrawn by the sucking mechanism. As stated in connection with the description of the gumming mechanism, the blank has its sealing flap gummed as it is removed from the stack.

My invention adapts itself to the use of other types of gummers and in the accompanying drawing are illustrated a few of the types applicable. Referring to Figures 13 and 14, illustrative of the plunger type of gummer, a stamping element 275 is mounted on a plunger 276 mounted in a frame 277. The plunger is moved up and down by means of a link 278, having a bifurcation 279 straddling a shaft 280, a disk 281 is mounted on said shaft and has an internal cam groove or track 282 in which a pin 283 is caused to ride. Thus link 278, by means of connections shown, gives the stamping element 275 an up and down movement which is arranged so as to stamp the topmost blank in the pile or stack A'.

Gum is applied to the stamping element 275 at the top of each stroke and the mechanism for accomplishing this is as follows: A transfer roller 285 receives a coating of gum from a rotating roller 286 mounted in a gum box 287. Transfer roller 286 is trunnioned in a frame 288 slidable on a pair of tracks 289. Frame 288 has connected thereto compound links 290, 291 on either side, which links are given the requisite movement by means of a further link 292 operating in a cam track 293 in disk 281. By the mechanism described, a complete revolution of disk 281 will cause the transfer roll 285 to move from contact with gum supplying roller 286 along the length of stacks 287 beneath the stamper 275, imparting thereto a film of gum. As soon as transfer roller 288 has been retracted clear of the stamper 275 the latter, due to the arrangement of the cam tracks 279 and 282 descends and imparts a film of gum to the topmost blank of the stack A'. When employing this type of gummer, the blank will be moved clear of the stamper after it has been once gummed thereby.

Figure 15 illustrates a wiper type of gummer, in which a wiper 300 is caused by the

cam and link mechanism illustrated to ride along a stack 301, to descend therefrom when a pin 302 reaches the end thereof, contact with the topmost sheet of the stack A'' and impart a film of gum thereto and thereafter to be retracted along a lower track 303 in contact with a gum transfer roller 304 and thence back to its original position. This movement is performed by suitable means including a link 305 operated by a cam 306 provided to reciprocate the wiper 300.

Figures 16 and 17 illustrate the ordinary box type of gummer which is supported on the top of a stack A'''. The gum flows through a slot 310 of the configuration of the seal flap and is spread upon the flap by means of a wiper 311 of felt or similar material when the blank is pulled off the top of a stack. The box 312 containing the gum is suspended from the shaft 313 by means of a link member 314 which is slotted at its lower end as shown in order that the gummer may adjust itself to the top of the stack A'''.

The feeding and gumming mechanism which I have described in the foregoing is capable of a relatively high speed of operation, and it is characterized by comparative simplicity of parts. It will be noted that the gumming and removal of the blank from the stack are accomplished in a single operation so as to give a continuous band of envelopes in overlapping formation which may in such condition be readily dried. It will be noted that by the use of the arrangement of air blasts described a transfer of the blank from one holding mechanism to another is accomplished without the use of complicated mechanism which would otherwise be required. The machine is moreover readily adjustable for various sizes of blanks.

What I claim is:

1. In a blank feeding machine, means for holding a stack of blanks, means for elevating an end of the topmost blank, means for blowing the released portion of the blank against a conveying element, means for gripping the blank against said element comprising a roller cooperating with said element and means to move same back and forth along the periphery of said element.

2. In a blank feeding machine, means for holding a stack of blanks, means for elevating an end of the topmost blank, means for blowing the released portion of the blank against a conveying element, means for gripping the blank against said element comprising a roller cooperating with said element, means for rotating said roller and means for moving same back and forth along the periphery of said element.

3. In a blank feeding machine, means for holding a stack of blanks, means for feeding blanks therefrom comprising a sucker for elevating an end of the topmost blank, said sucker having a pivotal movement, means for

varying the throw of the sucker and means controlled by said sucker for automatically and positively elevating the stack of blanks by measured increments comprising cam means for elevating the sucker, spring means for lowering and pressing same against the stack, and driving means for the stack elevating mechanism, including a ratchet, a pawl cooperating with said ratchet and actuated by said sucker.

4. In a blank feeding machine, means for holding a stack of blanks, means for elevating an end of the topmost blank, means for blowing the released portion of the blank against a conveying element, means for gripping the blank against said element, means for rotating said roller, means for moving same back and forth along the periphery of said element and means including spring pressed means allowing said roller to separate from said element.

5. In a blank feeding mechanism, means for holding a stack of blanks, means for feeding blanks therefrom comprising a sucker having movement toward and away from the stack, cam means for giving the sucker an upward movement, spring means for pressing the sucker against the stack, positive driving means for elevating said stack including a ratchet, a pawl in operative connection with said ratchet, a connection between said pawl and the sucker moving up and down with said sucker such that up and down movement of said sucker is effective to operate said ratchet only when the downward travel of the sucker exceeds a predetermined amount and means for adjusting the throw of the sucker comprising a telescoping hollow link transmitting motion thereto.

6. In a blank feeding mechanism having mechanically controlled blank end elevating means, means for holding a stack of blanks, a conveyor element, means for blowing the end of the blank against said conveyor element after it has been picked up and released by said elevating means mentioned and mechanical means for gripping the blank against said element after same has been blown thereagainst and conveying it off the stack.

7. In a blank feeding mechanism having mechanically controlled blank and elevating means, means for holding a stack of blanks, a conveyor element above said stack, means for blowing the end of the blank against said conveyor element after it has been picked up and released by said elevating means mentioned and mechanical means for gripping the blank against said element after same has been blown thereagainst and conveying it off the stack.

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

ABRAHAM NOVICK.