F. B. POWERS.

BANDING APPARATUS FOR ENVELOPS.

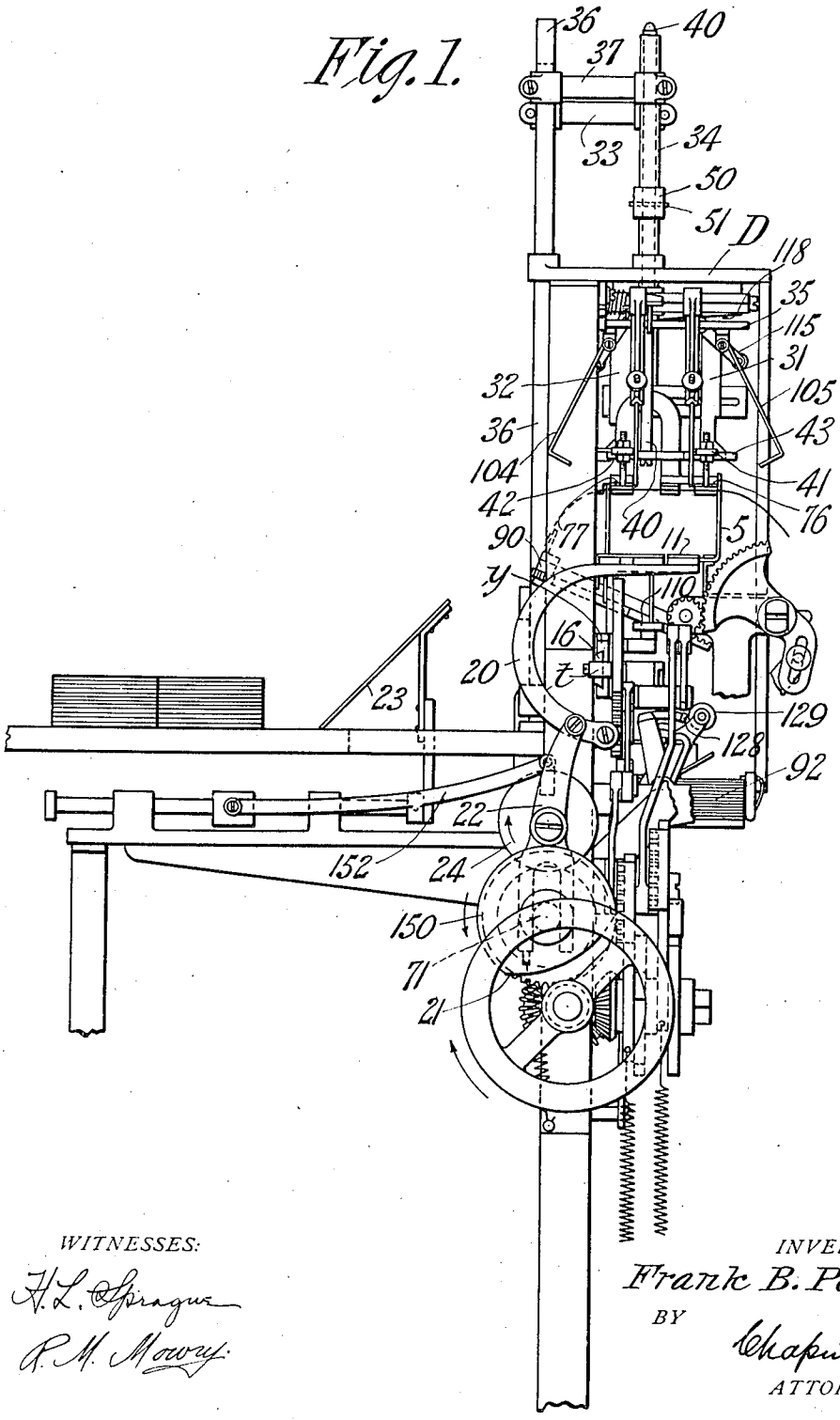
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1,261,612.

Patented Apr. 2, 1918.

6 SHEETS—SHEET 1.

Fig. 1.



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6 SHEETS—SHEET 2.

Fig. 2.

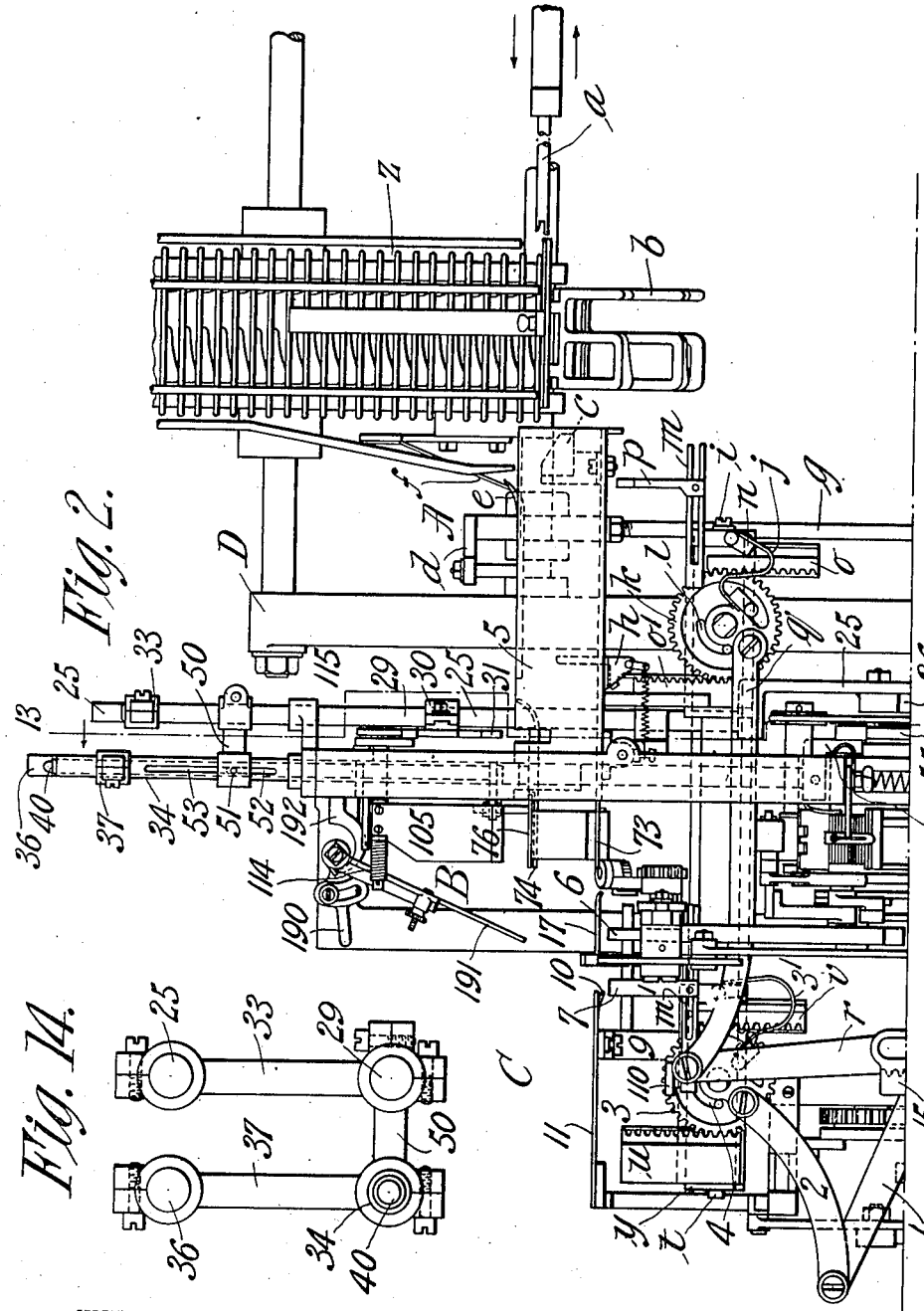


Fig. 14.

