A. WINKLER AND M. DÜNNEBIER.

ENVELOP ROLLER FOLDING MACHINE IN COMBINATION WITH A CLOSING FLAP GUMMING MACHINE.

APPLICATION FILED NOV. 20, 1919.

1,396,906. Patented Nov. 15, 1921.

3 SHEETS—SHEET 1.

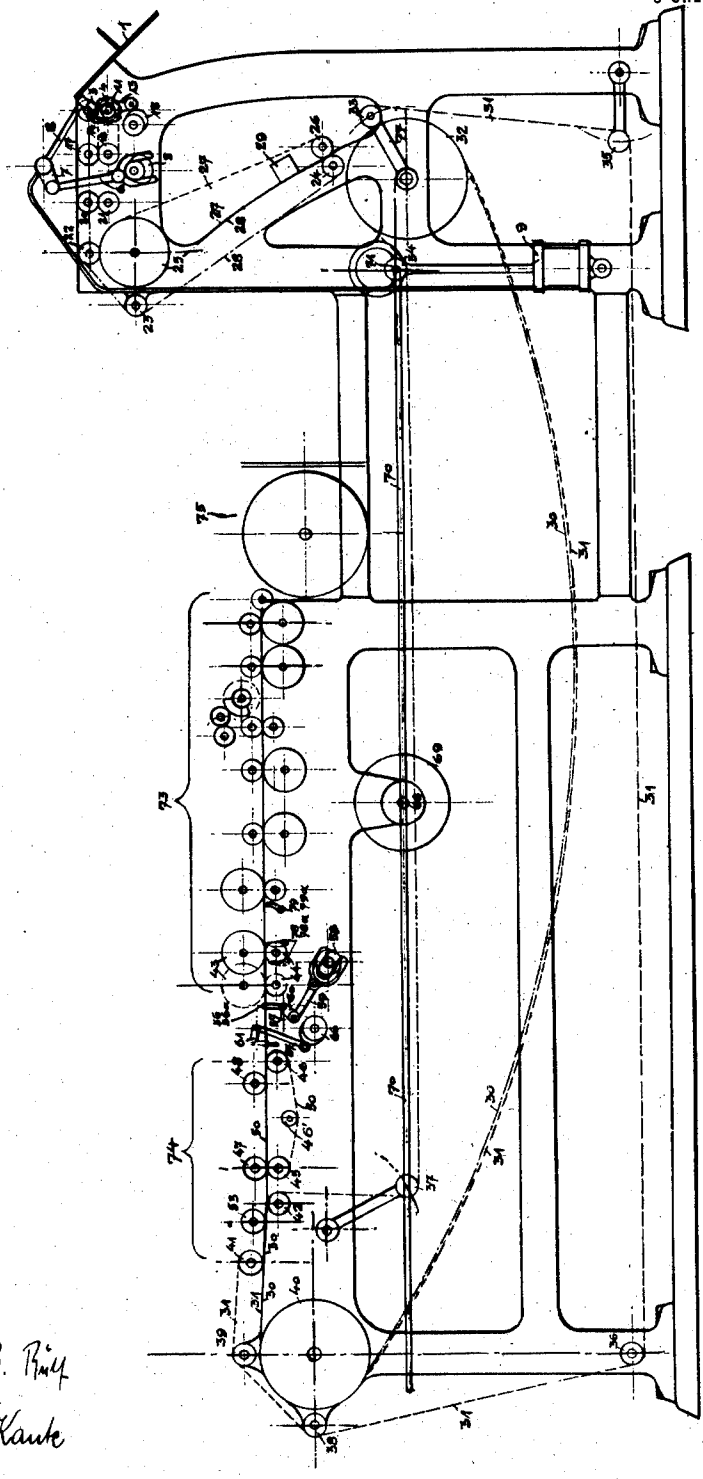


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.ª

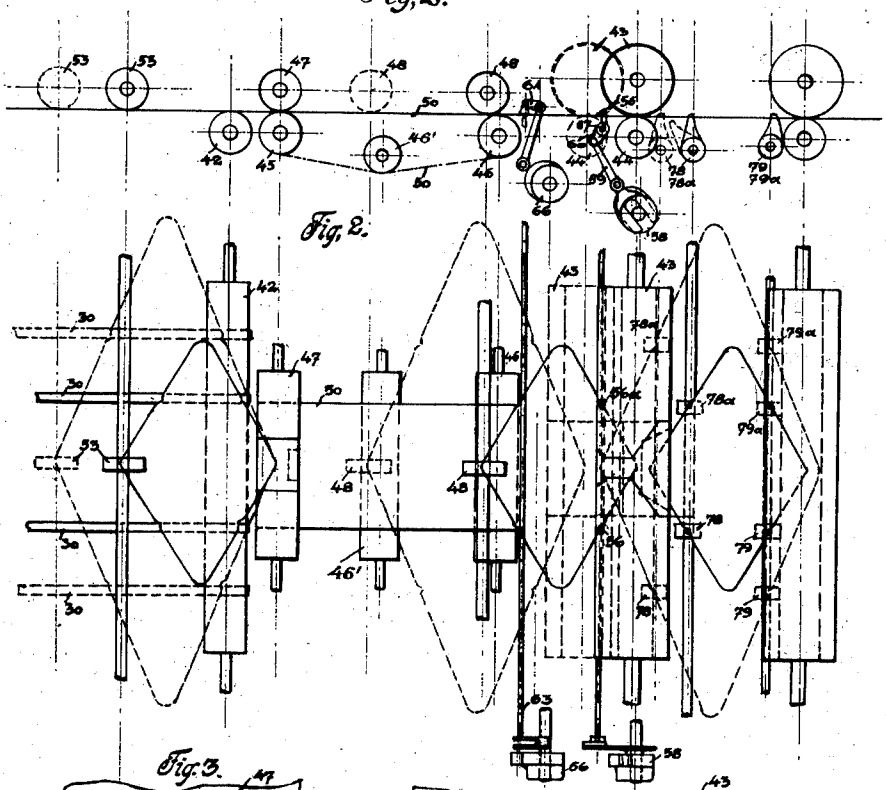
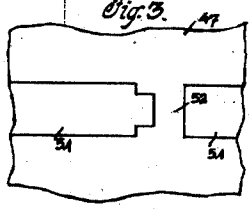


Fig. 2.

Fig. 3.



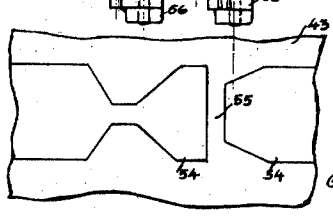


Fig. 4.

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3 SHEETS—SHEET 3.

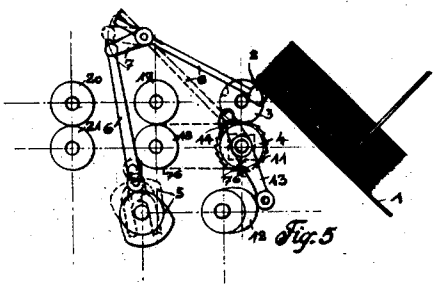


