(No Model.) 3 Sheets—Sheet 1.

R. ANDERSON.

ENVELOPE MACHINE.

No. 458,296. Patented Aug. 25, 1891.

Fig. 2.

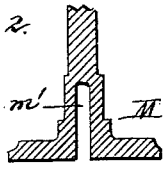


Fig. 3.

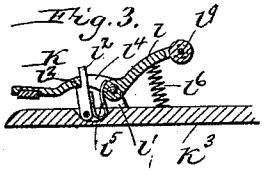
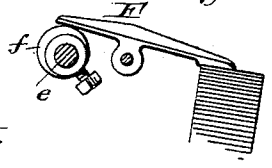


Fig. 1.

Fig. 4.



Witnesses:
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(No Model.) 3 Sheets—Sheet 2.

R. ANDERSON.

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Fig. 5.

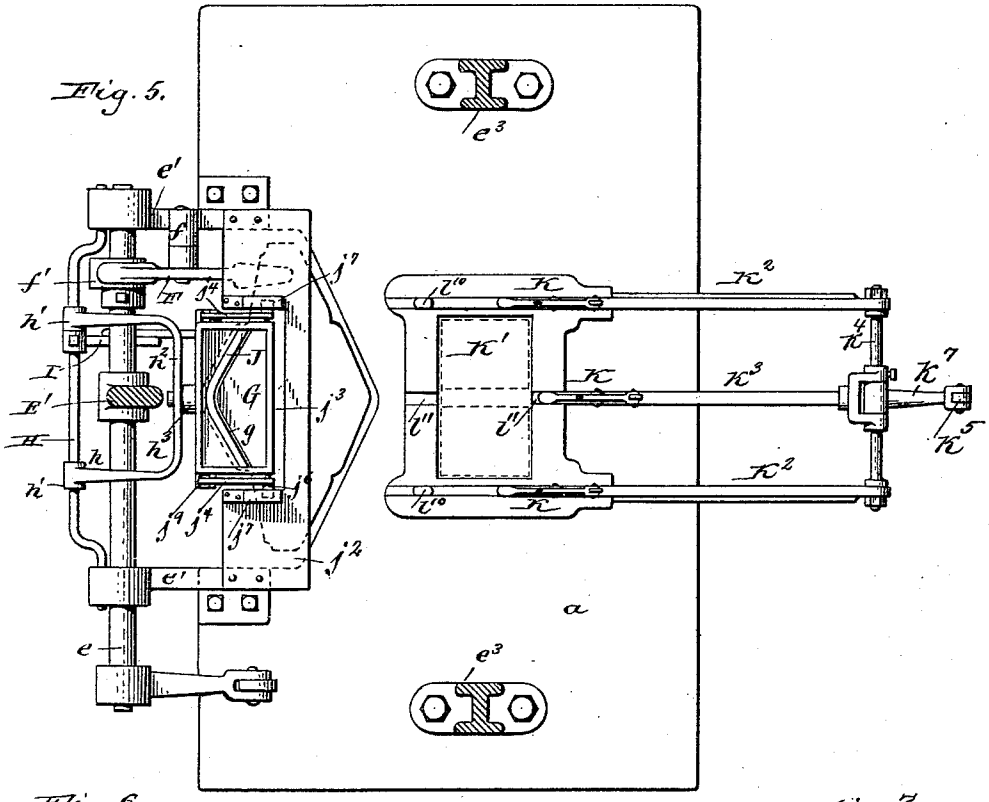


Fig. 6.

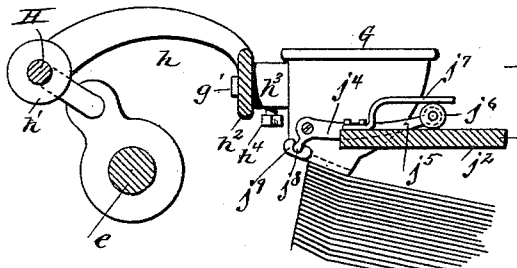


Fig. 7.