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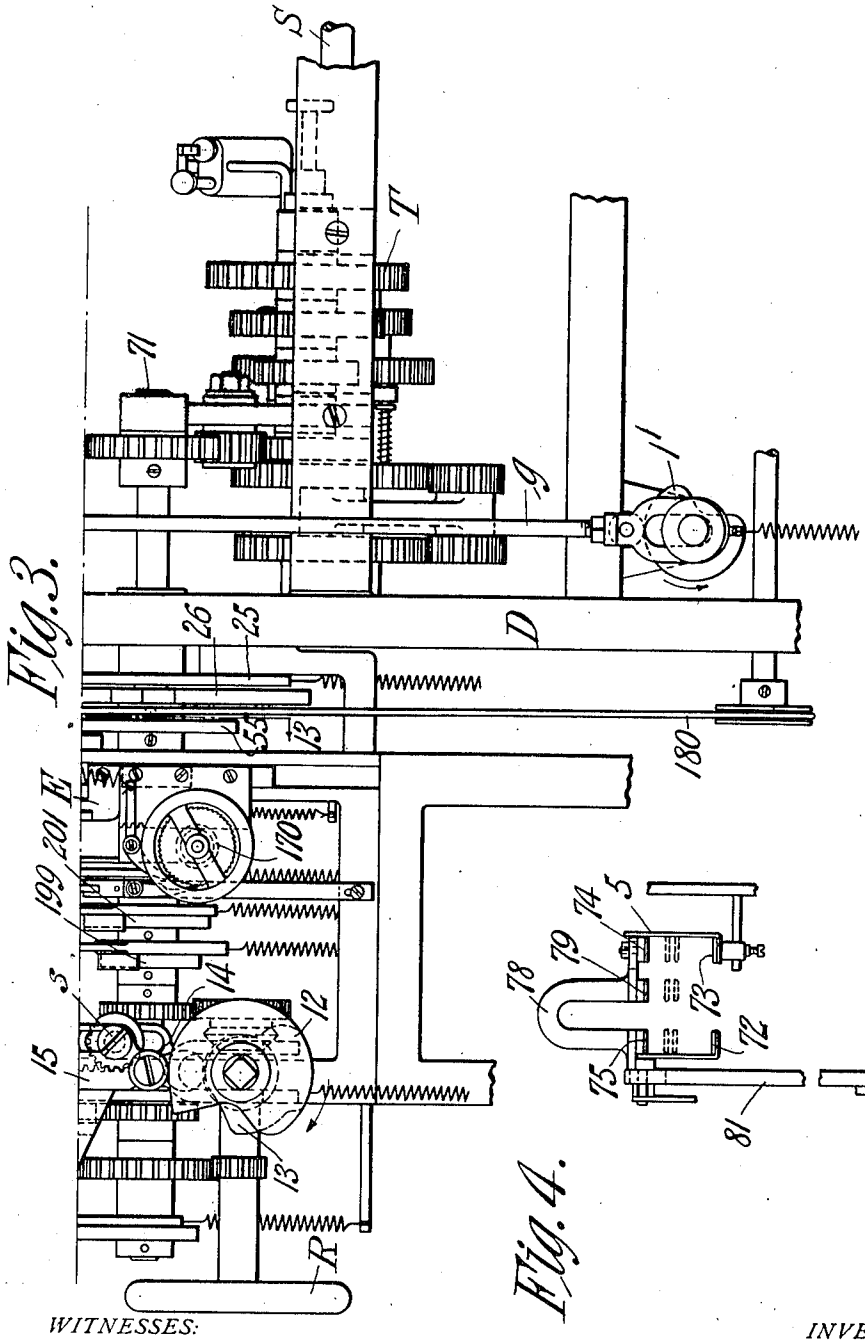


Fig. 3.

Fig. 4.

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6 SHEETS—SHEET 4.

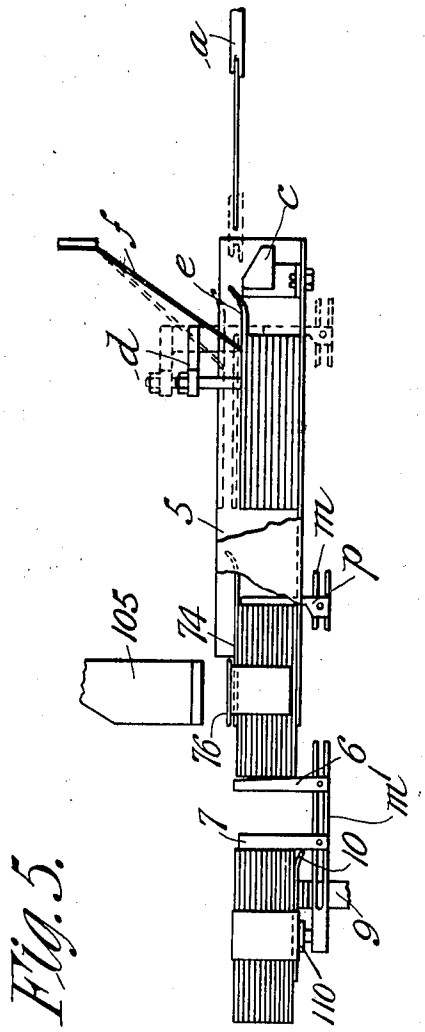


Fig. 5.

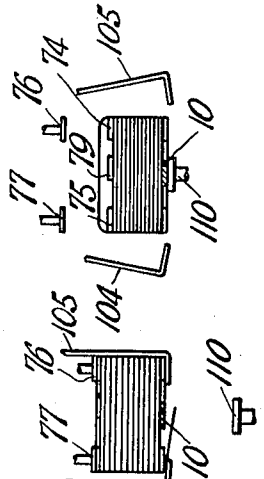


Fig. 10.

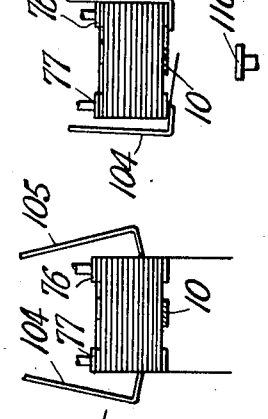


Fig. 9.

Fig. 8.

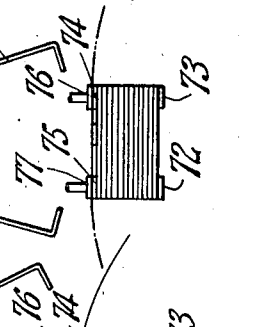


Fig. 7.

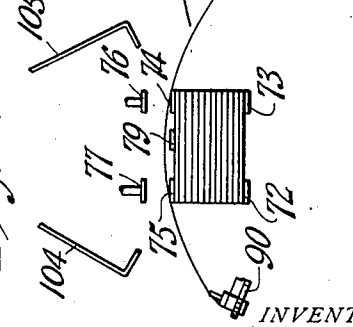


Fig. 6.

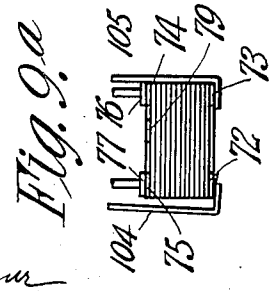


Fig. 9.a

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6 SHEETS—SHEET 5.

Fig. 11.

