Aug. 30, 1966 V. E. HEYWOOD 3,269,089

MACHINE FOR BANDING ENVELOPES

Filed Dec. 17, 1962 4 Sheets-Sheet 1

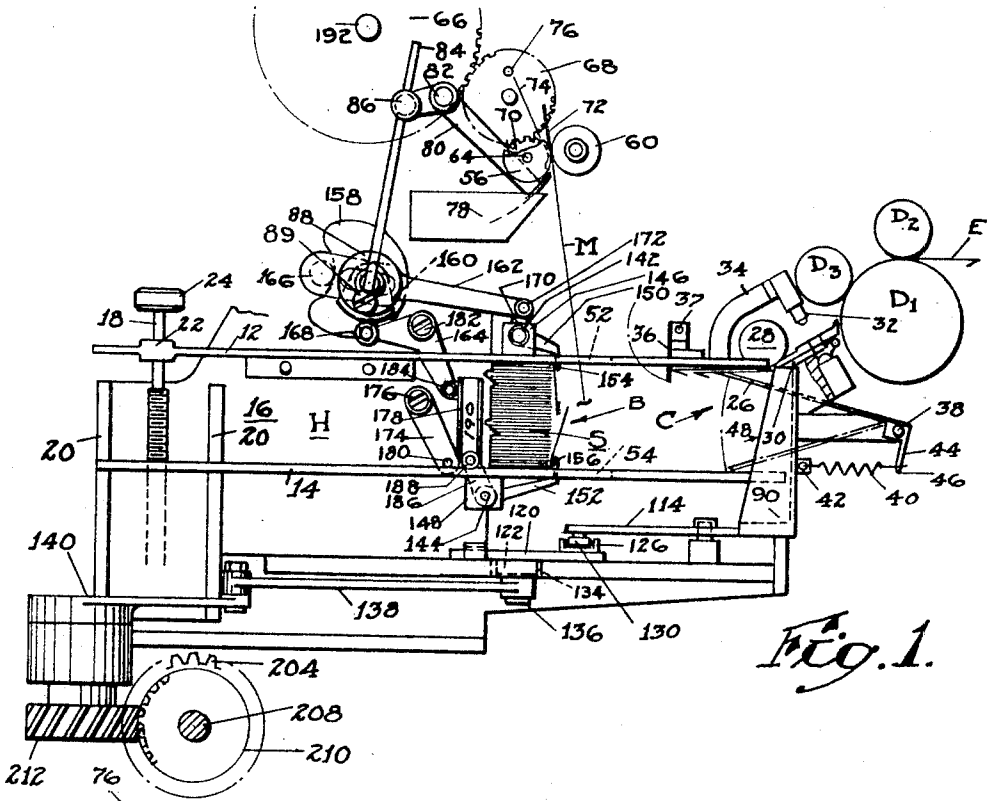


Fig. 1.

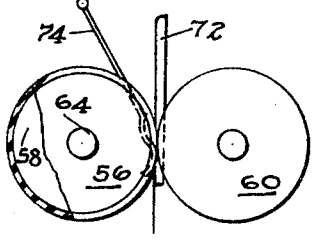


Fig. 9.

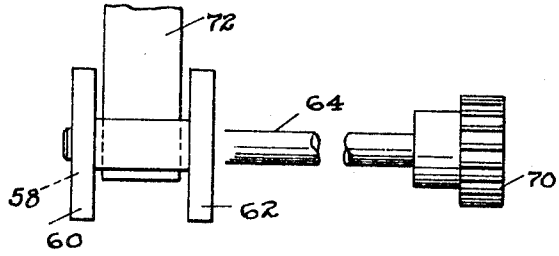


Fig. 10.

Inventor:
Vincent E. Heywood
By John F. Stevens
Patent Agent

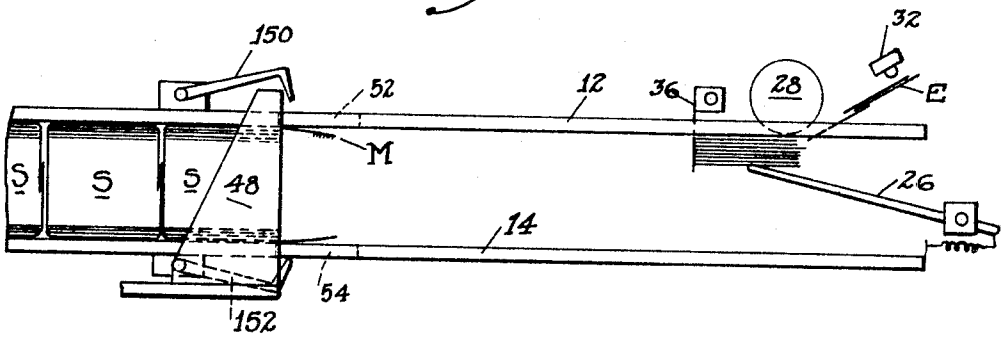
Aug. 30, 1966 V. E. HEYWOOD 3,269,089

MACHINE FOR BANDING ENVELOPES

Filed Dec. 17, 1962

4 Sheets-Sheet 2

Fig. 7.