Fig. 5

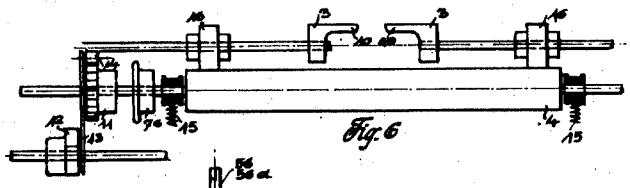


Fig. 6

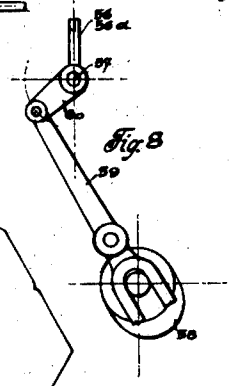


Fig. 8

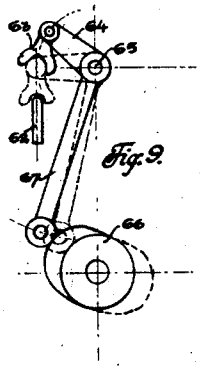


Fig. 9.

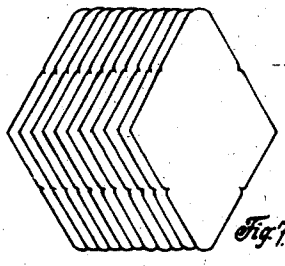


Fig. 7

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UNITED STATES PATENT OFFICE.

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ENVELOP ROLLER FOLDING-MACHINE, IN COMBINATION WITH A CLOSING-FLAP-GUMMING MACHINE.

1,396,906. Specification of Letters Patent. Patented Nov. 15, 1921.

Application filed November 20, 1919. Serial No. 339,529.