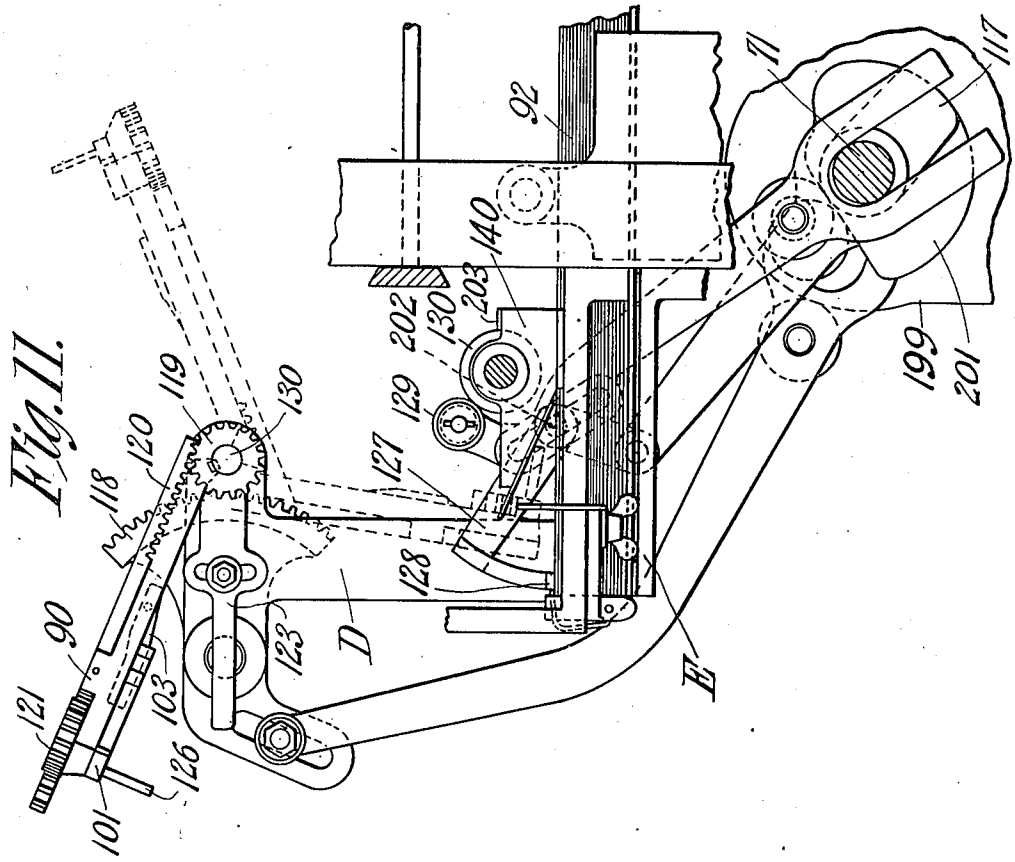
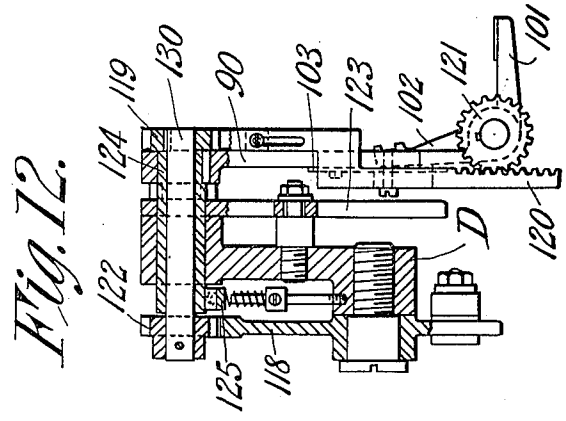


Fig. 12.



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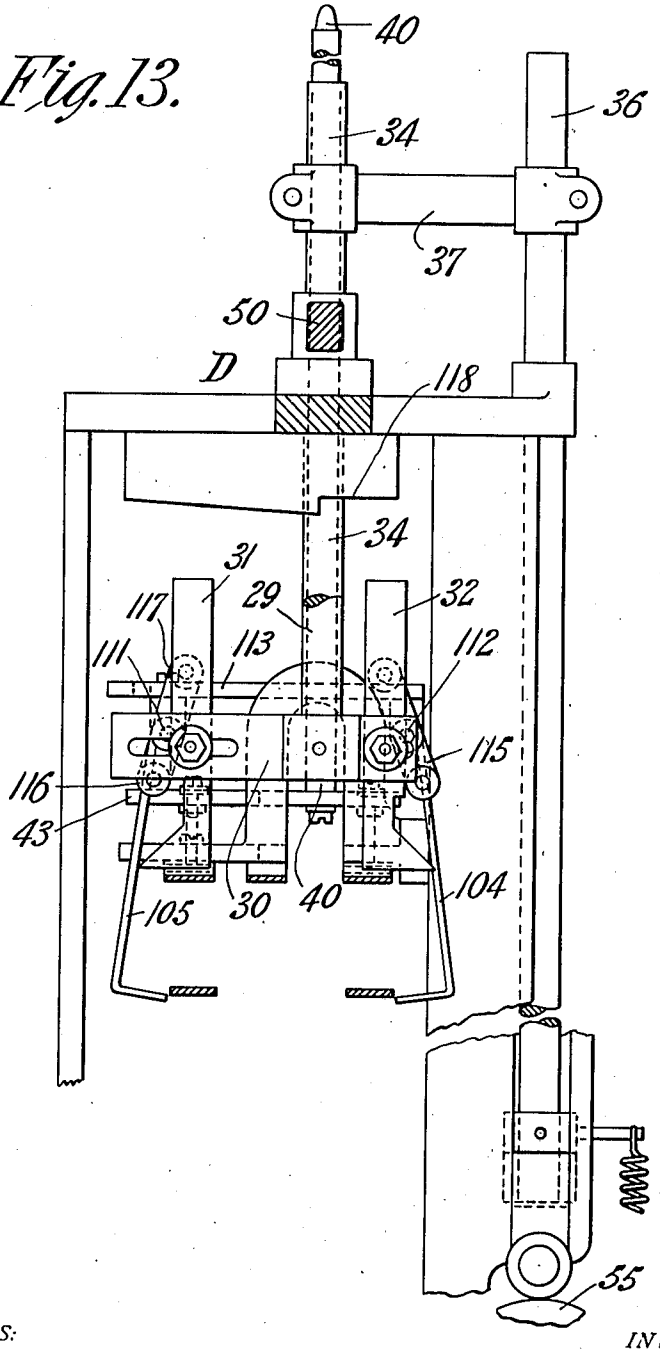
APPLICATION FILED JUNE 28, 1912.

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6 SHEETS—SHEET 6.

Fig. 13.



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UNITED STATES PATENT OFFICE.

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BANDING APPARATUS FOR ENVELOPS.

1,261,612. Specification of Letters Patent. Patented Apr. 2, 1918.

Application filed June 28, 1912. Serial No. 706,376.

To all whom it may concern:

Be it known that I, FRANK B. POWERS, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Banding Apparatus for Envelops, of which the following is a specification.

This invention consists of mechanism for receiving envelops or cards from a machine making them either in bunches previously counted or one by one until a bunch of predetermined count is formed, compressing each bunch to the desired thickness, banding the bunch and delivering it to a receiving station for further disposal as boxing or sorting or for other desired purposes.

Important improvements embodying one object of my invention consists of means for taking a band of predetermined length with a design or ornament printed or placed thereon, locating this design or ornament in a position on the bunch of envelops or cards to be banded, so that when the banding of the bunch is completed the design or ornament of the band will appear in the same place on all the bunches banded because of the same setting of the parts. The result is that perfect uniformity in the appearance of the different bunches is obtained. Means are also provided for adjusting all the parts to the different sizes of envelops or cards, or different thicknesses of bunches, or different lengths of bands and different positions of the design or ornament thereon.

Another important improvement embodying a second object of the invention consists of thin blades or wires of suitable material at each of the four side edges or the two uppermost edges of the bunch of envelops or cards to be banded around which the band is wrapped to the end that thick bunches of light material that would not offer resistance enough to the banding operation to be of uniform thickness when banded may be in this manner banded to a uniform thickness.