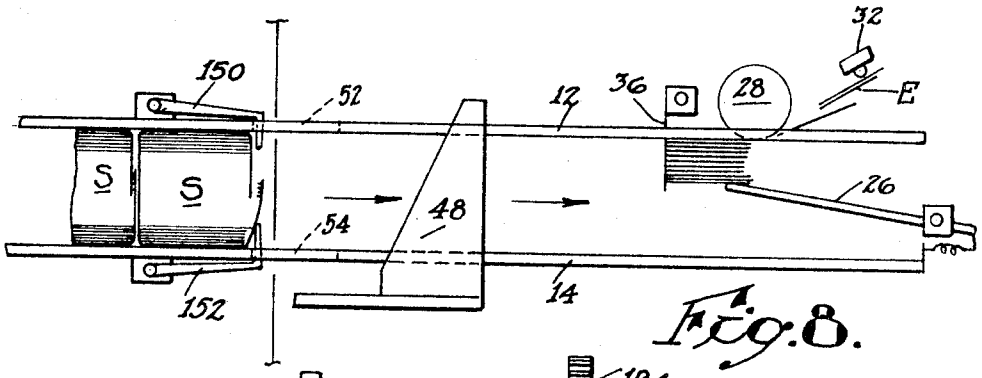


Fig. 8.

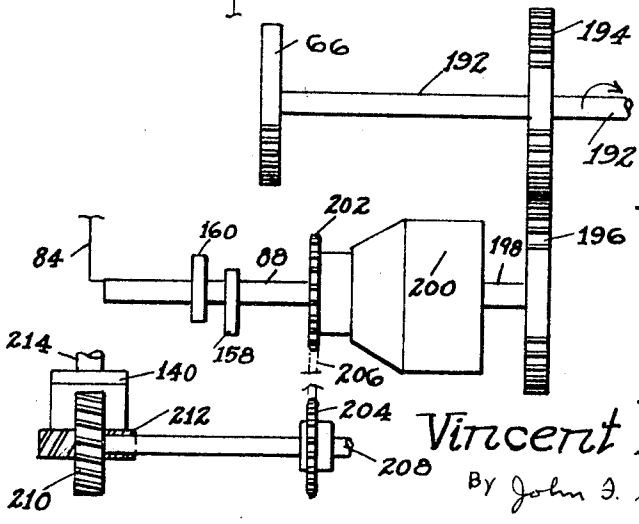


Fig. 2.

Inventor:
Vincent E. Heywood
By John J. Stevens
Patent Agent

Aug. 30, 1966 V. E. HEYWOOD 3,269,089

MACHINE FOR BANDING ENVELOPES

Filed Dec. 17, 1962 4 Sheets-Sheet 3

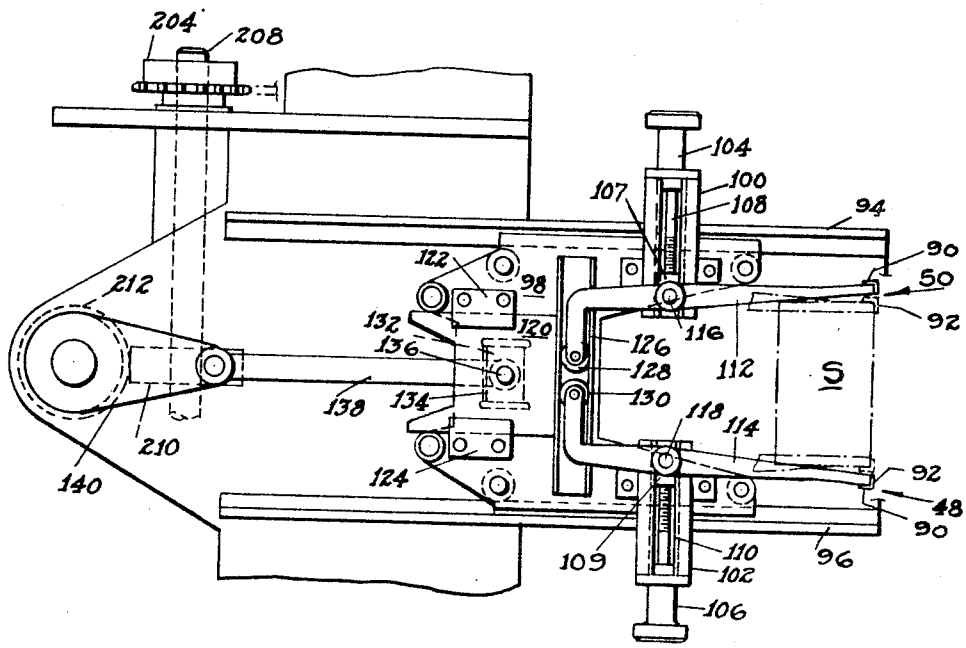


Fig. 3.