To all whom it may concern:

Be it known that we, ALFRED WINKLER and MAX DÜNNEBIER, citizens of Germany, residing at Neuwied, in the county of Rheinland and State of Germany, have invented certain new and useful Improvements in an Envelop Roller Folding-Machine, in Combination with a Closing-Flap-Gumming Machine, of which the following is a specification.

This invention relates to improvements in machines for manufacturing envelops, the principal object of the invention being to provide, in combination with a roller folding machine, an improved gumming apparatus, the output of which is equal to that of the roller machine, whereby the high efficiency of the latter machine can be made use of in such combined machine.

A further object of the invention is to provide a machine of the character set forth having an improved feeding mechanism by means of which it is unnecessary to interrupt the operation of the machine for supplying new sheets thereto, and in which the sheets are so fed that a uniform breadth of gumming is assured.

A further object of the invention is the provision, in combination with a machine of this character, of an improved gum-breaking device by means of which the rolling of the gummed edges of the envelop is prevented.

A further object of the invention is to generally improve the combined machine in such manner that intensive drying is made possible without the inherent disadvantages that have heretofore attended the employment of such a drying system.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention consists in the novel features of construction and combination of parts which will be more fully described hereinafter and particularly pointed out in the claims.

In the drawings, accompanying and forming part of the specification,

Figure 1 illustrates diagrammatically in side elevation, a combined folding and gumming machine constructed in accordance with the present invention, the gumming in this instance being done before the folding;

Fig. 2 is a plan view of the equalizing station from the drying belt to the folding apparatus;

Fig. 2ª is a side elevation of the apparatus shown in Fig. 2;

Fig. 3 illustrates a development of one of the special cylinders employed between the drying belt and the folding apparatus;

Fig. 4 illustrates a development of one of the cylinders of the folding apparatus;

Fig. 5 illustrates the feeding mechanism in side elevation, the dotted lines illustrating one extreme position of the "sucker," while the full lines indicate the opposite extreme position;

Fig. 6 is a side elevation of the feeding rolls;

Fig. 7 is a perspective view illustrating the manner of stacking the blanks for feeding into the machine;

Fig. 8 is an enlarged side elevation of the "gatekeeper" employed in the present invention to control the passage of the envelops to the folding mechanism;

Fig. 9 is an enlarged detail side elevation of the gum-breaking device.

The same characters of reference designate the same parts in the different figures of the drawings.

Referring to the drawings, 1 designates an inclined table or frame on which are placed the blanks to be gummed and folded, said frame being adjustable for different sizes of envelops, the blanks being placed thereon in the position shown in Fig. 5, so that the point of the closing flap of the undermost sheet or blank 2 will be within reach of the first pair of cylinders 3 and 4. In order to insure the feeding of the blanks from the bottom of the pile, we employ a "sucker" 8, which is pivotally mounted on the machine and secured to a crank 7, the sucker being in communication with a suitable air pump 9. For operating the sucker to bring the blank into contact with the rollers 3 and 4, a connecting rod 6 is pivoted to the crank 7 and is provided at its lower end with a roller adapted to contact with the edge of a cam disk 5 mounted on a shaft supported for rotation in bearings carried by the machine, and which shaft may be driven by any suitable mechanism, not shown. The lower end of the connecting rod 6 is bifurcated, as shown in Figs. 1 and 5, so as to straddle the shaft carrying

the cam disk and thereby retain the roller in contact with the cam disk.

The lower cylinder 4 is of the usual construction, but, in order to permit the sucker 8 to swing into contact with the lower blank of the pile and pull such blank down to the surface of the cylinder 4, the coöperating cylinder 3 is of special construction, as shown clearly in Fig. 6. In other words, the cylinder 3 is separated at the center of its length in order to provide a space for the passage of the sucker 8 in its swinging movements. This cylinder is formed of a pair of shafts mounted in the side walls of the machine frame and which shafts are provided at their opposed ends with a pair of segmentlike members 10, whereby during a complete rotation of the cylinder 4, the blank between it and the cylinder 3 is moved only as long as the surface of the segmentlike members 10 are in contact with the cylinder 4. The cylinder 3 is adapted for continuous rotation, while the cylinder 4 rotates only periodically, at the times when the segments 10 of the cylinder are in contact therewith. This movement of the cylinder 4 is accomplished by means of a lever 13 pivoted on the shaft of the cylinder 4 and carrying at one end a pawl adapted to engage a ratchet wheel 11 secured to said shaft, the opposite end of the lever 13 being provided with a roller adapted for operation by a cam disk 12 secured to a shaft the rotation of which is timed so as to cause the pawl to engage the ratchet wheel 11 and rotate the cylinder 4 when the members 10 are in engagement with said cylinder. The bearings of the cylinder 4 are supported by a pair of compression springs 15 in order to maintain the cylinder 4 in contact with a pair of rollers 16 loosely mounted on the shafts forming the cylinder 3, while at the same time permitting the roller 4 to move away from the roller 3 sufficiently to accommodate different thicknesses of blanks. The rollers 16 thus maintain the cylinder 4 always in parallel relation to the cylinder 3, and at the same time prevent lateral displacement of the blanks before the segments 10 of the cylinder 3 come into contact with said blanks.