Another improvement comprising a third object consists of the use of folding blades which wrap the band around the bunch of envelops or cards to a uniform thickness and in coöperation with the before mentioned blades or wires permit of a crease in any or all four edges of the band that would not be possible in the wrapping of a heavy band around a thick bunch of light material, the present method in putting up high grade stationery being to crease the bands by hand around a block of wood before banding. Because of the use of these blades or wires around which the band is wrapped, it is also possible for my machine to crease or even complete the folding and fastening together of the band without the presence of an inclosed bunch so that the band can be taken from the machine and the bunch inserted by hand or other means. When not needed for the purpose described these blades or wires can be removed and the band wrapped around the bunch without them, the other part being identical in operation.

Other objects of the invention will appear in the following general and specific description thereof as well as in the annexed claims. In boxing what are known as commercial or official envelops for the demands of commerce it is customary to put one-fourth thousand or one-half thousand in a box and in order that the envelops may fill the box and withstand transportation without arriving at their destination with the appearance of only partly filled boxes it is necessary to make the individual envelops thick or "fat" enough to more than fill the box without compression, the elasticity of the material allowing such compression in the process of banding a box. My method of banding provides for such compression.

So-called commercial or official envelops are now banded by hand with paper bands held together with an adhesive material called "gum". On account of the elasticity of the bunches and their tendency to "open" or separate the adhesive of the bands, this gum must be very quick drying and applied to the bands in a very thin even layer and my invention provides for that by my method of gumming as hereinafter described.

It has heretofore been the custom to gum the ends of the bands and allow this gum to dry before using the bands. This gummed surface in present practice is moistened with water on a sponge just before using. This makes a very quickly adhering process, and in my banding mechanism the bands can be so provided with previously dried gum and the gum box or receptacle for holding the gum as shown in my mechanism can be filled with water, the distributing roller supplying water to the gum finger instead of gum, and the gum finger wetting the previously dried gummed surface of the bands, the operation of the parts being otherwise identical.

Another improvement consists in providing a means against which the ends of the bands can be pressed to fix the gum so that this pressure will not be borne by a loose bunch of envelops which would not of itself permit of pressure enough to fix the gum or by freshly printed cards which would have the ink offset by the pressure.

This means provided to withstand the necessary pressure to fix the gum, therefore fills the dual function of fixing the gum to withstand the opening of the elastic bunch of envelops or to provide the necessary resistance to pressure when it is desirable to keep such pressure from the non-elastic bunch of cards. When the compression of an elastic bunch of envelops, or the firmness of the material thereof is sufficient to withstand the necessary pressure to fix the gum, or when not necessary to keep such pressure from being applied directly to a non-elastic bunch of cards, the presence of the means here provided is not necessary for the fixing of the gum, but such means of providing resistance is necessary to meet all conditions of a banding mechanism and such means may be removed or applied as found desirable.

With these objects and improvements in view one specific form of the invention as applied to an envelop banding machine is described herein as illustrative of the manner in which applicant's invention can be used.

Referring to the drawings:—

Figure 1 represents an end elevation of the banding mechanism with a part broken away to better show certain details.

Fig. 2 is a front elevation of the essential features of the banding mechanism showing in addition the manner in which it receives the envelops from an envelop machine.

Fig. 3 is a front elevation of mechanism belonging to the view shown in Fig. 2 but which is not possible to show in the same figure in sufficient size for a clear understanding thereof, Fig. 2 showing the upper part of the front elevation and Fig. 3 the lower part of the front elevation of the banding mechanism as described in relation to the envelop machine.

Fig. 4 is a detailed view showing the envelop containing pocket and the creasing plates or wrapping fingers with means for operating the latter.

Fig. 5 is a detailed view showing the several steps of bunching envelops in the assembling section, moving the bunch to the banding section, wrapping the band around the bunch and then moving the same to the delivery section of the machine all of which is a step by step operation.

Figs. 6 to 10 are detailed views showing diagrammatically the series of preferred operations involved in the banding section.

Fig. 11 is a detailed view of the band nipper and carrier.

Fig. 12 is a sectional plan view taken on line 12—12 of Fig. 11.

Fig. 13 is a detailed sectional view taken on line 13—13 of Figs. 2 and 3.

Fig. 14 is a plan view showing the five operating rods and their connections.

The operation of assembling the envelops will first be described. Referring to Fig. 2 the supporting frame work of the mechanism is indicated by D, the delivery mechanism of an envelop machine with a step by step operation is indicated by *z*. This mechanism delivers the envelops in a well known manner in a step by step operation. The constantly reciprocating ejecting device *a* operates as indicated to push each envelop as it comes along to the delivery position into the assembling section A of the banding mechanism. As the envelops are passed into the assembling section the forward end of each one is prevented from falling by the beveled face of the stationary device *c*. The envelop is thus caused to fall evenly to the bottom of the envelop containing pocket. (See Fig. 5.) In this manner a bunch of any desired number of envelops is obtained in the assembling section. During the assembling of these envelops in the bunch a rod *g* reciprocated by cam 1′ (see Fig. 3) driven in a suitable manner as from the envelop machine operates to pack the envelops assembled into proper form by means of the flat strips *e* which are carried by the casting *d* fastened to rod *g*, as indicated in Figs. 2 and 5. There are two of these strips *e* operating to pack the envelops one against the other in the assembling section and lying between these two strips *e* is a very light spring wire *f* supported from the frame work in any suitable manner. This wire is at an angle to the movement of the envelops into the assembling section and it is so light and flexible that when an envelop strikes the same it immediately rises but as the bunch of envelops is assembled this light wire resting on the top thereof gives just enough pressure to keep the envelops in proper position. After a desired number of envelops have been assembled in a bunch the bunch is moved along the envelop containing pocket 5 to a position in the banding section therein, said position being indicated generally by B, Fig. 2.

The envelop containing pocket (see Fig. 4) is supported on the frame work and is open at the top and bottom with marginal ledges at the bottom on which are fastened hardened steel plates to support the envelops as they slide along the pocket. One side of the pocket 5 is adjustable horizontally on its supporting rods in a manner obvious from Fig. 4 to accommodate different widths of envelops. The stationary device *c*

with the spring pressed finger *h* (see Fig. 2) and the sides of the pocket tend to square up the envelops on all sides. The device *c* is adjustable in a slot at the bottom of the pocket to different lengths envelops. As the assembled bunch is moved from the section A to the banding section B the spring pressed finger *h* yields to let the bunch pass along the pocket.