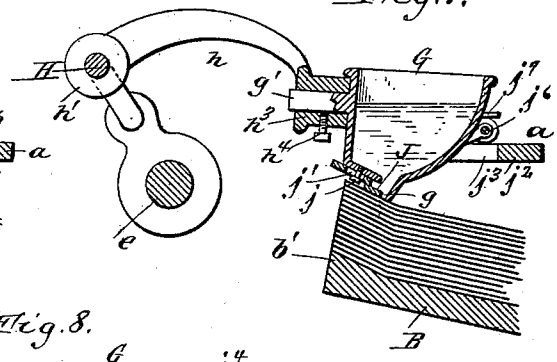
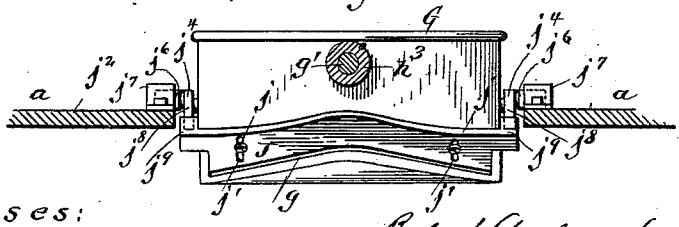


Fig. 8.



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(No Model.) 3 Sheets—Sheet 3.

R. ANDERSON.

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Fig. 9.

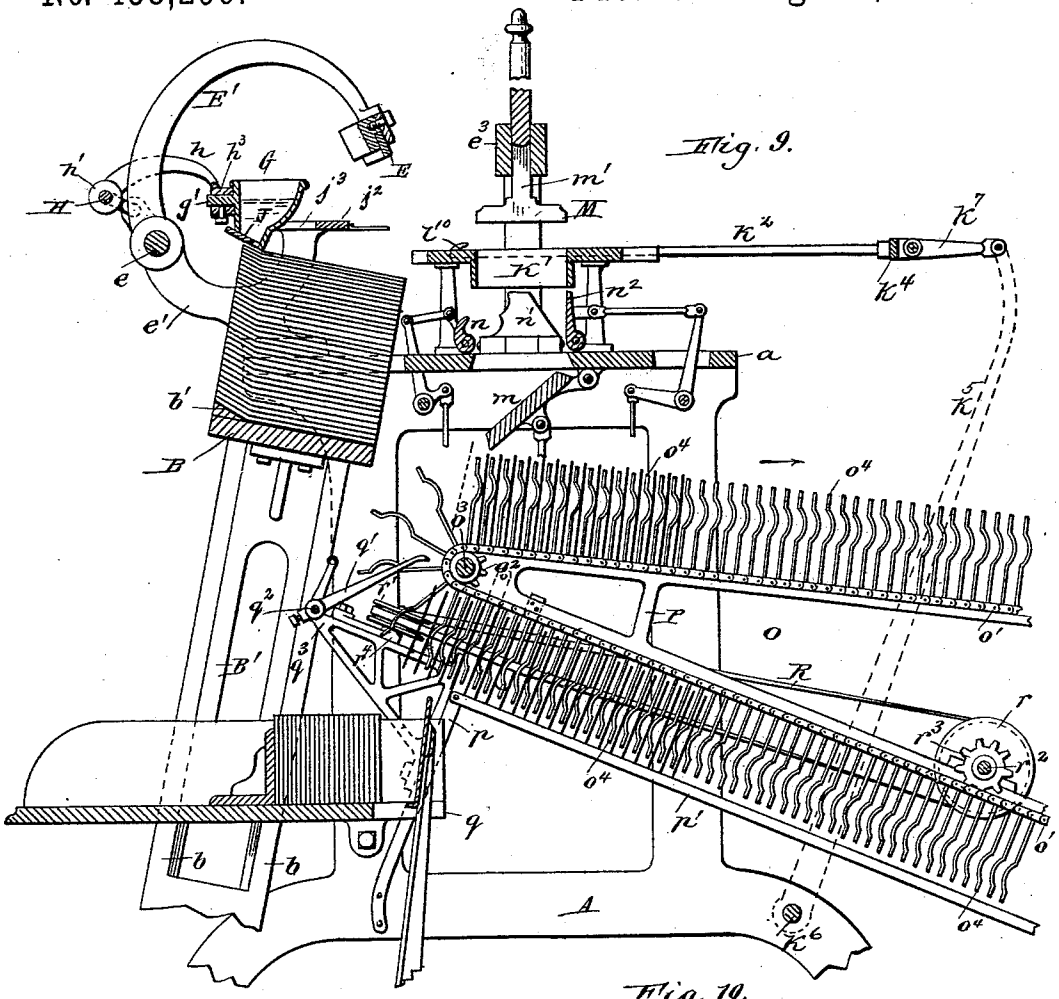


Fig. 10.