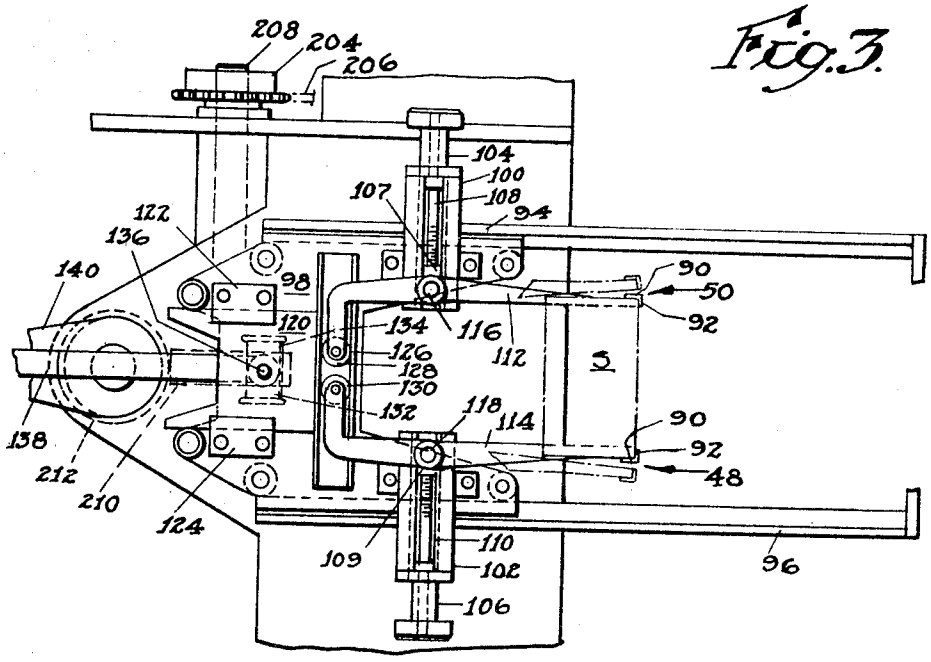


Fig. 4.

Inventor:
Vincent E. Heywood
By John A. Stevens
Patent Agent

Aug. 30, 1966 V. E. HEYWOOD 3,269,089

MACHINE FOR BANDING ENVELOPES

Filed Dec. 17, 1962 4 Sheets-Sheet 4

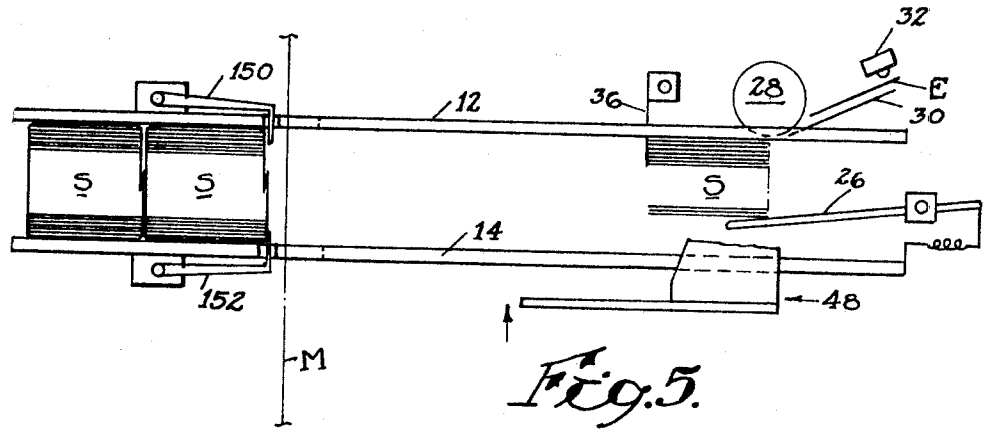


Fig. 5.

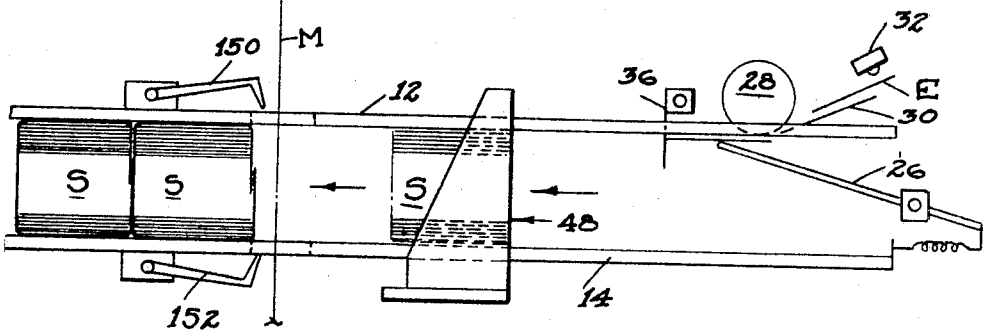


Fig. 6.

Inventor:
Vincent E. Heywood
By John J. Stevens
Patent Agent

United States Patent Office 3,269,089 Patented August 30, 1966

3,269,089

MACHINE FOR BANDING ENVELOPES

Vincent E. Heywood, Worcester, Mass., assignor to United States Envelope Company, Springfield, Mass., a corporation of Maine

Filed Dec. 17, 1962, Ser. No. 245,090
5 Claims. (Cl. 53—198)

This machine relates generally to a machine for and method of banding stacks of envelopes of a predetermined count. More specifically, this invention relates to a machine for and method of counting and collating envelopes into a stack as they emerge from an envelope making machine, and subsequently applying a band around the stack to snugly hold the envelopes therein in such a manner as not to apply pressure to the stack or cause compression or distortion of the envelopes within the stack.