The mechanism for moving the bunches from one section to another will now be described. A dove tailed horizontal plate 16 (see Fig. 1) is mounted below the path of the envelops and on this plate are mounted two quite similar sliding carriages *y* and *n* (Figs. 1 and 2). These carriages are limited in their sliding movements by the end stops *t* and *i* as they separate and by their abutting ends as they approach one another. On the carriage *n* the gear *k* is mounted on a stud shaft and vertical racks *o* and o^1 mesh with said gear. The rack *o* carries a horizontal slotted member *m* in which the vertical finger *p* is adjustably mounted. The rack o^1 travels oppositely to rack *o* and is for counter balancing purposes only. The carriage *n* has a pin to coöperate with the concentric slot *l* of the gear. A spring *j* has one end pivoted on the carriage *n* and the other end on the gear *k*. As the gear is turned for its slot *l* to have first one end against its limiting pin and then the other the spring *j* due to its specific mounting will pass across center and tend to hold the gear with slot *l* having one end or the other against its pin according to the way the gear is moved to carry the spring across center. This is all for the purpose to be described. The parts 3, *v*, *u*, 3^1 and 4 on carriage *y* correspond with parts *k*, *o*, o^1, *j* and *l* respectively of the carriage *n* and operate in the same manner as just described (with relation to the parts on the carriage *n*) when the gear 3 is moved. The rack *v* carries an adjustable slot member m^1 similar to *m* on carriage *n* but m^1 has adjustably mounted therein two vertical members 6 and 7. The carriages *n* and *y* are slid forward and backward by equivalent link members operated by differently designed cams. Referring to Fig. 3 the cam 12 suitably mounted and driven from the main cam shaft 71 as indicated raises and lowers a roll 14 spring pressed on its face in a definite time relation. This roll 14 is mounted on a rack member 15 having a forked end embracing the axis of the cams 12 and 13, to guide the rack member and a vertical slot embracing a stud *s* on which a gear segment is mounted to mesh with the rack. As the rack moves it turns the segment which has attached thereto the link member *r* (see Fig. 2). The latter is thus swung forward or backward as the roll on the cam rises and falls. This motion is transmitted to the carriage *n* through the link *q* pivoted to gear *k*. This movement of the carriage *y* is transmitted from cam 13 through link members 1 and 2, the former swinging on center *s* by mechanism similar in every way to that just described. When the bunch of envelops is properly assembled in the assembling section and ready to be transferred to the banding section the link member *q* has moved the sliding carriage *n* against stop *i* and as the link member *q* continues to move due to cam 12 the gear *k* is turned so that slot *l* moves to bear against its pin at the other end than is the case shown in Fig. 2. The spring *j* meanwhile is moved across centers and the rack *o* moved vertically. The spring tends to hold the parts in the position to which they have been moved for when the link member *q* moves to the left (Fig. 2) the frame *n* slides on the dove tailed plate 16 for spring *j* has sufficient force to keep gear *k* from turning as long as the frame *n* can slide but as soon as the end thereof abuts the end of carriage *y* the small additional movement of *q* causes the turning of gear *k* and the passage of spring *j* across centers to the position shown in Fig. 2 and the parts are then all returned to the position shown in that figure for the cycle of operations to be repeated. During this cycle of operations the finger or pusher *p* first takes the dotted line position shown in Fig. 5 at the right from which it pushes the bunch of envelops into position for banding. As the finger *p* finishes its forward movement the finger 6 carried by slide m^1 has been moved by rack *v* of the carriage *y* into the full line position shown to jog the forward end of the bunch into proper position for banding. With the bunch of envelops in the middle position shown in Fig. 5 the banding operations proper take place.

These banding operations will now be described. They are diagrammatically illustrated in Figs. 6 to 10. It is desirable in many classes of work especially such as fine stationery to band the envelops in a loose elastic bunch of predetermined thickness. In this work the envelops, being made "fat" that is full and with considerable elasticity when bunched to a predetermined thickness constantly tend to separate the ends of the bands and will separate them unless they are skilfully put on and stuck together. In addition it is desirable in this class of work to crease the bands at the corners which show when the bunches are put in a box or to crease them at all four corners. The bands are now in practice creased by hand around a block of wood and then wrapped around the bunch and stuck. It is important in the trade to get this clear cut appearance of the bands and applicant's banding mechanism is adapted to give this desired result in an automatic manner as well

as to band all those classes of envelops or cards which do not need the refinement mentioned. To this end the bunch of envelops when left in banding position are held between four creasing plates 72, 73, 74 and 75 as shown in Figs. 6 to 10. The plates 72 and 73 are extensions of the supporting plates of the envelop pocket 5 while plates 74 and 75 are carried by a casting 78 held by a rod 81 in which it is vertically adjustable by a nut and slot arrangement (see Fig. 4) for different thicknesses of bunches. The rod 81 is intermittently reciprocated by a cam 82 mounted on the main or cam shaft 71 (see Fig. 4) designed to give the necessary movements thereto. The casting 78 has a slot in which side plate 74 is adjustable for different width envelops and carries a third plate 79 which together with plates 74 and 75 is used to compress the bunch to be banded to a predetermined thickness.

Referring specifically to Fig. 4 the full and dotted lines of the folding and compression plates 74, 79 and 75 illustrate the cycle of operations of these plates. The bunch of envelops having been brought to position on plates 72 and 73 as described the cam 82 allows the compression plates 74, 79 and 75 to take the intermediate dotted line position. The bunch is thus compressed to a predetermined size for banding, every bunch of a run being treated in the same manner that is compressed and held compressed until the banding operation is completed. The predetermined length of band is thus wrapped around the predetermined thickness of bunch. When the banding operation is completed cam 82 allows the compression plates to descend to the lower dotted position in Fig. 4. (See also Fig. 10). This compresses the bunch when banded and allows the bunch and band to be readily transferred to the delivery section without having the band tear or bind as it leaves the folding plates. As soon as the bunch leaves the banding section and the band is free from the compression plates the envelops of the bunch expand to the limit which the band allows. It is obvious that these plates 72 and 75 could be changed to wire fingers if desired.

Just before the bunch has been placed within the folding or creasing plates a swinging nipper arm 90 carries a band of predetermined length from a pile 92 of such bands (see Figs. 1 and 11) the band having been supplied with adhesive all of which will be described, and lays said band over the plates 74, 75 and 79 (see Figs. 1 and 6) after which the arm 90 swings back to an intermediate position all of which will be hereinafter described. With the band in place and the nipper arm 90 having returned as stated the band retaining members 76 and 77 are lowered to bear on the band. (See Figs. 7 and 10). The top bow in the band is thus straightened out and the band is held properly for the folding plates to operate thereon. These retaining members are carried by the cross arm 43 (see Fig. 1) which latter is held on and moves with the vertical rod 40 in a way to be described. The member 76 is mounted in a slot on the cross bar 43 to be adjustable for different widths of envelops. With the bunch in the condition shown in Fig. 7 through the operations described the flat folding arms 104 and 105 operate.

The operation of the folding arms will now be described as illustrated diagrammatically in Figs. 8 to 10. By suitable means to be described the arms descend parallel to the sides of the bunch (see Fig. 8) folding the band sharply as shown until the right angled extensions thereof are just at the lower edges of plates 72 and 73 as shown in Fig. 13. The vertical descending movement of the folding arms then stops and first one and then the other of said arms turning on centers vertically above the edges of the plate fold the ends of the bands around plates 72 and 73 (see Fig. 9) in overlapping relation with the gum on one side sticking against the other end of the band. Between where these two ends meet and the bunch a plate 10 fixed to the carriage y by upright 9 (see Figs. 2 and 5) gives a flat surface against which the sticking finger 110 presses the overlapping ends of the band.

The folding arms 104 and 105 are mounted on studs 111 and 112 (see Fig. 13) carried by the cross arm 113 which latter is fixed to the hollow rod 34. The shaft 111 has an adjustable lateral connection (see Fig. 13) with the cross piece. A suitably coiled spring as 114 (see Fig. 2) is mounted on each stud to give each folding arm a constant tendency to swing inwardly. The folding arms are normally spread apart by arms 115 pinned to the studs 111 and 112 with rollers 116 and 117 at the opposite ends thereof bearing against either cam faces 118 or the upper ends of 31 and 32. The normal position for the folding arms 104 and 105 is shown in Fig. 1 which also shows the lower position for the cam faces 31 and 32 which latter are carried adjustably on a cross piece 30 fixed to the rod 29. (See Fig. 13). In the folding operation there are five rods concerned as shown in Fig. 14. The rod 34 carries cross piece 113 as described and is operated from a rod 36 through a connection 37. This rod 36 is moved vertically by a cam 55 on the main cam shaft 71. Rod 29 carries the cross piece 30 on which the cam faces 31 and 32 are mounted and this rod 29 is operated by a rod 25 which is moved vertically by a cam 26 on the main cam shaft 71. (See Figs. 2 and 3). The rod 34

is hollow and rod 40 is positioned for movement therein. Rod 40 is operated by a pin 51 (see Figs. 1 and 2) fixed in a cross connection 50 with the rod 29. The rod 34 has a slot 53 to allow the pin 51 to move vertically without affecting the rod 34. A short slot 52 in the rod 40 is for a purpose to be described.

