ENVELOPE BOXING METHOD AND APPARATUS

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ABSTRACT OF THE DISCLOSURE

A method and apparatus for boxing envelopes comprising, in preferred form, the steps of and the means for (a) separating a preselected number of envelopes into a group; (b) positioning a box in inverted position above that group of envelopes; (c) joining the box and the envelope group together to locate the envelopes inside the box; and (d) turning the box over, with the envelopes retained in it, into an upright or carrying position.

This invention relates to envelope forming machines. More particularly this invention relates to a method and apparatus for boxing envelopes formed by envelope forming machines.

An envelope forming machine, as the term is generally used in the art, refers to a machine that produces a completely formed envelope from a precut envelope blank. The method steps an envelope forming machine must perform to achieve such a result typically include (a) withdrawing a single precut blank from a stacked supply of blanks; (b) placing that blank in either overlapped or spaced relation relative to the blank immediately preceding it; (c) applying glue to the seal or top flap of the blank; (d) immediately thereafter drying the glue on the seal flap; (e) scoring the precut blank for folding purposes; (f) applying glue to the side and/or bottom flaps of the blank; (g) folding the side and bottom flaps into a final configuration and into sealing relation before the glue can dry; (h) drying the seal flap; and (i) positioning the formed envelopes in stacked relation on a suitable delivery table. Needless to say, the forming machinery required for carrying out these various method steps is quite complex in nature. However, envelope forming machines, as such, have been known and widely used in the envelope industry for many, many years.

In the economic environment of today not only must an envelope forming machine be able to provide a finished envelope, but it must do so at an output rate that permits the manufacturer to achieve relatively low per unit envelope production cost. Such a result is required because of the high competitive nature of the envelope industry and the relatively low per unit retail cost of envelopes. Thus, it has been necessary in recent years for envelope forming machines to be engineered to produce envelopes at increasingly faster rates, that is, that produce more and more envelopes in a given unit of time on a single machine. For example, it is not uncommon to expect an envelope forming machine to produce about 400 envelopes per minute and even more. Such relatively high-speed production of envelopes can be achieved by the envelope forming machines of today because of the relative sophistication of those machines developed over many, many years.

As mentioned, known envelope forming machines commence operation with a precut envelope blank and then perform various method steps on that blank until an envelope in final envelope configuration is formed. For the purpose of this application the phrases "completely formed envelope," "final envelope configuration," and similar phrases refer to an envelope with all flaps except the seal flap folded and glued together. The seal flap, that is, the top flap, is preferably folded but is not glued so that the envelope may be readily used by a consumer. In the case of open side type envelopes, for example, these envelopes are generally conveyed onto a delivery table from the envelope forming machines in horizontal stacked relation relative one to the other. As subsequent envelopes are moved onto the delivery table the prior envelopes are pushed downstream on the table farther away from the delivery apparatus. Thus, the continual transfer of the horizontally stacked envelopes onto the delivery table forms a "train" of stacked envelopes on the delivery table and moves the train down the delivery table to a take-off area.

Historically, envelopes have been removed from the delivery table by an operator attending the envelope forming machine. The operator must remove a predetermined number of envelopes in a group and place that group in a box provided so as to provide efficient boxing and delivery of the envelopes to the customers. Generally speaking, it is because of the necessity for providing an operator to remove the preformed envelopes from the delivery table that one envelope forming machine requires the full time and attention of one operator. The only other jobs that the operator must perform while attending the machine is to maintain a supply of precut envelope blanks in the blank magazine, and make certain that the glue pot remains full and in operable condition as the machine performs its tasks. However, by far the greatest portion of the operator's job time is required to remove envelopes that are fully formed and dispensed by the envelope forming machine.

Therefore, in an attempt to lower the cost attendant to the forming of an envelope from a precut envelope blank, it has been one objective of this invention to provide an envelope boxing method for mechanically boxing a group of envelopes without the continual attention of an operator being required.

It has been another objective of this invention to provide apparatus for performing the method wherein the only attention required of an operator is that the apparatus's box supply be maintained at an operable capacity.