This invention has particular application in the art of banding stacks of so-called "fat" or "puff" folded envelopes, in which the folds or edges of the envelopes are not sharply defined, but are smoothly rounded, holding the front and rear panels of the envelope in spaced apart relation. These "fat"-folded envelopes have received fairly widespread acceptance in certain fields, and today many of the higher quality greeting card envelopes, dry sealing envelopes, and the like are fat-folded to improve their appearance.

It is fairly common in the art of banding envelopes to collate them into stacks as they emerge from the envelope making machine, the stacks being formed successively on a support of some kind, usually horizontal, such that the individual envelopes are supported on their edge. A certain amount of back pressure is usually built up in the stack so as to compress the stack and frictionally hold the individual envelopes in alignment as the stack is completed, and the pressure is usually maintained on the stack while the stack is transferred to a banding station and until the stack is securely held by a band.

It is also common to dispose the banding material in the path of the stack between the collating station and the banding station so that when the stack intercepts the band of material it will become entrained around the stack, and the ends of the band are then joined together at a face of the stack.

Various types of the above described machines may be found in the art, and many are commercially available today. However, these machines are not well adapted for the banding of fat-folded envelopes because of the crushing or distorting result of compressing the stacks as they are collated and transferred to the banding station.

It is common practice today to band fat-folded envelopes by hand. This requires the services of extra personnel to count and make the stack ready for banding, and also for applying the band around the stack.

As mentioned briefly above, certain problems are encountered with the banding of fat-folded envelopes which render previous banding machines undesirable, or unadaptable for use in the banding of fat-folded envelopes. Compression of the stack cannot be tolerated in the banding of these envelopes, and machines heretofore have largely depended directly upon compression of the stack for accomplishing the jobs of collating, and for insuring the alignment of the envelopes in the stack during movement from the collating station to the banding station.

The present invention, therefore, approaches the job of banding fat-folded envelopes in a different manner than that shown in the prior art. The machine provided in this invention collates the envelopes in a stack as they emerge from the envelope making machine, the individual envelopes of the stack lying in generally horizontal planes under their own weight, so that compression of the stack is negligible. The machine according to the present invention also provides novel means for transferring the stack after it has been formed, from the collating station to a banding station, without compressing the stack, and in such a manner as to align the envelopes contained in the stack, which have been loosely collated, and to maintain the envelopes in the stack in alignment until the stack reaches the banding station where there is no longer a chance of the envelopes falling out of alignment.

The present invention further provides novel means for suspending a precut and pregummed band across the path of stack movement between the collating and banding stations, such that the band is yieldably suspended, whereby the advancing stack of envelopes intercepts the band at approximately the mid portion of the leading edge of the progressing stack, and is consequently entrained around the stack. The means for yieldably suspending the band is adjustable towards and away from the center of a stack to be banded, so that for stacks of different thicknesses, the suspended band may be raised or lowered accordingly to correctly center the band.

The invention further provides apparatus for forming the band around the sides of the stack at the banding station, and joining the tips of the pregummed band at the trailing side of the stack.

Other provisions of this invention will become apparent hereinafter as the machine is described with reference to the drawings. It is to be understood that the machine and method may well be suitable and adapted for application in fields other than fat-fold envelope banding.

One embodiment of the present invention is illustrated in the drawings in which:

FIGURE 1 is a side elevation view of my apparatus for banding envelopes, the envelopes being delivered from an envelope making machine having delivery rolls indicated at the extreme right of the figure;

FIGURE 2 is a diagrammatic view of the drive means for operating my bander;

FIGURE 3 is a plan view of the stack transferring and aligning mechanism of the banding machine, showing the stack handling members in a position just prior to grasping a stack S of envelopes;

FIGURE 4 is a plan view similar to FIGURE 3, but showing the stack handling members at the end of their transfer stroke ready to release the stack and return to their position shown in FIGURE 3;

FIGURE 5 is a schematic side elevation view showing the stack handling members in their stop position at the envelope collating station;

FIGURE 6 is a view similar to FIGURE 5, but showing the stack handling members after completing about ¼ of their cycle;

FIGURE 7 is a similar view showing the stack handling members after completing their transfer stroke to the banding station, or ½ of the cycle;

FIGURE 8 is a similar view showing the stack handling members after completing about ¾ of their cycle;

FIGURE 9 is a detailed side elevation view of the mechanism for yieldably suspending a band across the path of envelopes being transferred from the collating station to the banding station; and

FIGURE 10 is a front elevation of the mechanism shown in FIGURE 9.

Referring to the drawings, the envelopes E are delivered by the envelope making machine by delivery rolls D1, D2, and D3, to a collating station C at the intake end of the banding machine. Subsequently, the collated stacks S are transferred to a banding station B where a band of flexible material is entrained around the stack, and connected at the ends to hold the stack S together. The banded stacks then emerge from the delivery end of the banding machine, being pushed out the chute H as suc-

cessive stacks enter the banding station B, for subsequent packaging of the banded stacks.