Referring to Fig. 13 the folding arms and the cam faces 31 and 32 are normally above the position shown as also is the rod 40 to which the band retaining fingers 74 and 77 are attached. The operations of folding will now be specifically described. With the band in position as shown in Fig. 6 the cams 26 and 55 either cause or allow through the five rods mentioned the following operations: Cam faces 31 and 32 carried by rod 29 descend as do also the folding arms 104 and 105. As soon as the rollers 117 on the arms 115 leave the stationary cam face 118′ the springs on the studs 111 and 112 turn the rollers 116 on the arms 115 into engagement with said cam faces. The cam faces and the folding rod descend to the position shown in Fig. 13 where they stop. During this movement the rod 29 having been lowered the pin 51 no longer supports the rod 40 at the upper end of the slot 52 and said rod falls by gravity until the band retaining fingers 76 and 77 rest on the band as indicated. As the rod 34 falls (see Fig. 2) an arm 192 attached thereto falls and the loosely pivoted arm 191 turns and straightens the band square against the ends of the envelop pocket 5. There are preferably two of the arms 191 and they are adjusted by device 190 to stop at the desired point to square up different width bands. Slot 52 allows the pin 51 and rod 29 to move downwardly without moving the rod 40. Thus the band retaining fingers will always descend into the band retaining position no matter what the thickness of the bunch of envelops may be. From the structure described it is seen that the adjustment for the band retaining fingers is an automatic one. With the folding arms 105 and 104 located as shown in Fig. 13 the rod 29 begins to ascend due to its operating cam 26 while the folding arms remain stationary. By an examination of the cam face 31 in comparison with the cam face 32 it will be seen that as these cams are raised the folding arm 105 will fold in the band due to the spring 114 (Fig. 2) before the folding arm 104 operates as indicated in Fig. 9. This is due to the fact that the shoulder in the cam face 31 is raised above roll 116 before the corresponding shoulder on cam face 32 is raised above roller 115 of folding arm 104. As the cam faces continue to rise, folding arm 104 will fold the other end of the band as indicated in Fig. 9 almost as soon as the first end is folded in. The continued movement of the cam faces 31 and 32 upwardly will cause through the lower 45° cam surface (see Fig. 13) the folding arms 104 and 105 to spread apart as indicated in Fig. 10. After the folding arms have been spread apart the rod 34 due to its operating cam 55 on the main cam shaft begins to rise. The folding arms 104 and 105 and the cam faces 31 and 32 all return to the normal position including the band retaining members carried by the rod 40. The cycle of operations just traced is best seen from a consideration of Figs. 6 to 10 in connection with the more detailed showing in Figs. 1 to 13.

The specific means for operating the nipper arm 90 in order to carry a band from the pile of bands to the position shown in Fig. 6 will now be described.

Referring to Figs. 11 and 12 the pile of bands 92 of predetermined length is located in a frame work as E. The bottom of this frame work is gradually lifted as the bands are fed therefrom by a suitable rack and ratchet mechanism 170 operated from the main cam shaft 71. (See Fig. 3). The nipper arm 90 is mounted on a shaft 130 and is operated through a segment 118 which has the connection as shown with the cam 199 located on the main cam shaft 71. This segment meshes with a gear 122 pinned to the shaft 130. On this shaft is a loose sleeve 124 (see Fig. 12) to which is pinned the nipper arm 90. This nipper arm carries a bar 120 having a rack at each end thereof one turned 90° with respect to the other. One rack meshes with the gear 119 pinned to the shaft 130 and the other rack meshes with a gear 121 mounted on the nipper arm 90 and carrying the movable nipper finger 102. The flexible spring 103 attached to the arm 90 limits the movement, in one direction of finger 102. A friction device 125 tends to prevent the sleeve 124 from turning. As the segment 118 turns the shaft 130, the gear 119 in mesh with the rack on bar 120 will move said rack if possible but if said rack is moved to one of its limiting positions and can move no farther, then the turning of gear 119 will operate to turn the nipper arm 90 with the shaft 130 as well as the sleeve 124 which will operate in spite of the friction device 125. The nipper arm has the three positions shown in Fig. 11, the normal position being shown in full lines and the two limiting positions being shown in dotted lines. An adjustable device 123 is mounted on the frame work and has a hub fitting around the sleeve 124 with a lug to coöperate with corresponding lug fixed with the hub of the nipper arm 90. These lugs are shown dotted in Fig. 11. As the nipper arm 90 turns the lug on its hub, it will coöperate with the adjustable lug held by the device 123 whereby limiting positions for the nipper arm 90 is obtained as

is indicated in dotted lines in Fig. 11. With the nipper arm in full line position shown in said figure, a gum carrying finger 128 operates to pick up the top band or label of the pile 92 and lift it until the label occupies a position directly against the inclined face of the gum box 140 at which point the gum finger remains stationary. The arm 127 carrying this finger has its center located at the top of the bands so that as the top band is bent upwardly it swings on a true center and there is no tendency for the band to buckle or slip away from the gum finger. The movement of the arm 127 is obtained through a link connection to the cam 201 on the main cam shaft 71, arm 127 being pivoted at the point 202 which is on the level of the topmost band. The band is held in the raised position while the nipper arm 90 with the nipper fingers 101 and 102 as shown in Fig. 12 turns from the full line position shown to the lower dotted line position due to its cam and gear segment operating means. The screw 126 then holds the band against the inclined face of the gum box and the nipper arm 90 can no longer turn counter clockwise. The cam operating said arm then causes the segment to turn the gear 190 in a clockwise direction causing the racks on bar 120 to operate gear 121 until the nipper arm 102 closes with 101 holding the band back of the gum portion therebetween. When the rack can no longer move due to the fact that the fingers are pressing together the continued movement of the gear 119 in a clockwise direction will operate to turn the nipper arm to the upper dotted line position carrying the band therewith and laying it across the folding blades as indicated in Fig. 6. As the nipper arm takes its upper dotted line position it is limited by the lug arrangement previously described from turning further in a clockwise direction. The reverse movement of the gear 119 due to the cam and segment operating means will then cause the bar 120 to operate the gear 121 and open the nipper fingers again to the position shown in Fig. 12. The spring 103 will then stop the movement of the rack and the nipper arm 90 must then turn counter clockwise against friction 125. This spring structure is necessary because of the desired adjustability of the parts for when the stop 126 holds the band against the gum box the continued movement of gear 119 presses finger 102 against spring 103 without any breakage of parts. After the fingers have released the band it is left in the position shown in Fig. 7 and the nipper arm returns to the full line position shown in Fig. 11 and remains there while the gum finger 128 picks up another band. As soon as the nipper arm takes the lower dotted position the cam 201 causes the gum finger 128 to pull away from the band which is held by the limiting screw 126. The arm 127 then turns the gummed finger 128 in line with the rolls 130 and 129. The roll 130 rotates constantly in a gum box due to the belt connection 180 (see Fig. 3) having a scraper 203 as indicated so that the upper surface of the roll will have a constant supply of gum which it transfers to the roll 129. When the gum finger is in line with said roll the cam 117 operates to lift the roll 129 into position to transfer the proper supply of gum to the gum finger. The latter then is turned on its center 202 to the position shown in full lines in Fig. 11. The gum on the finger will cause a band in pile 92 to stick thereto and as the arm 127 is raised the band will travel with the arm. This gum is so placed on the end of the band that it is away from the edges thereof and there is no danger when the ends of the bands are stuck together that the gum will be squeezed over the edges.