In accordance with these objectives, I have provided a method for boxing envelopes comprising, in preferred form, the steps of (a) separating a preselected number of envelopes into a group; (b) positioning a box in inverted position above that group of envelopes; (c) joining the box and the envelope group together to locate the envelopes inside the box; and (d) turning the box over, with the envelopes retained in it, into an upright or carrying position. Apparatus has also been provided by this invention to carry out these desirable method steps and this apparatus will be more completely and fully described in the following detailed description. The method and apparatus of this invention permit the effective boxing of envelopes as they are made and delivered by an envelope forming machine with no attention from an operator being required except to maintain a supply of boxes for the apparatus.

Other objectives and advantages of this invention will be more apparent from the following detailed description taken in conjunction with the drawings in which:

FIG. 1 is a perspective view of the envelope boxing unit of this invention;
FIG. 2 is a front end view of the boxing unit illustrated in FIG. 1;
FIG. 3 is a cross-sectional view taken along lines 3—3 of FIG. 2;
FIG. 4 is a cross-sectional view taken along lines 4—4 of FIG. 3;
FIG. 5 is a cross-sectional view taken along lines 5—5 of FIG. 2; FIG. 6 is a circuit diagram illustrating the pneumatic circuit used in operating the boxing unit; and FIG. 7 is a circuit diagram illustrating the electrical circuit used in controlling the pneumatic circuit.

**ENVELOPE BOXING METHOD**

The envelope boxing method of this invention is best described in conjunction with the apparatus shown in FIG. 1. As the envelopes 10 are conveyed by a transfer wheel 11 from an envelope forming machine, not shown, onto a pair of delivery belts 12, they are first counted by counting means 13 and thereby divided into groups 14 of any desired number. The envelopes 10 are established in a horizontally stacked relation to form a train of envelopes, and the groups 14 that make up the train are divided one from the other by envelope ends 15 that periodically protrude out from that train. The envelope groups 14 are subsequently transferred to the boxing station 17 by the slow moving delivery belts 12 where the leading envelope abuts against a movable backup plate 18.

A supply of preformed boxes 19 is provided in a magazine 20 in a bottom 21 position, that is, the open top of the box is positioned face down in the magazine. The boxes 19 move to the bottom of the magazine 20 by gravity. Once at the bottom of the magazine stack each box is removed from the bottom of the magazine 20 and moved toward the boxing station 17 on opposed channel tracks 21 by two timing belts 22. When a box 19 reaches the boxing station 17 it abuts a stop bar 23 which prevents forward movement of the box and positions it, upside down, in the boxing station.

At the boxing station a single group 14 of the envelopes 10 is isolated out from the envelope train of horizontally stacked envelopes awaiting to be boxed. Isolation of that group 14 is accomplished by means of a separator blade 26 in cooperation with the backup plate 18. Thus, a group 14 of envelopes is provided within the boxing station 17 and the group is positioned in that station on a lower level between separator blade 26 and backup plate 18. At this point the upside down box 19 in the station 17 is positioned on an upper level above the envelope group 14.

Once the box 19 is positioned over the isolated group 14 of envelopes, and once that group is separated from the rest of the envelope train, the box is moved down over the group of envelopes so that those envelopes are positioned or located within the box.

The box 19 is now positioned inside the box 19 within the boxing station 17, however, the box bottom 27 covers the top of the envelopes so that the envelopes 10 are retained in the box only because the envelopes and box are resting on the table 28 of the boxing station. If the box 19 and envelopes 10 were lifted off the base plate 28 all the envelopes, of course, would fall out of the box. As a result, the box 19 and envelopes 10 must be turned over so the box is right side up and in the carrying position. Preferably, the box 19 and envelopes 10 within the boxing station 17 is pushed out of the station and, as it is pushed out, the box is flipped over onto its bottom 27 so it is right side up. This step is accomplished by pushing the envelope full box 19 over an edge or drop-off 29 toward a chute 30 whence it commences to flip. As the box’s leading upper edge 32 slides on the chute 30 it engages a flip bar 31 that causes it to pivot or flip a full 180° so that the box lands on its bottom 27 going in the inverted position, that is, a take-off conveyor 33, see phantom lines of FIG. 1. The conveyor 33 moves the box 19 of envelopes 10 to suitable storage or other packaging facilities.