The apparatus for carrying out the operations of collating the envelopes and banding the stacks is centralized around two horizontal, elongated plates 12 and 14, which define a passage between the collating station C and the banding station B, and also provide support for parts of the machine. The upper plate 12 is held rigidly in position by frame member 16, and the lower plate 14 is adjustable relative to plate 12 by means of threaded shaft 18, the plate 14 having a portion guided by guide members 20. Shaft 18 is fixed in its relation to plate 12 by suitable means, such as the rotatable mounting indicated at 22. By turning handle 24, the plate 14 will raise or lower on the threads of shaft 18, to accommodate stacks of different thicknesses.

The envelopes E are collated at C as they emerge from delivery rolls D1, D2, and D3, of the envelope making machine, on to a supporting arm 26. The envelopes may be fed through the bite of feed roll 28 and backing plate 30. A photoelectric cell 32 is mounted on arm 34 so as to count the envelopes as they pass into the bite of feed roll 28 and backing plate 30. The leading edges of the envelopes are restrained by stop bar 36, pivoted at 37, and as successive envelopes are fed into the collating station C, the stack is formed on arm 26, which pivots about 38 in a counterclockwise direction as the weight of the envelopes increases. The weight of the envelopes is counterbalanced by the force of spring 40, fixed at 42 and attached to lever 44 at 46.

Upon collation of a predetermined number of envelopes as determined by the photoelectric cell 32, transfer of the stack S from the collating station to the banding station is effectuated by the stack handling members 48 and 50, which will be explained hereinafter.

The mechanism directly above the banding station is used for supplying precut lengths of banding material through openings 52 and 54 in the upper and lower plates 12 and 14, respectively, and across the path of a stack of envelopes being transferred from the collating station C to the banding station B. Prior to the transfer of each stack S from the collating station C to the banding station B, a band M is fed by any suitable feeding mechanism (not shown) into the constantly rotating wheels 56, 58, 60, and 62. Wheels 56 and 58 are fixed to shaft 64, which is driven through the chain of meshing gears 66, 68, and 70. The axes of gears 68 and 70 are movable relative to the axis of gear 66, and relative to each other, enabling the band feeding wheels 56, 58, 60, and 62 to be raised or lowered according to the length of bands being used, and locked in place by suitable means (not shown). Driven wheels 56 and 58 are provided with an outer layer of rubber, or other highly frictional material, so as to frictionally impart a rotary motion to wheels 60 and 62 when in engagement therewith. The band suspending assembly is adjusted to a level such that the middle of the band is approximately midway between the plates 12 and 14.

Backing plate 72 is positioned between the axes of the wheels and between each pair of wheels. A surface of backing plate 72 lies in a plane tangent to the wheels at their points of contact, so that when a band is being fed through the wheels, it also slides along the surface of backing plate 72. A spring member 74, fixed at 76, extends downwardly at an angle to backing plate 72 and contacts it on said tangent surface at a point immediately below the outgoing nip of the wheels 56, 58, 60, and 62. Thus, a band fed through the constantly rotating feed wheels is restrained between the spring 74 and the backing plate 72 immediately after it is discharged from the outgoing nip of the feed wheels, and is yieldably suspended by its trailing end through the openings 52 and 54 in the frame plates 12 and 14, respectively.

Means may be provided for applying gum to the bands while they are suspended between the spring 74 and the backing plate 72. Gum box 78 is fixed in relation to the band feed and suspending means described above. Hence, when adjustments are made on the band feed and suspending means for different length bands, the gum box 78 maintains its position relative thereto. Gummer 80 pivots about point 82, and swings through an arc as indicated in FIGURE 1. Pivot point 82 is also fixed in relation to the band feeding and suspending means and to the gum box 78. Gummer 80 is connected to rod 84 at 86, and rod 84 in turn is eccentrically connected to shaft 88 at 89. Point 86 is adjustable along the length of rod 84 to enable the band feeding, suspending, and gumming assembly to be raised or lowered according to the length of band being used.

The means for transferring stacks of envelopes from the stack collating station C to the banding station B is best shown in FIGURES 1, 3, and 4. The opposed stack handling members 48 and 50 have L-shaped upright portions providing lateral side stack engaging portion 90 and trailing side stack engaging portions 92. The stack handling members act on the back or trailing corners of the stacks to grasp the stack at these corners along both the lateral sides thereof and the trailing side thereof to align the individual envelopes so that the sides of the stack are substantially vertical. As will be hereinafter described, a motion is imparted to the opposed stack handling members to (a) converge on the trailing corners of a collated stack S in the collating station C, (b) move to the banding station while being held converged, (c) diverge after reaching the banding station B, and (d) return to its original position at the collating station C while in the diverged position. Hence, the stacks S may be collated and transferred to the banding station without compressing the stacks, but still in a neat, completely aligned stack.

The carriage assembly for imparting the above described motion to the stack handling members 48 and 50 is also best shown in FIGURES 1, 3, and 4. This assembly is positioned below plate 14. It is supported by tracks 94 and 96 for reciprocable movement longitudinally of the elongated plates 12 and 14.