From the foregoing it will be seen that, when the blanks are placed on the table 1 in the manner shown in Fig. 5 and the feeding mechanism set in motion, the sucker 8 engages the lower surface of the lowermost blank and is then swung so as to pass between the members 10 of the cylinder 3 and carry the blank into contact with the surface of the cylinder 4, whereupon the members 10 of the cylinder 3 contact with the upper surface of the blank and carry said blank along between them and the cylinder 4 until the members 10 pass out of engagement therewith, the length of the periphery of the segments 10 being such as to carry the blank along the proper distance for which the envelop is to be gummed. At this time the sucker has returned to the bottom of the pile and taken along with it the second blank, which is then caught between the members 10 and the upper surface of the first blank, said first blank being in advance of the second blank the length of the periphery of the members 10. It will thus be seen that each successive blank is carried into the machine at the proper distance from the edge of its predecessor to leave sufficient space for gumming.

Back of the cylinders 3 and 4, and in parallelism therewith, are a second pair of cylinders 17 and 18, (see Figs. 1 and 5). The cylinder 18 is rotated from the cylinder 4 by means of a pair of pulleys 76, one on the shaft of the cylinder 4 and the other on the shaft of the cylinder 18, these pulleys being connected by means of a belt, shown in dotted lines in the drawing, whereby the pair of cylinders 17 and 18 make the same periodical motions as the cylinder 4. The cylinders 17 and 18 are spaced a sufficient distance from the cylinders 3 and 4 so that the corner of the blank will be caught between the cylinders 17 and 18 before the rear corner leaves the cylinders 3 and 4, whereby the blank will be passed between these cylinders in a continuous band.

For carrying forward the band of paper formed by the blanks as they pass through the cylinders 3, 4 and 17—18, a third pair of parallel cylinders 20 and 21 is provided, this pair of cylinders being adapted to rotate continuously and being driven by any suitable mechanism (not shown). The speed of rotation of the cylinders 20 and 21 is such that it harmonizes with the speed of rotation of the cylinders 3, 4, 17 and 18 to carry the band of paper formed by the blanks which are intermittently fed to the cylinders 20 and 21 by the cylinders 17 and 18. If the cylinders 3 and 4 were arranged to deliver the band to a continuously rotating pair of cylinders, the "bellying" which takes place after every periodical advance of the band by the cylinders 3 and 4 would spring back because of the fact that the cylinder 3 is not continuously in contact with the cylinder 4 and therefore cannot hold the intermittently advanced paper band. For this reason the second pair of cylinders 17 and 18 is provided, which pair of cylinders also rotates periodically, but being constantly in contact with each other the bellying referred to is held, whereby the paper band is delivered to the continuously rotating cylinders 20 and 21.

After passing between the cylinders 20 and 21, the paper is led in a manner well known, to the gumming device. In Fig. 1 I have indicated in dotted lines the belts which

receive the blanks from the cylinders 20 and 21 and convey them to the gumming device. As shown in said figure, the belt 27 passes around a large pulley 25 at one end and around a smaller pulley 26 at the other end. The belt 28 passes over the pulley 22 and under the same in contact with that portion of the belt 27 that passes to the left of the roller 25 as shown in Fig. 1, and thence downward in contact with said belt 27, around the pulley 24 and over the pulley 23, back to the pulley 22. The reference character 29 designates the gumming device in a general way. It will, of course, be understood that the speed of travel of the gumming belts 27 and 28 is exactly the same as that of the cylinders 20 and 21.