The means for sticking the bands together and transferring the completed bunch of banded envelops from the banding position to the delivery position will now be described. Referring to Fig. 2 when the bunch of envelops has been placed between the folding fingers and has been jogged up as previously described at the front end by contact with the finger 6 carried by the carriage *y* and the nipper arm has carried the band for that bunch in position to be folded around it as described and then retired to the full line position as shown in Fig. 11 the link motion 1 and 2 previously described operates to lower the fingers 7 and 6 in a manner similar to the movement of finger *p* in the carriage *n*. Carriage *y* is then moved along to the right in Fig. 2 until it abuts the carriage *n* after which the fingers 7 and 6 are raised in a manner already described until the finger 7 is immediately back of the pile of envelops which is then being banded. Carriage *y* also carries the plate 10 to a position indicated in Fig. 8 to aid in the sticking together of the ends of the band. After the folding fingers fold the ends of the band around the bunch of envelops as indicated in Fig. 9 the fingers 7 and 6 are raised to a position in which the finger 7 is immediately back of the bunch of envelops then banded. At the same time the sticking finger 110 being raised with the fingers 6 and 7 operates to push the overlapping ends of the bands against the plate 10 as indicated in Fig. 10. Just about this time cam 82 (see Fig. 4) allows a spring or gravity to pull the plates 74, 75 and 79 from the intermediate dotted line position to the lower dotted line position or to the full line position shown in Fig. 10 so that the band will not stick on said plates as the bunch is trans-

ferred to the delivery section. As the folding arms have been spread apart as indicated in said figure the carriage y is then operated so that it moves to the left against its limiting stop t and the fingers 7 and 21 move the bunch of envelops just banded to the delivery section C and place the bunch on the plate 11. Meanwhile the finger p of of carriage n has moved and assembled the bunch from the assembling section to the banding section so that the finger 6 can jog up the front end of the bunch about to be banded in a manner already described. The carriage y then operates so that the fingers 7 and 6 and the sticking finger 110 are lowered into the position shown in Fig. 2 and the cycle of operations can be repeated.

In Fig. 9^a a modification of the means for sticking the overlapping bands together is shown. In this modification one overlapping end extends to the other end against one of the wrapping blades and as the wrapping plate folds the short end over against the underlying end the two are stuck together in the manner shown. In this modification the sticking finger 110 and the plate against which it presses is dispensed with.

With the banded bunch of envelops on the plate 11 a cam 150 (see Fig. 1) through the link motion 20 and 22 operates to place the bunch of envelops on the slide 23. This latter slide is inclined as shown and leads to a delivery table where the bunches of envelops are delivered in a row for as each bundle slides down the table 23, that table is reciprocated by the means shown in Fig. 1 comprising a carriage arm connection with the link 152 operated from the crank wheel 24 in an obvious manner.

Referring to Fig. 3 the power for the machine is supplied from shaft s which is connected to the main cam shaft 71 through a suitable speed changing gearing indicated generally by T. The cam shaft 71 can be turned by hand through the means indicated by R with the connection shown. Both from the drawings and descriptions thereof it can be seen that the apparatus is made adjustable throughout as to the size of envelops or cards to be banded, the size of the bands used and the thickness of the bunch desired. A most convenient means of obtaining the desired adjustability of parts has been set forth for it will be seen from Fig. 1 taken in connection with the other figures that all the parts which need adjustment for the width of envelops or cards have the adjustability provided at the right of said figure or toward the front of the machine while all those parts which need adjustment for the thickness of the bunches have a top, up and down adjustment of the vertically moving parts The different adjustments needed for the different lengths of envelops or cards are of course made lengthwise of the machine.

The means here shown and described in the specific form of the invention described for compressing an elastic bunch of envelops are necessary for that operation, but it is obvious that the peculiar form of construction also allows the banding of a non-elastic bunch of cards, only the parts necessary to the latter operation being necessary to both.

While applicant has necessarily described a specific form of his invention the latter in its broad conception is capable of many specific applications. The invention therefore is defined generically as well as specifically in the annexed claims.

What I claim is:—

1. An envelop banding machine comprising in combination, means to receive an assembled bunch of envelops, mechanism to compress said bunch to a predetermined thickness and devices operating to wrap a band around the compressed bunch.

2. An envelop banding machine comprising in combination means to receive an assembled bunch of envelops, mechanism to compress said bunch to a predetermined thickness corresponding to a predetermined length of band and devices operable to wrap a separate predetermined length of band around the compressed bunch.

3. A banding machine comprising in combination means to receive an assembled bunch together with mechanism for wrapping a band around the same and supporting means positioned at two or more corners of the bunch over which the band is wrapped whereby the bunch is not subject to the pressure of the wrapping operation, all constructed and arranged so that when the banded bunch leaves the receiving means the band will leave the supporting means.

4. An envelop banding machine comprising in combination means to group a number of envelops in an elastic bunch to be banded together with a compression device operable to bring the bunch to a predetermined thickness and mechanism operable to wrap a band around the bunch of predetermined thickness.

5. A banding machine comprising in combination a bunch receiving means, means having straight edges mounted to lie at one or more corners of a bunch therein, mechanism operable to fold a band around said straight edges and said bunch all for the purpose described.

6. A banding machine comprising in combination a bunch receiving means, means having straight edges mounted to lie at one or more corners of a bunch therein, mechanism operable to fold a band around said straight edges and said bunch together with a member in line with the overlapping ends of the band and means to press said overlapping ends thereagainst for the purpose described.

7. A banding machine comprising in combination a bunch receiving means, means having straight edges mounted to lie at one or more corners of a bunch therein, mechanism operable to fold a band around said straight edges and said bunch, said straight edges and folding mechanism being so constructed and arranged that when the band is folded around the straight edges it is sharply creased at the folding corners.

8. An envelop banding machine comprising in combination receiving means adapted to hold a loose elastic bunch of envelops, means having straight edges mounted to lie at two or more corners of such a bunch, means operable to compress a loose elastic bunch of envelops to a predetermined size for banding, means to hold a pile of separate bands, carrying mechanism operable to carry a band to position for wrapping around the compressed bunch, together with folding mechanism to fold the band around the bunch and said straight edges creasing the band sharply over said straight edges and bringing the overlapping ends of the band in position to be stuck together, all arranged so that the banded bunch can be taken from the receiving means and the band be stripped from said means having straight edges for the purpose described.

9. A banding machine comprising in combination a receiving means adapted to hold a loose elastic bunch of envelops, means having straight edges mounted to lie at two or more corners of such a bunch, means to hold a pile of separate bands, carrying mechanism to take a band from the top of the pile and lay it against said means having straight edges in position to be folded around the bunch, a band retaining means operable to hold the band against the means having straight edges for folding and mechanism to fold the band around the means having straight edges and the bunch and bring the ends thereof into overlapping position for the purpose described.

10. A banding machine comprising in combination a banding section adapted to receive a bunch, means to jog said bunch preparatory to banding, a support for a pile of separate bands, carrying mechanism operable to carry a band from the pile to a position for wrapping around said bunch, folding means operable to wrap the band around the bunch with the ends in overlapping relation all for the purpose described.

11. A banding machine comprising in combination an assembling section, a banding section, and a delivery section, means to transfer an assembled bunch of envelops from one section to another in a step by step operation, means to square up the assembled bunch as an incident to bending, means to hold a pile of separate bands, carrying means to transfer a band from the pile to a position to be wrapped around a bunch in the banding section, folding mechanism to fold the band around the bunch and bring the ends into overlapping relation, all for the purpose described.

12. A banding machine comprising in combination an envelop receiving pocket, means having straight edges to lie at two or more corners of a bunch of envelops in said pocket, means to hold a separate pile of bands, carrying means to transfer a band from said pile to a position to be wrapped around a bunch in the pocket together with folding means operable to fold said band around the bunch and the straight edges whereby the band is sharply creased and the ends of the band are brought in overlapping relation for the purpose described.

13. An envelop banding machine comprising in combination supporting means for a bunch of envelops, mechanism to compress for banding a bunch on said supporting means, means having straight edges mounted to lie at two or more corners of said bunch, mechanism to wrap a band around the bunch and said straight edges to bring the ends in overlapping relation whereby the band is bent around the straight edges and the bunch does not bear all the pressure of the banding operation.