The carriage assembly includes a frame 98 to which blocks 100 and 102 are rigidly attached. Screw members 104 and 106 are rotatably fixed in blocks 100 and 102, respectively. Pin carrying members 107 and 109 are slidable in slots 108 and 110, respectively, of blocks 100 and 102, respectively, and are threaded on screw members 104 and 106, respectively. Opposed levers 112 and 114 are pivotally mounted on pins 116 and 118, respectively, and carry stack handling members 50 and 48, respectively.

Frame 98 has movably mounted thereon a block 120 between guide brackets 122 and 124. Block 120 has fixed thereto a laterally elongated channel member 126 through which movement is imparted to levers 112 and 114, which have rollers 128 and 130 connected thereto. The block 120 carries an element 132 on its bottom side which extends through opening 134 of frame 98. The opening 134 is larger than element 132 and allows relative movement between the element 132 and the frame 98 to the extent that the block is free to slide in the opening 134. Pin 136 extends from the bottom of element 132 below the frame 98, and has pivotally attached thereto one end of a connecting rod 138, the other end of which is pivotally attached to crank 140. A rotary movement is provided to crank 140 at predetermined intervals. In this manner, movement of the assembly between the collating and banding stations, and lateral movement of the stack handling members 48 and 50 (convergence and divergence about pivot pins 116 and 118) may be effected by the stroke of the crank 140. Because the parts which move relative to the frame 98 have a relatively small inertia compared with the inertia of the entire assembly, the element 132 will slide in slot 134 to pivot the arms 112 and 114 about points 116 and 118 before movement is

imparted to the carriage assembly, resulting in a "square" motion for each of the stack handling members 48 and 50. In this manner, when the crank 140 is rotated clockwise from its position shown in FIGURE 3, the element 132 will move to the left in slot 134, imparting a like movement to the channel member 126, to converge the stack handling members 48 and 50. When the element 132 has moved to the left in slot 134 to its fullest extent, a movement to the left will be imparted to the entire carriage assembly until the crank 140 has turned 180°, as shown in FIGURE 4. As the crank begins its back stroke from the position shown in FIGURE 4, the element 132 will move to the right in slot 134, while the carriage assembly remains stationary, diverging the stack handling members to release a stack at the banding station. When the element 132 has moved to the right in slot 136 to its fullest extent, a movement to the right will be imparted to the entire carriage assembly until the apparatus reaches its initial position shown in FIGURE 3.

Band folder operating shafts 142 and 144 are rotatably mounted in housings 146 and 148, respectively, fixed to the plates 12 and 14, respectively. Upper and lower band folding members 150 and 152, respectively, are keyed to shafts 142 and 144, respectively, and have portions 154 and 156, which operate through openings 52 and 54, respectively. Upon clockwise and counterclockwise rotation of the shafts 142 and 144, respectively, through an arc, the portions 154 and 156 act to aid in banding the stack S.

The band folding members 150 and 152 are operated from a main shaft 88. Shaft 88 is provided with cams 158 and 160 fixed thereto, which operate levers 162 and 164, respectively, through cam followers 166 and 168, respectively. Lever 162 is pivotally connected to arm 170 at 172, and arm 170 is keyed to shaft 142. Means are provided to operate the lower band folding member 152 at different levels as determined by the spacing of the plates 12 and 14. Lever 174, which is pivotally mounted to frame member 16 at 176, is pivotally connected to block 178 at 180. Lever 164 is pivotally connected to frame member 16 at 182 and pivotally connected to the block 178 at 184.

Arm 186 is keyed to shaft 144 and is provided with a roller 188, which is guided by slot 190 of block 178. Due to this linkage between cam 160 and the lower band folding member 152, the same motion is imparted to band folding member 152 irrespective of the level of plate 14 relative to shaft 88. It is now apparent that rotation of shaft 88 through one revolution will cause the band folders to move through one cycle. Actually, the action of the top folder 150 leads the action of the bottom folder 152 so as to overlap the ends of the band.

Means for driving the banding apparatus is illustrated in FIGURES 1 and 2.

A constant rotary motion is imparted to shaft 192 by suitable means (not shown). Gear 194 is keyed to shaft 192 and provides the drive to the main bander operating shaft 88. Gear 66 is also keyed to shaft 192 and provides the drive for the constantly rotating band feed wheels 56, 58, 60, and 62. Gear 196, which is keyed to the input shaft 198 of the clutch brake 200, meshes with gear 194. The clutch brake 200 operates to impart exactly one revolution to shaft 88 when a predetermined number of envelopes have been collated at the collating station C. As explained hereinbefore, rotation of shaft 88 operates the band folder cams 158 and 160, and the gummer operating rod 84. Sprocket wheel 202 is also keyed to shaft 88, and drives sprocket wheel 204 through chain 206, driving shaft 208. Gear 210 is keyed to shaft 208 and drives gear 212 keyed to shaft 214. Also keyed to shaft 214 is the crank 140. Sprockets 202 and 204, and gears 212 and 214 are designed such that a single revolution of sprocket wheel 202 results in a single revolution of the shaft 214 carrying crank 140.