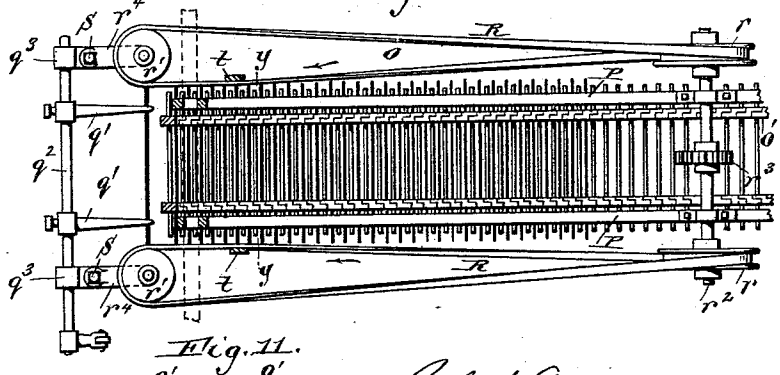
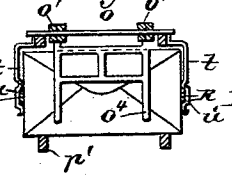


Fig. 11.



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UNITED STATES PATENT OFFICE.

ROBERT ANDERSON, OF TORONTO, CANADA, ASSIGNOR OF ONE-HALF TO EDWARD W. BLACKHALL, OF SAME PLACE.

ENVELOPE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 458,296, dated August 25, 1891.

Application filed February 9, 1891. Serial No. 380,817. (No model.)

To all whom it may concern:

Be it known that I, ROBERT ANDERSON, a subject of the Queen of Great Britain, residing at Toronto, in the county of York, in the Province of Ontario, Canada, have invented new and useful Improvements in Envelope-Machines, of which the following is a specification.

This invention relates to that class of envelope-machines which are provided with a vertically-movable table or elevator for supporting a pile of blanks, a feed device for automatically raising said table as the blanks are picked off from the top of the pile, a gum-box resting upon the pile of blanks and provided with a discharge-opening in its bottom for gumming the seal-flaps of the blanks, a vertically-reciprocating gummer for gumming the bottom flaps and lifting the top blank from the pile, horizontally-reciprocating grippers whereby the blanks are carried to the folding mechanism, and an endless conveyer or carrier which receives the envelopes from the folding mechanism.

My invention has for its objects to improve the construction of the pile-supporting table and the gum-box for gumming the seal-flaps of the blanks, the gum-box with its discharge-opening resting upon the pile of blanks, being automatically adjusted to conform to the position of the top blank by the movement of the table, whereby a uniform and regular discharge of gum upon the seal-flaps is obtained; also to overcome the excess or over-feed of the pile-supporting table independently of the movement of the gummer or picker, and to provide a simple means for controlling the movement and discharge of the envelopes from the endless conveyer or carrier.

In the accompanying drawings, consisting of three sheets, Figure 1 is a fragmentary sectional elevation of an envelope-machine embodying my improvements. Fig. 2 is a vertical transverse section of the plunger, whereby the gummed blank is creased and delivered to the folding mechanism. Fig. 3 is a sectional elevation of one of the grippers. Fig. 4 is a detached elevation of the independent depressing-lever and its actuating mechanism. Fig. 5 is a sectional top plan view of the machine with the gummer and plunger broken away. Fig. 6 is a sectional elevation of the gum-box and its supporting parts on an enlarged scale, showing the position of the gum-box when the blanks are but slightly buckled. Fig. 7 is a sectional elevation of the same, showing the position of the gum-box when the blanks are buckled considerably. Fig. 8 is a front elevation of the gum-box and its supporting devices. Fig. 9 is a fragmentary sectional elevation of the machine, showing the endless conveyer and the mechanism for removing the envelopes from the conveyer. Fig. 10 is a sectional top plan view of the conveyer and connecting mechanism for controlling the movement of the envelopes from the conveyer. Fig. 11 is a vertical transverse section in line *y y*, Fig. 10.

Like letters of reference refer to like parts in the several figures.

A represents the side frames of the machine, connected at their upper ends by a horizontal top plate *a*.