14. An envelop banding machine comprising in combination means for receiving a bunch, means having straight edges to lie at two corners of a bunch in the receiving means together with a carrying device to carry a band to a position suitable for folding around the bunch and folding mechanism operable to fold a band around the means having straight edges and the bunch bringing the ends of the band in overlapping relation and a device to move the means having straight edges to compress the bunch within the band whereby the removal of the bunch from the receiving means will not cause the band to bind on the means having straight edges.

15. An envelop banding machine comprising in combination an envelop containing pocket adjustable to different width envelops, jogging devices therein to straighten up the front and rear ends of a bunch of envelops adjustable to different length envelops, means associated with said pocket to assemble a bunch of envelops of predetermined number, other means associated therewith to move the assembled bunch to a banding position, mechanism to compress the bunch to a predetermined thickness, together with means for folding a band around the compressed bunch and fastening the overlapping ends thereof.

16. A banding machine comprising in combination means to hold a bunch in position to be banded, holding means for a pile of separate bands together with carrying de-

vices to carry a band from said pile to position to be folded around the bunch comprising an arm mounted to swing from a center located at the top of the pile of bands, means to move said arm to position to receive a substance to aid the overlapping ends of the band in sticking, then to a position in contact with the topmost band whereby said substance is transferred thereto and then to a position above the pile whereby the topmost band will be turned up on a true center with the arm and means to take the band thus separated to position for banding.

17. An envelop banding machine comprising in combination a device to receive a bunch to be banded, together with means to compress the bunch to a predetermined thickness and mechanism to carry a band around the bunch while in the bunch receiving device.

18. An envelop banding machine comprising in combination a device to receive a bunch to be banded, together with means to compress the bunch to a predetermined thickness, means to hold a pile of separate bands and mechanism operable to take a band from said pile and wrap it around the bunch while in the bunch receiving device, the bunch being held so compressed during the banding process.

19. A banding machine comprising in combination a device to receive a bunch to be banded, means to carry a band to position for folding around the bunch, a separate band retainer to hold the band in said position and mechanism operable to fold the band around the bunch and means to jog the bunch.

20. An envelop banding machine comprising in combination a device to receive a bunch to be banded, means to compress said bunch to a predetermined size, means operable to carry a band to position for folding around the bunch, a separate band retainer to hold the band in said position and mechanism operable to fold the band around the bunch, the bunch being held so compressed during the banding process.

21. A banding machine comprising in combination a device to receive a bunch to be banded, means to hold a pile of separate bands, a device operable to carry a band from said pile to a position for folding around a bunch, a separate band retainer to hold the band in that position together with mechanism operable to fold the band around the bunch and means to jog the bunch.

22. A banding machine comprising in combination a device to receive a bunch to be banded, means to hold a pile of separate bands, a device operable to carry a band from said pile to a position for folding around a bunch, a band retainer to hold the band in said position together with mechanism to fold the band around the bunch so that the ends overlap and means operable to press said overlapping ends together to fasten the same.

23. A banding machine comprising in combination a device to receive a bunch, means to hold a pile of separate bands, a device operable to carry a band from said pile to position to be wrapped around the bunch, folding devices operable to fold the band around the bunch with the ends overlapping and means operable to press the overlapping ends together to fasten the same.

24. A banding machine comprising in combination a device to receive a bunch, means to hold a pile of separate bands, a device operable to carry a band from said pile to position to be wrapped around the bunch, wrapping means having straight edges mounted to lie at one or more corners of the bunch together with mechanism operable to fold the band around the said blades as well as the bunch.

25. A banding machine comprising in combination a device to receive a bunch, means having straight edges mounted to lie at one or more corners of a bunch in said device and adapted to grasp the entire bunch therebetween together with mechanism operable to wrap a band around said blades and bunch.

26. A banding machine comprising in combination a device to receive a bunch, blades mounted to lie at one or more corners of a bunch in said device and adapted to grasp the entire bunch therebetween having sharp edges corresponding to the creasing corners of the bunch together with mechanism operable to fold a band around the bunch and crease one or more corners on said blades in the folding operation.

27. A banding machine comprising in combination a device to receive a bunch, means operable to feed a band in position to lie across one face of the bunch in position to be folded around the other three faces together with folding devices and means operable to move the latter to fold the band first against two faces of the bunch and then against the remaining face so that the ends of the band overlap against that face.

28. A banding machine comprising in combination a device to receive a bunch, means operable to feed a band in position to lie across one face of the bunch in position to be folded around the other three faces, a band retaining device to hold the band in that position, together with folding devices and means operable to move the latter to fold the band first against the two faces of the bunch and then against the remaining face so that the ends of the band overlap against that face.

29. A banding machine comprising in combination a device to receive a bunch, means having straight edges mounted to lie at one or more edges of a bunch held by said device and parallel with said edges, means operable to feed a band in position to lie across one face of the bunch and across said straight edged means in position to be folded around said straight edged means and the other three faces, a band retaining device to hold the band in that position together with folding devices operable to fold the band against the said straight edged means and the other three faces of the bunch with the ends in overlapping relation.

30. A banding machine comprising in combination a device to receive a bunch, means having straight edges mounted to lie at one or more edges of a bunch held by said device and parallel with said edges, means operable to feed a band in position to lie across one face of the bunch and across said straight edged means in position to be folded around the straight edged means and the other three faces, a band retaining device to hold the band in that position together with folding devices operable to fold the band against the straight edged means and the other three faces of the bunch with the ends in overlapping relation, and means operable to press the overlapping ends of the band together to fasten the same.

31. A banding machine comprising in combination a device to receive a bunch, means operable to feed a band in position to lie across one face of the bunch in position to be folded around the other three faces, together with folding devices operable to fold the band first against two faces of the bunch and then against the remaining face so that the ends of the band overlap against that face and means operable to press the overlapping ends of the band together to fasten the same.

32. A banding machine comprising in combination a device to receive a bunch, means operable to feed a band in position to lie across one face of the bunch in position to be folded around the other three faces, together with folding devices operable to fold the band first against two faces of the bunch and then against the remaining face so that the ends of the band overlap against that face, a blade mounted to lie between the bunch and the overlapped ends of the band, and means operable to press the overlapping ends of the band together against said last mentioned blade to fasten the same.

33. A machine of the class described comprising in combination two or more blades the outside edges of which represent the edges of a bunch to be banded, means operable to fold a band around the outside edges of said blades and bring the ends in overlapping relation, all constructed and arranged so that the bands can be formed independent of the bunches to be banded.

34. A machine of the class described comprising in combination two or more blades representing the edges of a bunch to be banded, means operable to feed a band in position across two of said edges, a band retaining device to hold the band in that position together with folding devices operable to fold the band around the edges of said blades and bring the ends in overlapping relation.

35. A machine of the class described comprising in combination two or more blades representing the edges of a bunch to be banded, means operable to feed a band in position across two of said edges, a band retaining device to hold the band in that position together with folding devices operable to fold the band around the edges of said blades and bring the ends in overlapping relation and mechanism operable to press the overlapping ends of the band together to fasten the same.

FRANK B. POWERS.

Witnesses:

FRANKLIN G. NEAL,

K. I. CLEMONS.

Correction in Letters Patent No. 1,261,612.

It is hereby certified that in Letters Patent No. 1,261,612, granted April 2, 1918, upon the application of Frank B. Powers, of Springfield, Massachusetts, for an improvement in "Banding Apparatus for Envelops," an error appears in the printed specification requiring correction as follows: Page 8, line 63, claim 11. for the word "bending" read *banding;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of April, A. D., 1918.

[SEAL.]

F. W. H. CLAY,

Acting Commissioner of Patents

Cl. 93—93