The sequence of operation of the carriage assembly for transferring stacks S from the collating station C to the banding station B is probably best understood by reference to FIGURES 5 through 8. In FIGURE 5, a number of envelopes E have been collated into stack S, supported by arm 26. The envelopes are directed against stop member 36 by the momentum imparted thereto by roller 28. The envelopes accumulate in stack S, and arm 26 is balanced so that the weight of the envelopes will cause it to rotate counterclockwise as the envelopes E are accumulated. In this method of collating, no pressure is applied to compress the stack, destroying the "puff" of the envelopes, but a problem is created as to the alignment of the individual envelopes E in the stack, because some control of the individual envelopes E is lost due to the loose collation, when compared to collating under pressure with sharp folded envelopes. However, before the band M is applied to the stack at B, it is necessary to align the stack S. Herein lies a most important feature of my invention, in providing means to align the envelopes in the stack S simultaneously with transferring them from C to B.

The photo electric cell 32 sends successive impulses to a counter (not shown) which may be any one of several standard types. The counter is preset for a given number of impulses corresponding to the desired number of envelopes in each stack. After the counter has received the number of impulses for which it is preset, it automatically energizes a solenoid (or other switch) which causes clutch brake 200 to engage, rotating shaft 88 a complete revolution, which in turn cycles the carriage assembly through its full transfer and return stroke, and operates the upper and lower folders 150 and 152, respectively, and the gum applicator 80.

At the stop position of the output shaft of the clutch brake, both the upper and lower folders 150 and 152 are closed (FIGURE 5). A band M has been fed into the band feed wheels 56, 58, 60, and 62, fed therethrough, and yieldably suspended between spring 74 and backing plate 72 just below the outgoing nip of the wheels 56, 58, 60, and 62. The carriage assembly is positioned such that the stack handling members 48 and 50 are ready to converge on the stack S (FIGURES 3 and 5).

At the instant the shaft 88 begins its revolution, the stack handling members 48 and 50 converge on the stack S so as to laterally align the envelopes, and the assembly begins its transfer stroke from right to left from station C to B. The adjusting screw members 104 and 106 mounted in blocks 100 and 102 have been previously set so that the inner stop point of the members 48 and 50 is such that the distance between the side portions 90 is equal to or slightly greater than the width of the envelopes. As the stack S begins its movement from C to B, the stop member 36 is forced to rotate counterclockwise about 37 by the force of the stack of envelopes beginning to move.

At this time, the stack S has been laterally aligned by the convergence of the members 48 and 50 but only partially, if at all, aligned in the longitudinal direction due to the initial momentum of the stack.

As soon as the trailing side of the stack S passes the tip of envelope supporting arm 26, the spring 40 urges the arm 26 back to its "empty" position shown by the dotted lines, to begin accepting more envelopes for a new stack.

As the output shaft 88 of clutch brake 200 continues to rotate, the cams 158 and 160 cause band folding members 150 and 152 to open, as shown in FIGURE 6, to allow the stack S to enter the banding station B. The moving stack intercepts suspended band M, carries it against its leading edge, and the upper and lower plates 10 and 12 at the edges of the openings 52 and 54, cause the band to be pulled away from its suspended position between the spring 74 and backing plate 72, and become entrained around the top and bottom sides of the stack.

At the mid-point of the stroke of the carriage assembly, the stack S has completely entered the banding station B, as shown in FIGURE 7. During this transfer stroke, more envelopes are being collated on supporting arm **26**. The stack in station B is positioned such that when the folders **150** and **152** converge, as shown in FIGURE 8, the folders will fold the band around the trailing edge of the stack, the upper folder **150** being operated such that it is a little ahead of the bottom folder in its operation to overlap the ends of the band.

In FIGURE 7, it is evidence that the longitudinal alignment of the envelopes in the stack S will be completed as the stack S, being transferred, is forced into the trailing side of the previously banded stack S, thereby forcing the preceding stack S from the banding station B to the delivery end of the bander.

As the carriage assembly begins its return stroke to the collating station C, the stack handling members **48** and **50** diverge, as shown best in FIGURE 4, out of contact with the stack S of envelopes that it has just carried to the banding station B. The apparatus for causing these stack handling members 48 and 50 to diverge has hereinbefore been described. As the carriage assembly continues its return stroke, mechanism, (not shown) feeds a new length of precut banding material into the wheels **56**, **58**, **60** and **62**, which is subsequently suspended by the spring 74 and backing plate **72**. As soon as this new band is in position, the gum applicator dips into the gum box **78**, accepts a portion of gum and raises to a position in contact with the suspended end of the band for deposition of a supply of gum to the band.

The folders **150** and **152** remain closed as shown in FIGURE 8, as the carriage assembly is returned to collating station C to wait for a new stack of envelopes to be collated. The carriage assembly comes to rest at collating station C at the completion of a revolution of the output shaft **88** of the clutch brake **200**.