B represents the vertically-movable elevator or table which supports the pile of envelope-blanks. This table is provided on its under side with a depending plate B′, which is guided between upright guides or ways *b b*, secured to the frame of the machine. The table, with its pile of blanks, is elevated or raised by means of a strap *c*, the lower end of which is secured to the depending plate of the table, and its upper end is wound around a drum *c′*, mounted upon a shaft c^2, journaled in bearings secured to the stationary guides *b b*.

D represents a frictional gear-rim, which is mounted on the shaft c^2 and rotated by a pinion *d*, mounted on a driving-shaft *d′*, which latter is rotated from any suitable moving part of the machine.

E represents a vertically-reciprocating gummer arranged above the table and secured to the free end of a curved rock-arm E′. The opposite end of the arm E′ is secured to a transverse rock-shaft *e*, which is journaled in bearings formed in brackets *e′*, secured to the top plate of the machine. A vertical reciprocating movement is imparted to the gummer E from its rock-shaft, and on each downward stroke of the gummer it descends upon

the pile of blanks, pressing the latter slightly downward and gumming the lower flap on the uppermost or top blank. As the gummer ascends it picks up the top blank from the pile by the adhesion of the gum, preparatory to the blank being seized by the grippers, which convey it to the folding mechanism.

e^2 represents a stationary gum-fountain, secured to the front side of a standard e^3, arranged centrally above the top plate. This gum-fountain is provided with a gum-roller e^4, which is journaled in the sides of the stationary gum-fountain and immersed in the gum. The gum is carried from this roller to the gummer or picker by means of an oscillating gum-carrying roller e^5 or by any other suitable means. The upward feed of the pile-supporting table is continuous and is always in excess of what is necessary to maintain the top of the pile at the proper height; but the gummer in bearing down upon the pile at each downward stroke slightly depresses the table to its normal position, thereby automatically controlling the overfeed of the table and retaining the top of the pile of blanks at the same elevation at all times.

The depression of the feed-table while its elevating mechanism is in operation is permitted by the frictional connection between the shaft c^2 and the gear-rim D, which allows the latter to slip back on said shaft. This mechanism is substantially like that shown and described in Letters Patent of the United States No. 417,973, granted to E. W. Blackhall and myself December 4, 1889; but any other suitable mechanism may be substituted therefor.

It has been found in practice that the gummer-arm is sometimes slightly bent or sprung when the gummer presses down upon the blanks, which allows the feed-table to gain in its upward movement and permits an uneven feed of the blanks and unduly strains the gummer-arm. To avoid this, an independent pressing-lever F is provided, which is pivoted to a lug f on the upper side of the bracket e' and bears with its inner end against the top of the pile, while its outer end rests on the upper side of a cam f', secured to the rock-shaft e. Every time the gummer descends to pick up a blank the inner end of the pressing-lever is forced downwardly upon the pile of blanks by the cam of the rock-shaft bearing underneath the outer end of the lever. The leverage of the pressing-lever is greater than that of the gummer-arm, and therefore exerts a greater pressure upon the pile of blanks, thereby relieving the gummer-arm of excessive strains and causing the feed-table to be depressed to its normal position.

G represents a gum-box, which is provided in its bottom with a slotted mouth g, which latter rests upon the front or seal flap of the pile of blanks and causes a thin deposit of gum to be placed upon each blank when the latter is withdrawn from underneath the gum-box.

The upper front side of the elevator or feed-table is provided with an inclined block or raised portion b', whereby the front flap portion of the pile of blanks resting thereon is slightly elevated or raised, so as to form a slight transverse depression or buckle in the pile of blanks. The open mouth of the gum-box is inclined inwardly and rests upon the pile of blanks in front of this depression or buckle. In drawing the envelope blank from underneath the gum-box its upwardly-buckled front flap will be depressed or deflected out of a straight line as it passes across the open mouth of the gum-box, thereby straightening out any wrinkles in the blank and causing a uniform deposit of gum upon the front or seal flap of the blank. The weight of the envelope-blanks causes the lower portion of the pile to bear firmly on the inclined portion of the feed-table, whereby the lower blanks are buckled or deflected to a greater extent than the upper blanks are buckled and the effect of the incline or raised portion of the table in buckling the blanks diminishes in proportion to the height of the pile. It is therefore necessary to adjust the position of the inclined mouth of the gum-box while the blanks are being fed from the top of the pile, so as to retain the proper relative position between the latter and the mouth of the gum-box. To effect this, the inclination of the gum-box is automatically adjusted, while the blanks are fed from the pile as follows:

H represents a transverse crank-shaft journaled at its opposite ends in bearings formed in the brackets e'.

h represents a U-shaped frame provided at its ends with sleeves or collars h', which fit loosely on the crank-shaft and whereby the U-shaped frame is pivotally connected therewith. The cross-bar h^2 of the frame h is provided centrally with a bearing h^3 and the gum-box G is attached to the U-shaped frame by a horizontal pin or journal g', formed on the front side of the gum-box and engaging in the bearing h^3. The pin g' is held in the bearing h^3 by a set-screw h^4.

I represents a depending arm secured with its upper end to the crank portion of the shaft H and provided at its lower end with a roller which engages in a longitudinal slot i, formed in an inclined bar I'. The latter is provided at its upper end with a transverse segmental slot i' and is secured to the depending plate of the feed-table by an adjusting-screw i^2, passing through the segmental slot i', and a pivot-bolt i^3, connecting the lower end of the inclined slotted bar I' with a bracket i^4, secured to the lower end of the depending plate of the feed-table. The lower end of the depending arm I, engaging with the longitudinal slot of the inclined bar I', is gradually forced outwardly as the feed-table is elevated, and this movement of the depending arm causes the crank-shaft H to turn in its bearings, which adjusts the position of the frame h and the

inclination of the gum-box G, which is secured thereto. When the feed-table is in its lowermost position and supplied with a pile of blanks, the transverse buckle or depression in the top blanks is very slight, and in this condition of the blanks the roller of the depending arm is arranged in the upper portion of the slotted bar, which causes the gum-box to be tilted forwardly just sufficient to present its mouth squarely to the buckled or raised portion of the top blank. As the blanks are fed off from the top of the pile the angle of the buckle or depression increases gradually toward the bottom of the pile, and the table which is gradually rising moves the depending arm outwardly and actuates the crank-shaft so as to throw the outer side of the gum-box upwardly, and tilts its mouth in the same proportion in which the angle of the buckle in the blank changes, thereby retaining the mouth of the gum-box squarely in contact with the buckle or raised portion of the blank at all times and insuring a uniform deposit of gum thereon. In very thin or soft paper the angle of the depression in the top blank would be nearly the same as the angle of the depression in the bottom blank, whereas in thick or stiff paper the variation would be more marked. By providing the upper end of the slotted bar with the transverse segmental slot i' the inclination of the slotted bar can be readily changed by loosening the adjusting-screw i^2, so that the degree of movement of the depending arm I and the gum-box can be adjusted and nicely regulated, as may be necessary in accordance with the quality and thickness of the paper that is being acted upon.

The mouth of the gum-box, resting upon the pile of blanks, is preferably shaped to conform to the contour of the front flap of the blank, and is provided with a sliding gate J, whereby the discharge of gum from the box is regulated. This gate is secured to the under side of the gum-box bottom by means of screws $j\,j$, secured to the gum-box and passing through transverse slots $j'\,j'$, formed in the gate.

j^2 represents a horizontal shelf arranged transversely above the pile of blanks and supported at its ends on the brackets e'. The front side of this shelf is provided with a notch or recess j^3, in which the rear portion of the gum-box is arranged.

$j^4\,j^4$ represent elbow-levers, which are pivoted at their elbows to the opposite sides of the gum-box and provided at the ends of their inwardly-extending arms j^5 with rollers j^6, which rest upon the upper side of the shelf j^2. These rollers are retained in place upon the shelf by means of guide-plates $j^7\,j^7$, secured to the upper side of the shelf and overhanging the rollers, so as to bear against the upper side of the latter. Each elbow-lever is provided below its pivot with a downwardly-projecting arm or knuckle j^8, which engages with a socket formed in a lug j^9, extending laterally from the side of the sliding gate J. The rollers of the elbow-levers are held against vertical movement by means of the guide-plates, but are capable of horizontal movement, whereby the gum-box can be tilted to suit the inclination of the paper without materially affecting the position of the sliding gate.