Thus, the preferred overall method of boxing envelopes according to the principles of this invention, and the general mode of operation for the boxing apparatus of this invention, includes, in detail, the steps of (a) transferring the envelopes from an envelope forming machine, not completely shown, onto delivery means 12 in horizontal stacked relation so as to form a train of stacked envelopes; (b) periodically nudging one of the envelopes 10 out of the train’s general configuration for establishing groups 14 of envelopes having equal numbers of envelopes in each group; (c) providing a supply of preferably preformed boxes 19 in an upside down or inverted position; (d) transferring the boxes 19 to a boxing station 17; (e) moving or driving the box in the station downwardly over the group of envelopes in the station to enclose or locate those envelopes in the box; (g) removing the boxed envelopes from the boxing station in a manner so that the box is flipped into a right side up position, and (h) conveying those boxed groups of envelopes away from the boxing station to other packaging means or storage.

**ENVELOPE BOXING APPARATUS**

Envelope transfer and counting mechanism

The envelope boxing apparatus is positioned at the downstream or outlet end of the envelope forming machine, not completely shown. Envelopes 10 are conveyed from the envelope forming machine to a pair of delivery belts 12 in horizontal stacked relationship by a finger transfer wheel 11 associated with, for example, the seal flap folder mechanism, not shown, of the envelope forming machine. The two driven belts 12 extend between the finger transfer wheel 11 and the boxing station 17 of the envelope boxing apparatus. As the envelopes 10 are deposited on the delivery belts 12 from the transfer wheel 11 they are slowly moved away from the wheel by the continuously moving belts that move at a relatively slow pace, thereby establishing the envelopes in horizontal stacked relation. Thus, through the continuously moving belts 12, the envelopes 10 are delivered to the boxing station 17.

Counting means 13 is provided to cooperate with the outlet end of the envelope forming machine to establish or divide the envelopes 10 into groups 14 once they have been conveyed to the delivery belts 12. As illustrated in FIG. 1, the counting means includes a ratchet wheel 37 having a number of teeth 38 about its peripheral edge equal to the number of envelopes desired for a given group 14. For example, if it is desired to package 500 envelopes in a box 19, a ratchet wheel having 500 teeth will be used. Cooperating with the ratchet wheel 37 is a pawl 39 continuously biased by a spring 40 toward the periphery of the ratchet wheel. The pawl 39 engages a ratchet 41 through a pawl arm 42 to an eccentric wheel 42 driven in timed relation to the transfer wheel 11 by the envelope forming machine. The timed relation is such that the eccentric wheel 42 makes a complete revolution for each formed envelope 10 deposited on the delivery belts 12. For every complete revolution of the eccentric wheel 42, the pawl 39 engages another tooth 38 on the ratchet wheel 37, thus causing the wheel 37 to rotate in the counterclockwise direction a distance equal to the peripheral length of one tooth 38. As the ratchet wheel 37 rotates a counter arm 43 fixedly mounted through hub 44 to the ratchet wheel is also caused to rotate in a counterclockwise direction. When the counter arm 43 reaches the twelve o’clock position, as illustrated in FIG. 1, it engages the flared tip 45 of transfer arm 46 pivotally mounted by shaft 47. This causes the transfer arm 46 to pivot in the clockwise direction, thereby urging finger 48 into the train of horizontally stacked envelopes to a position such that finger 48 is dimensioned wide sideways so that it engages only one envelope and pushes the end 15 of that envelope out a short distance from the general rectangular configuration of the envelope train, see FIG. 1. If, as suggested, the ratchet wheel 37 has 500 ratchet teeth 38 on it, the finger 48 will be actuated to engage every 500th envelope, thereby dividing the train of horizontal stacked envelopes into groups 14 of 500 envelopes a piece.
The supply of boxes 19 is maintained in a magazine 20. The travel path of boxes 19 from the magazine 20 to the boxing station 17 is substantially perpendicular to the travel path of the train of stacked envelopes from the discharge end of an envelope forming machine to the boxing station, the box travel path being in a horizontal plane above the horizontal plane of the envelope train travel path. The magazine 20 illustrated in FIG. 1 comprises four angle bars 51 vertically positioned relative to the box 19 travel path, the bars 51 being positioned to receive and maintain the boxes 19 in vertical stacked relation. The boxes 19 are supplied to the magazine 20 by an operator in the upside down position, that is, with their open top facing downwardly. The boxes 19 shown for purposes of illustration have a bottom 27 and four side walls 52, hence, the bottom 27 is shown facing up in FIG. 1 as the boxes are withdrawn from beneath the magazine's stack.