I claim:

1. Apparatus for banding stacks of envelopes comprising

(a) an elongated, substantially horizontal support plate having spaced apart thereon a station for collating envelopes and a station for banding envelopes, and having an opening therein between said collating station and said banding station for passage of a piece of banding material,

(b) means for yieldably suspending a band of flexible material of a predetermined length through the opening in said support plate,

(c) means for collating a predetermined number of envelopes at said collating station, the envelopes lying substantially flat in planes parallel with said support member,

(d) carriage means movable adjacent the support plate and longitudinally relative thereto,

(e) opposed, cooperating stack handling members having lateral and trailing side stack engaging portions movably mounted on said carriage, said stack handling members having a stack engaging position and a stack releasing position,

(f) means for positioning said carriage such that the stack handling members are in a position to engage a stack at said collating station,

(g) means for moving said stack handling members into engagement with a stack of envelopes at said collating station after a predetermined number of envelopes have been collated,

(h) means to move said carriage from said collating station to said banding station with said stack handling members in stack engaged position,

(i) means to entrain said band around the top, bottom, and leading sides of said stack as it is transferred to said banding station,

(j) means for releasing the stack from engagement by said stack handling member at said banding station,

(k) means at said banding station for overlapping the ends of the band at the trailing side of said stack,

(l) means for returning said carriage to its original position with said stack handling members in a stack released position,

2. Apparatus for banding stacks of envelopes comprising

(a) an elongated, substantially horizontal support plate having spaced apart thereon a station for collating envelopes and a station for banding envelopes, and having an opening therein between said collating station and said banding station for passage of a piece of banding material,

(b) means for feeding a precut band of material substantially vertically into the opening in said support plate and across the path stack advancement such that the width of the band extends transversely of the path of stack movement and the center of the band is above said support plate approximately half the height of the stack to be banded,

(c) means for yieldably engaging the trailing end of said band immediately upon discharge from said feeding means,

(d) means for collating a predetermined number of envelopes at said collating station, the envelopes lying substantially flat in planes parallel with said support member,

(e) carriage means movable adjacent the support plate and longitudinally relative thereto,

(f) opposed, cooperating stack handling members having lateral and trailing side stack engaging portions movably mounted on said carriage, said stack handling members having a stack engaging position and a stack releasing position,

(g) means for positioning said carriage such that the stack handling members are in a position to engage a stack at said collating station,

(h) means for moving said stack handling members into engagement with a stack of envelopes at said collating station after a predetermined number of envelopes have been collated,

(i) means to move said carriage from said collating station to said banding station with said stack handling members in stack engaged position,

(j) means to entrain said band around the top, bottom, and leading sides of said stack as it is transferred to said banding station,

(k) means for releasing the stack from engagement by said stack handling member at said banding station,

(l) means at said banding station for overlapping the ends of the band at the trailing side of said stack,

(m) means for returning said carriage to its original position with said stack handling members in a stack released position.

3. In an envelope banding machine, the combination with an elongated support plate having a collating station for collating envelopes as they emerge from an envelope making machine and a banding station for wrapping a band around a stack of envelopes spaced apart therefrom, and means for transferring a collated stack from the collating station to the banding station, of

(a) means for collating the envelopes in stacks such that the individual envelopes lie substantially parallel to said support plate,

(b) opposed, cooperating stack handling members having lateral and trailing side stack engaging portions movably associated with said transferring means for aligning and engaging a stack being transferred from said collating station to said banding station,

(c) means to engage a collated stack at said collating station with said stack handling member after a

predetermined number of envelopes have been collated,

(d) means to release the stack from said stack handling members after the stack has come to rest at said banding station.

4. In an envelope banding machine, the combination with an elongated support plate having a collating station for collating envelopes as they emerge from an envelope making machine and a banding station for wrapping a band around a stack of envelopes spaced apart therefrom, of

(a) means for collating the envelopes in stacks such that the individual envelopes lie substantially parallel to said support plate,

(b) a carriage movable adjacent said support plate and longitudinally relative thereto,

(c) opposed, cooperating stack handling members having lateral and trailing side stack engaging portions movably associated with said carriage, for aligning and engaging a stack being transferred from said collating station to said banding station,

(d) the movement of said carriage being operable for reciprocating said stack handling members between said collating station and said banding station,

(e) means to engage a collated stack at said collating station with said stack handling members after a predetermined number of envelopes have been collated,

(f) means to release the stack from said stack handling members after the stack has come to rest at said banding station.

5. In an envelope banding machine, the combination with an elongated support plate having a collating station

for collating envelopes as they emerge from an envelope making machine and a banding station for wrapping a band around a stack of envelopes spaced apart therefrom, of

(a) means for collating the envelopes in stacks such that the individual envelopes lie substantially parallel to said support plate,

(b) a carriage movable adjacent said support plate and longitudinally relative thereto,

(c) opposed, cooperating stack handling members having lateral and trailing side stack engaging portions pivotally mounted on each side of said carriage and movable through a transverse arc in relation to the path of said carriage,

(d) the movement of said carriage being operable for reciprocating said stack handling members between said collating station and said banding station, and for causing said stack handling members to engage a stack at said collating station and to release the stack at said banding station.

References Cited by the Examiner

UNITED STATES PATENTS

3,094,826	6/1963	Davey et al.	53—198 X
3,122,870	3/1964	Stemmler	53—198

FOREIGN PATENTS

858,142	1/1961	Great Britain.

FRANK E. BAILEY, *Primary Examiner.*

TRAVIS S. McGEHEE, L. S. BOUCHARD,
Assistant Examiners.