In lowering the feed-table to replenish the supply of blanks the gum-box is free to drop until its downward movement is arrested by the elbow-levers. When the gum-box descends, the rollers secured to the inner arms of the elbow-levers hold the latter against downward movement, which causes the lower knuckle-arm of the elbow-levers to actuate the sliding gate and close the latter. The weight of the gum-box tends to retain the sliding gate in a closed position, and thereby effectually prevents the flow of gum from the box. When the pile of blanks is again elevated, it raises the gum-box and opens the sliding gate through the medium of the elbow-levers. In this manner the flow of gum from the box is automatically controlled by the rising-and-falling movement of the pile of blanks.

K represents the grippers which seize the top blank as it is lifted from the pile by the reciprocating gummer and carry the same to the creasing-box K′ to be folded. The grippers are arranged upon two parallel bars k^2 k^3, supported in a horizontal position on opposite sides of the creasing-box, and a similar bar k^3, arranged centrally between the two side bars. The gripper-bars are connected at their outer ends by a cross-bar k^4. A reciprocating motion is imparted to the gripper-bars by means of an upright rock-arm k^5, secured at its lower end to a transverse rock-shaft k^6 and connected at its upper end with the central portion of the cross-bar k^4 by a link k^7.

As shown in Fig. 3, each gripper consists, essentially, of a grip-lever l, pivoted centrally between upright lugs l', formed on the inner portion of the gripper-bar. The inner arm of the grip-lever is held in an elevated position by a catch l^2, pivoted to the gripper-bar and provided with a shoulder l^3, which engages against the under side of the inner arm of the grip-lever. The upper end of the catch passes through a slot l^4 in the grip-lever, and its shoulder is held in engagement with the grip-lever by a spring l^5. l^6 is a spring interposed between the outer arm of the grip-lever and the gripper-bar, whereby the front arm of the grip-lever is depressed when released by the catch l^2. In the forward movement of the grippers the inner ends of the gripper-bars pass underneath the gummed blank, which has been previously picked up by the gummer. Before the grippers have completed their forward movement the catches l^2 come in contact with stops l^7, secured to the lower side of the stationary gum-fountain e^2, whereby the inner arms of the grippers are released and the blank is clamped between the gripper-bars

and the inner arms of the grip-levers. The grippers on their return or backward movement carry the blank until the latter is deposited over the creasing-box. Before the grippers have entirely completed their return movement the blank is released from the grippers by trip-arms l^8, which engage against and depress the outer arms of the grip-levers. This causes the inner arms to rise and the catches to spring underneath the inner arms and hold them in a raised position, thereby releasing the blank. The outer arm of each grip-lever is preferably provided with an anti-friction roller l^9 to receive the impact of its trip-arm. The inner ends of the two side gripper-bars are provided with hooks l^{10}, which engage against the outer edge of the blank. The upper side of the creasing-box is preferably provided with notches or recesses l^{11}, which receive the central gripper-bar, whereby the latter is guided in its reciprocating movement. By employing a central gripper in addition to the two side grippers the envelope-blank is carried from the pile to the creasing-box more accurately and positively. This is particularly desirable in envelope blanks of large dimensions, in which case the blank is apt to sag at the center and prevent its proper delivery to the creasing-box.

M represents a vertically-reciprocating plunger arranged over the creasing-box and guided on the standard e^3. The gummed blank deposited on the creasing-box is carried through the latter by the plunger and delivered upon a drop-table m, arranged in the top plate directly underneath the creasing-box. The plunger is provided with a vertical central slot m', arranged in line with the central gripper, whereby the plunger can begin its downward stroke and bear on the paper before the central gripper has fully completed its backward movement, thereby enabling the plunger to bear on the paper the instant it is released by the grippers.

$n\ n'\ n^2$ represent the wings whereby the flaps of the envelope are folded. An oscillating movement is imparted to these wings by any well-known and suitable mechanism, whereby the blank deposited upon the drop-table by the plunger is folded and its flaps pasted together, with the exception of the front or seal flap. After the envelope has been pasted the drop-table descends and deposits the envelope upon the endless conveyer O, arranged underneath the folding mechanism. The drying-conveyer consists, essentially, of an endless chain belt o', arranged lengthwise of the machine, with its inner portion below the folding mechanism and passing around a sprocket-wheel o^2, mounted upon a transverse shaft o^3, journaled in the side frames of the machine. The links of the chain are pivotally connected by transverse pins and are provided with outwardly-projecting carrying-arms o^4, between which the pasted envelopes are deposited and carried outward in the direction of the arrow in Fig. 1.