As the boxes 19 drop down to the bottom of the magazine 20, the bottommost box in the stack engages a pair of timing belts 22 that are continuously moving at a relatively slow speed, by means not shown, to direct the boxes toward the boxing station 17. The timing belts 22 extend from underneath the magazine to within about two box lengths of the boxing station 17. Each timing belt 22 is provided with a relatively shallow V notch 53 so that the leading and trailing side walls of a box 19 are grabbed by the belts to remove that box out from underneath the stack of boxes remaining in the magazine 20.

The magazine 20 and timing belts 22 are positioned relative to two guide channels or channel tracks 21 that are separated from one another by a distance substantially equal to the width of a box 19. Opposed side walls of each box 19 thus rest on and travel over the lower ledge 54 of each channel, thereby providing vertical support for the boxes as they are moved to the boxing station 17.

Once the boxes 19 leave the timing belts 22, they abut one against the other so that further movement of the boxes toward and into the boxing station is provided by subsequent boxes pushing on those boxes ahead of them; thereby pushing those boxes one at a time into the boxing station 17.

**Boxing station mechanism**

The boxing station 17 includes apparatus for positioning and isolating the box 19 and envelope group 14 within the station so that the box can be placed over the envelopes and then engaged with the group. The station 17 also includes apparatus for flipping the packaged box of envelopes into its right side up position.

The envelope separating and group positioning mechanism includes the separator blade 26 provided with a tapered leading end 59 and a sloping upper edge 60, the blade being integral with an abutment plate 61. The abutment plate 61 is mounted to the piston rod 62 of pneumatic cylinder PC-1, the pneumatic cylinder PC-1 being mounted to an extension 63 of the table 28. It will be noted that the sloping upper edge 60 is on the downstream side of the separator blade 26 and that the abutment plate 61 extends upstream a substantial distance from the junction of the plate 61 and the blade 26. The function of the separator blade 26 is to project into the train of horizontally stacked envelopes for separating from that train a group of those envelopes to be boxed. The blade 26 is inserted into the envelope train when limit switch LS-1 is closed by engagement of a protruding envelope end 15 with a leg 64 connected to that limit switch. The limit switch LS-1 is normally open because spring 65 continually biases leg 64 so that it remains open, but when an envelope end 15 engages the leg 64 the leg is pivoted away from the switch LS-1 thereby closing it and actuating the cylinder PC-1 to push the separator blade 26 into the box. The separator 26 is automatically advanced to the envelope train at a position downstream from the extended envelope end 15 and, as the blade goes into the train, the abutment plate 61 at the rear edge of the blade engages the extended envelope end and pushes that envelope back into the normal train configuration with the rest of the envelopes. This permits that envelope to pass the tip of the separator blade 26 during the next boxing cycle.

When an envelope group 14 is within the boxing station 17, the envelopes are positioned between the separator blade 26 and the backup plate 18 that is reciprocably mounted relative to the travel path of envelope train. The backup plate 18 is mounted to a T-bar 68 that is movably supported on two rails 69, a trackway 70 being provided in the table 28 so the T-bar and, hence, the backup plate 18, can reciprocate back and forth in the same travel path that the envelope train follows. A weight 71 is connected to the T-bar 68 by a cable 72. The cable 72 is threaded over a pulley 73 connected to the underside of the table 28 upstream from the boxing station 17. Thus, the backup plate 18 is constantly urged in the upstream direction that is in the opposite direction to that movement direction of the envelope train, because the weight 71 is continuously and evenly pulling the backup plate in that direction. As a box of envelopes is removed from the boxing station 17, the backup plate 18 is moved upstream to meet the first envelope of the next envelope group 14 that will be boxed, and as that envelope group is moved into the boxing station by the delivery belts 12, the backup plate is pushed back into its boxing position illustrated in FIG. 1. Thus, when in the boxing station 17, the group 14 of envelopes is positioned between the separator blade 26 and the backup plate 18, and that group of envelopes rests on the table 28.