P represents the supporting-frame of the conveyer, secured at its inner end to the side frames by brackets p. The arms o^4 of the conveyer-belt in passing upwardly around the sprocket-wheel are spread apart, which enables them to conveniently receive the envelopes from the drop-table. The envelope rests on the links of the upper advancing portion of the chain belt, and during the return movement of the lower portion of the conveyer-belt the envelopes are supported by longitudinal guide-bars p', arranged underneath the lower portion of the conveyer. Upon reaching the inner ends of these guide-bars, which terminate underneath the sprocket-wheel, the envelopes are delivered upon a receiving-table q by knocker-arms q', secured to a transverse rock-shaft q^2, which is journaled in bearings q^3, formed in the outer ends of the brackets p. An oscillating movement is imparted to these knocker-arms at regular intervals, whereby the envelopes are delivered upon the receiving-table below.

To insure a proper delivery of the envelopes from the conveyer to the receiving-table, I provide two retaining-belts R R, which are arranged on opposite sides of the lower portion of the conveyer-belt, so as to impinge against opposite ends of the envelopes for the purpose of retaining them in an elevated position after leaving the guide-bars p'. The envelopes are retained in this elevated position until they are struck by the knocker-arms, which cause them to drop upon the receiving-table. The retaining-belts pass around vertical drive-pulleys $r\ r$ and horizontal guide-pulleys $r'\ r'$. The drive-pulleys $r\ r$ are mounted on opposite ends of a drive-shaft r^2, journaled in bearings secured to the conveyer-frame. The drive-shaft r^2 is provided with a sprocket-wheel r^3, which meshes with the transverse connecting-pins of the chain belt, whereby the latter is caused to rotate the retaining-belts in unison with the conveyer. The inner pulleys $r'\ r'$ are journaled in bearings $r^4\ r^4$, arranged at an angle to the drive-pulleys $r\ r$, so as to give the retaining-belts a quarter-turn and present the flat sides of the belts against the envelopes. The drive-pulleys $r\ r$, supporting the outer portion of the retaining-belts, are arranged a short distance from the sides of the conveyer-belt, so that the outer portion of the retaining-belt will not touch the sides of the envelopes. The bearings $r^4\ r^4$, supporting the inner guide-pulleys, are preferably secured to the upper side of the brackets by pivot-bolts S, which enables the inner portion of the retaining-belts to be adjusted so as to bear against the sides of the envelopes with greater or less tension, as may be desired.

$t\ t$ represent depending fingers secured to opposite sides of the conveyer-frame and bearing against the inner portion of the retaining-belts. Each of these guide-fingers is provided with a notch or recess u on its inner side, which is adapted to engage with the in-

ner front portion of the retaining-belt some distance in advance of the inner guide-pulleys, whereby the inner front portion of the retaining-belts, in contact with the sides of the envelopes, are caused to travel parallel and in line with the lower front portion of the conveyer. When the envelopes are carried underneath the outer ends of the knockers, the latter deliver a downward blow against the upper edge of the envelope, whereby the latter is released from the retaining-belts and delivered upon the receiving-table.

I claim as my invention—

1. The combination, with the feed-table provided with a raised portion or elevation, whereby a crease or depression is formed in the pile of blanks supported on said table, of a gum-box provided with a discharge-opening in its bottom and resting upon the pile of blanks above the raised portion of the feed-table, substantially as set forth.

2. The combination, with a vertically-movable feed-table having an incline or raised portion, whereby the pile of blanks supported by said feed-table is inclined or raised at one end to form a crease in said pile, of a pivoted gum-box supported above the pile of blanks and provided with an inclined bottom having a discharge-opening resting upon the top blank of the pile, substantially as set forth.

3. The combination, with a vertically-movable feed-table provided on its upper side with a raised portion, whereby one end of the pile of blanks supported on said table is raised above the level of the pile, of a pivoted gum-box having a discharge-opening in its bottom and resting upon the pile of blanks, and mechanism connecting said gum-box with the feed-table, whereby the position of the gum-box is automatically adjusted by the vertical movement of the table, substantially as set forth.

4. The combination, with the vertically-movable feed-table supporting the pile of blanks and having an incline on its upper side whereby one end of the pile is raised, of a gum-box having an open mouth resting on the raised end of the pile of blanks, an inclined bar connected with the table, and intermediate mechanism connecting said arm or cam with the gum-box, whereby the gum-box is tilted by the movement of the table, substantially as set forth.

5. The combination, with a vertically-movable feed-table supporting a pile of blanks, of a pivoted gum-box provided with a discharge-opening in its bottom and resting upon the pile of blanks, an inclined bar secured to the table, and a rod connecting the pivot of the gum-box with the incline arm or cam of the feed-table, whereby the gum-box is tilted by the movement of the table, substantially as set forth.

6. The combination, with the vertically-movable feed-table supporting the pile of blanks, of a gum-box provided with a discharge-opening in its bottom and resting upon the pile of blanks, a crank-shaft, a supporting-arm connecting the gum-box with the crank-shaft, and a depending arm secured to said crank-shaft and engaging with a cam or incline connected with the feed-table, substantially as set forth.

7. The combination, with the vertically-movable feed-table supporting the pile of blanks, of a gum-box having an open mouth resting upon the pile of blanks, a crank-shaft, a supporting-arm mounted loosely on said shaft and connected with said gum-box, an inclined bar pivotally connected with the feed-table and provided with a cam-slot, a depending arm secured at its upper end to the crank-shaft, and a roller secured to the depending arm and engaging with said cam-slot, substantially as set forth.

8. The combination, with the vertically-movable feed-table for supporting the pile of blanks, of a movable gum-box supported by the pile of blanks and provided with a discharge-opening in its bottom, a sliding gate for closing said discharge-opening, a lever pivoted to the gum-box and connected with said sliding gate, and a stationary support against which said lever engages for closing said gate, substantially as set forth.

9. The combination, with the vertically-movable feed-table for supporting the pile of blanks, of a movable gum-box resting upon the pile of blanks and provided in its bottom with a discharge-opening, a sliding gate for closing said discharge-opening and provided at its opposite ends with lugs or sockets, levers pivoted to the sides of the gum-box and engaging with said lugs or sockets, rollers mounted on the free ends of said levers, a stationary support for said rollers, and guide-plates secured to said support and bearing against said rollers, substantially as set forth.

10. The combination, with the vertically-movable feed-table for supporting the pile of blanks, of a rock-shaft carrying a vertically-reciprocating gummer for gumming and picking up the top blank from the pile, and a pressing-lever arranged above the pile of blanks and actuated by the rock-shaft of the gummer, whereby the pile of blanks and the supporting-table are depressed with the descent of the gummer, substantially as set forth.

11. The combination, with the feed-table supporting the pile of blanks, of a rock-shaft carrying a vertically-reciprocating gummer for gumming and picking up the top blank from the pile, a lever arranged above the pile of blanks, and a cam secured to said rock-shaft and engaging against said lever, whereby the pile of blanks and the supporting-table are depressed with the descent of the gummer, substantially as set forth.

12. In an envelope-machine, the combination, with the endless conveyer or carrier adapted to receive the folded envelopes, of retaining-belts arranged on opposite sides of said conveyer and moving with said conveyer,

whereby the envelopes are carried forwardly after being released from the conveyer, and knocker-arms whereby the envelopes are released from the retaining-belts, substantially as set forth.

13. The combination, with an endless carrier or conveyer of an envelope-machine adapted to receive the folded envelopes, of a retaining-belt arranged on each side of said conveyer and adapted to bear against the edges or ends of the envelopes, a transverse drive-shaft provided with pulleys, over which said retaining-belt runs, and a sprocket-wheel secured to said shaft and engaging with the retaining carrier or conveyer, whereby the retaining-belts are driven from the conveyer, substantially as set forth.

14. The combination, with the endless carrier or conveyer adapted to receive the folded envelopes, of retaining-belts arranged on opposite sides of said carrier, pulleys adjustably supporting said belts, whereby the latter are adjusted toward and from the sides of the carrier, and a knocker whereby the envelopes are released from the retaining-belts, substantially as set forth.

15. The combination, with the endless carrier or conveyer of an envelope-machine adapted to receive the folded envelopes, of the endless retaining-belts arranged on opposite sides of said carrier, pulleys supporting said belts, and guides whereby the inner portions of said belts are held against the edges or ends of the envelopes, substantially as set forth.

Witness my hand this 20th day of January, 1891.

ROBERT ANDERSON.

Witnesses:
H. C. COATES,
T. J. ANDERSON.