As mentioned, the box 19 in the boxing station 17 abuts up against the stop bar 23 to center it in the station and prevent it from being pushed out of that station by subsequent boxes being pushed toward the station. When in the boxing station 17, the opposite box edges rest on pivotal ledge sections 76 for supporting the boxes above the envelope group resting on the table 28 below. As shown, the ledge sections 76 are formed by merely cutting them out of the channel tracks 21 as those tracks extend through the station 17 to the stop bar 23. As best seen in FIGS. 3 and 4, the ledge sections 76 are each rotatably mounted to a pivot bar 77. Each pivot bar 77 is mounted to supports 78 by tongues 79. Each ledge section 76 is connected to one end of an ear 80 at each end of the section 76 and the section 76 is rotatably mounted to the ear 80 intermediate the ears 80 for enabling the other end of the ears 80 for each section 76 are related by a connector bar 81. A piston rod 82 of a pneumatic cylinder PC-2 is connected to each connector bar 81 intermediate its length, thereby providing the power means through which the linkage means 77-81 causes the ledge sections 76 to pivot into and out of alignment with fixed ledges 84 of channel tracks 21. The pneumatic cylinders PC-2 are themselves pivotally mounted, as at 83A, to suitable support structure 83. Identical ledge sections 76, linkage means 77-81, and power means structures are on each of the opposing box sides for the box 19 in the boxing station 17. When the pneumatic cylinders PC-2 are actuated, the cylinder rods 82 move upwardly as seen in FIG. 3, to pivot the ledge sections 76 within the boxing station 17 out from underneath the opposed sides of the box, thereby permitting the box to be moved downwardly into cartoning engagement with that envelope group 14 within the station.

To aid in moving the boxes down over the envelope group within the boxing station 17 there is provided a boxing plate 84 having a surface area substantially equal to the bottom 27 surface area of the box so the box will not be deformed as it is pushed downwardly into engagement with the envelopes. The trailing end of the boxing plate 84 carries a flange 85 that stops upstream boxes from moving forward into the boxing station 17 when the boxing plate 84 is pushing the box down over the envelope.
group 14. The boxing plate 84 is actuated by a pneumatic cylinder PC-3 connected to the plate 84 by a piston rod 86. The cylinder PC-3 is supported by a bridge 87 positioned over the boxes and mounted to supports 78. The bridge 87 provides a hole 88 through which a guide rod 89 passes, the rod being mounted to the boxing plate 84. Thus, the guide rod 89 in combination with the cylinder PC-3 aids in maintaining the boxing plate 84 in alignment during its reciprocal movement. Another rod 91 carries a thumb block 90 positioned on that rod so that when the plate 84 is at its lowermost attitude the block 90 can actuate limit switch LS-3 mounted to the top of the bridge 87.

Once the box 19 is positioned down over the envelope group 14 in confining engagement, and once the boxing plate 84 has returned to its uppermost position, a kick plate 94 is moved into engagement with the boxed envelopes by pneumatic cylinder PC-4 to push the box of envelopes off the table 28. The cylinder PC-4 is mounted to the table 28 and is connected to kick plate 94 by piston rod 95. The kick plate 94 has fins 96 mounted to both sides of it, the fins extending rearwardly of the kick plate. The kick plate's fins 96 cooperate with the backup plate 18 and the separator blade 26 to prevent the back-up plate from moving forward. Upstream once the box of envelopes has been pushed out of the boxing station 17 until the kick plate 94 has returned to its original position. One fin 96 of the kick plate carries an extension finger 97 with a thumb plate 98 at the end for actuating a limit switch LS-4 when the kick plate 94 reaches its extended position.

As the pneumatic cylinder PC-4 is actuated, and as the kick plate 94 is moved forward, the box of envelopes is pushed off the table 28 and starts to fall or drop over edge 29 of that table onto the chute 30 for delivering the boxed envelopes to the take-off conveyors 33, see phantom lines of FIG. 1. Intermediate the length of the chute 30 there is provided the flip bar 31 that is adapted to engage the leading upper edge 32 of the box as it falls over the table 29 edge. The flip bar 31 is adjustable relative to the length of the chute 30 by means of slots 101 and adjusting bolts 102, see FIG. 5, to enable correct positioning of the bar 31 for maximum effectiveness. Upon engaging the flip bar 31 the box is flipped over on its bottom 27 onto the take-off conveyor 33, thereby providing the box of envelopes in the upright position. Thus, the difference in height between the table 28 surface and the take-off conveyor 33, in combination with the distance between the table 28 surface and the flip bar 31 position, is such that as the box of envelopes falls over the edge 29 of the table it engages the flip bar and is thereby flipped over onto its bottom or upright position suitable for further handling. That is, the bottom 27 of the box is now positioned at the bottom of the envelope group so that the envelopes cannot fall out of the box 19 when the box is picked up.

OPERATIONAL SEQUENCE WITH ELECTRICAL AND PNEUMATIC CIRCUITS

The overall operation of the envelope boxing apparatus is controlled by a system of electrical and pneumatic circuits illustrated more particularly in FIGS. 6 and 7.

The counter mechanism 13 (which determines the size of the group of up to 12 envelopes) comprises means 37-48 driven by the envelope forming machine, not shown, and has been explained above. It is the counter mechanism 13 that periodically ejects an envelope end 15 from the train of horizontal stacked envelopes, that periodic envelope ejection being, for example, every 500 envelopes, thereby dividing the train into groups 14 of envelopes.

As the train of envelopes are moved downstream by the constantly but relatively slow moving delivery belts...
A new group of envelopes is positioned within the boxing station, once the boxed group has been pushed out of the station by kick plate 94 and the kick plate returned to its original position, by drawing the backup plate 18 toward the leading envelope now in the envelope train, the backup plate 18 being pulled in that direction by the weight 71 passing over the pulley 73. As the backup plate 18 reaches the separator blade 26 it engages a limit switch 1S-5 positioned underneath the delivery table. Closure of the limit switch 1S-5 actuates solenoid B which, in turn, redirects the flow of compressed air to the other end of the cylinder PC-1 so that the separator blade is drawn out of the envelope train travel path. Subsequently, because the envelopes 20 are continuously urged along their travel path by the delivery belts 12, the envelopes abut against the backup plate 18 and push it back toward its boxing station position as illustrated in FIG. 1 until the separator blade 26 is again injected into the envelope train by an edge 15 of a downstream envelope engaging leg 64, thereby starting the cycle all over again.

It will be completely apparent that the envelope boxing apparatus and method of this invention substantially eliminates the requirement for an operator's presence to place envelopes so formed by an envelope forming machine into suitable boxes. The only duty now required of an operator is that the magazine 20 must be maintained with a sufficient supply of boxes 19 so that a continuous supply of boxes is available at the boxing station 17 for boxing the continuous supply of envelopes 10 formed by the envelope forming machine.

Although I have described the preferred embodiment of my invention in complete detail it will be understood by those skilled in the art that variations and modifications may be established in the method of boxing envelopes and the apparatus for boxing envelopes as described in this application without departing from the spirit or scope of the appended claims. Accordingly, having fully disclosed the preferred embodiments of my invention, what I desire to claim and protect by Letters Patent is:

1. A mechanical method for boxing envelopes comprising the steps of:
   a. Providing a train of envelopes, said train having a multiplicity of envelopes disposed on edge in stacked relation;
   b. Partially ejecting an envelope from said train periodical-ly to establish successive groups of envelopes from said train, each group having a preselected number of envelopes,
   c. Isolating the groups one at a time from the train in succession in response to sensing of the projecting envelope edges;
   d. Positioning a box in inverted position above each of said groups as each group is isolated from said train, joining each box and each group together to locate each group of envelopes within a box.

2. A mechanical method as set forth in claim 1 including the steps of:
   a. Counting the envelopes in said train as they are received from a supply to establish the preselected number of envelopes in each group, said envelopes being partially ejected from said train in response to the counting of said envelopes.

3. A mechanical method as set forth in claim 1 including the steps of:
   a. Pushing the envelope filled box transversely of said train over a ledge, and
   b. Engaging said filled box with flip means during its fall to turn said box into an upright position.

4. Apparatus for boxing envelopes comprising:
   a. First support means for supporting a group of envelopes on edge in stacked relation at a boxing station,
   b. First delivery means associated with said first support means for delivering a train of envelopes from an envelope supply to said boxing station, said train ending at said boxing station,
   c. Counting means positioned to cooperate with said train for indicating successive groups of envelopes in said train that are of substantially equal size, each group having a preselected number of envelopes, and
   d. A separator blade at said boxing station mounted to reciprocate into and out of said envelope train in response to said counting means for isolating said groups within said boxing station one at a time from said train, each of said groups of envelopes being boxed in succession at said boxing station and thereafter removed to permit isolation of a subsequent group.

5. Apparatus as set forth in claim 4 wherein said counting means includes:
   a. Means for numerically counting successive envelopes in said train as the envelopes pass a fixed location, and
   b. A finger sequentially engageable with selected envelopes of said train to eject those envelopes partially out of the train's travel path each time said numerical counting means senses the passage of a preselected number of envelopes.

6. Apparatus as set forth in claim 5 including:
   a. A sensing finger engageable with the protruding edge of those envelopes pushed partially from said train to sense the passage thereof, said separator blade being reciprocated into said train to isolate a group therefrom in response to the engagement of said sensing finger with each protruding envelope edge.

7. Apparatus as set forth in claim 4 including:
   a. A backup plate reciprocably moveable within said boxing station on a travel path substantially parallel with the travel path of said train, said backup plate being continuously urged in a direction counter to the travel direction of said train and being adapted to cooperate with said separator blade to confine each group of envelopes within said boxing station.

8. Apparatus as set forth in claim 7 wherein the upper edges of said separator blade and backup plate are beveled to act as camming surfaces for guiding a box over each group of envelopes within said boxing station.

9. Apparatus as set forth in claim 7 wherein said first delivery means includes:
   a. A delivery belt on which said train is positioned for movement to said boxing station, said delivery belt being disposed between said boxing station and the take-off end of an envelope forming machine.

10. Apparatus as set forth in claim 4 including:
    a. A kick plate reciprocably moveable into and out of said boxing station for pushing each filled box from said boxing station, said kick plate being moveable in a direction transverse to the travel direction of said train.

11. Apparatus for boxing envelopes as set forth in claim 10 including:
    a. Turning means associated with said boxing station for turning said box over to an upright position with the envelopes retained inside, said turning means having drop-off structure associated with the boxing station over which each filled box is pushed by said kick plate, and flip means positioned below the drop-off structure, the filled box starting to flip over the drop-off structure and being completely flipped by the flip means into an upright position and,
    b. Conveyor means positioned below the flip means for receiving the upright box.

12. Apparatus for boxing envelopes as set forth in claim 7 including:
    a. A second support means positioned above said first support means for holding a box in inverted attitude.
above a group within said boxing station, said second support means having support tracks with bottom ledges movable into and out of holding engagement with said box, and driving means associated with said boxing station for joining said box with said group to locate the envelopes within said box, said driving means having a boxing plate engageable with the bottom of that box within said boxing station for moving said box down over said group of envelopes within said boxing station.

13. Apparatus as set forth in claim 12 including a box magazine for storing a supply of preformed boxes, and second delivery means for moving said boxes from said magazine to said support tracks, said second delivery means having at least one conveyor belt operatively related to said magazine for delivering said boxes one by one from said magazine to said support tracks within said boxing station.

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