After having been gummed, the blanks are delivered by the gumming belts 27 and 28 to the drying belts 30 and 31. The belt 30 passes around the large pulley or roller 32 and extends to the other end of the machine and passes up and over the large roller 40, thence under the roller 41, over the roller 42, thence downward under the roller 37, returning to the opposite end of the machine under the roller 34 and over the roller 32. The belt 31 passes over the roller 33 and under the roller 32 and along with the belt 30 to the opposite end of the machine, over the roller 40, around the roller 41, over the rollers 39 and 38, thence downward and under the roller 36, back to the opposite end of the machine, around the roller 35, and upward over the roller 33. It will thus be seen that the belts 30 and 31 receive the blanks after the latter have been gummed and carry them along to the opposite end of the machine to be delivered to the folding mechanism. In order that the drying belts may be adjusted to suit different lengths of blanks, the roller 33 is carried by a bracket or lever 77, which is adapted to be swung toward and away from the roller 26 carrying the gumming belt 27. Any suitable means for drying the closing flaps may be employed to act on the blanks as they are carried along between the belts 30 and 31, such as hot air, steam, gas, etc., so that, when the blanks leave the drying belts at the roller 41, they are in perfectly dry condition.

It will be understood that the blanks are maintained throughout their travel and up to the time of delivery at the roller 41, with the closing flap of each successive blank a short distance back of the preceding one. The folding mechanism, however, must operate on one blank at a time, and hence means must be provided to entirely separate the blanks before they are delivered to the folding mechanism. For this purpose, I have provided between the last roller 42 of the drying belt 30 and the first pair of cylinders 43 and 44 of the folding mechanism, a special separating mechanism. This mechanism comprises an endless belt 50 which travels over the rollers 45, 46 and 46′, and which belt is adapted to travel at a greater speed than the speed of the first pair of cylinders 43 and 44 of the folding mechanism. Above the belt roller 45, and adapted to coöperate therewith for receiving the blanks from the drying mechanism, is a roller or cylinder 47 of special construction. A development of this roller is illustrated in Fig. 3, from which it will be seen that the roller is provided centrally thereof with a circumferentially extending recess 51, this recess extending for about seven-eighths of the circumference of the roller, leaving a portion or rib 52 between the ends of the recess for catching the projecting end of the first blank that is delivered from the drying belts, between said rib 52 and the belt 50. It will thus be seen that only the projecting corner of the blanks will be gripped between the roller 47 and the belt 50 and that should such corner of the blank arrive too soon, it merely rests in the recess 51 of the roller 47 until the rib 52 rotates to the position where it engages the blank between it and the belt 50. The width of the recess 51 is such that, after the blank has been gripped between the belt 50 and the rib 52 of the roller 47 and pulled forward so as to be detached from the next preceding blank, the portion of the roller 47 at each side of the recess also grips such blank and carries it forward on the belt 50. In order to permit the detachment of the lowermost blank from the succeeding blank when said lowermost blank is gripped between the rib 52 of the roller 47 and the belt 50, means must be provided for holding the succeeding blank against the pull exerted on the lowermost blank, while leaving said lowermost blank free to be detached. For this purpose we have provided an intermediate roller 53 between the last roller 41 of the belt 31 and the cylinder 47. This roller 53, as will be apparent from an inspection of Fig. 1, is placed a short distance back of the roller 42 over which the belt 30 passes. By this arrangement the roller 53 coöperates with the belt 30 for retaining all of the blanks except the lowermost one, which, of course, is in advance of the next successive one a distance equal to its gummed flap, and which distance is sufficient to free it from the roller 53 and the belt 30 while its forward end is gripped between the rib 52 of the cylinder 47 and the belt 50. This intermediate roller 53, in order to provide for different sizes of blanks, may be adjustable along the belt 30, as indicated in dotted lines in Fig. 2ª, so that for any size of blank as soon as the lowermost blank is gripped between the cylinder 47 and the belt 50, the rear portion of said blank has passed free of the roller 53.

In Fig. 1 the folding mechanism is brack-

eted together and designated by the reference character 73, while the mechanism above described for delivering the blanks from the drying belts to the folding mechanism is designated 74. The folding mechanism *per se* forms no part of this invention, and it is therefore illustrated only in a general way as comprising a plurality of cylinders or rollers. This mechanism is well understood, and it is not necessary that the same be described herein.

In order that the blanks may be delivered to the folding mechanism in proper sequence, we have provided a pair of cylinders 43 and 44, which, like the cylinder 53, are adjustable longitudinally of the machine in order to accommodate different sizes of blanks, these cylinders being shown in Figs. 1, and 2^a in full lines in one position, and in dotted lines in another adjusted position. By reason of this adjustability, blanks of different sizes may pass between the rollers 43 and 44 and be released therefrom before being engaged by the directing fingers 78, 78^a, 79 and 79^a of the folding mechanism for guiding the blanks into the proper position to be folded. In other words, the larger the blank to be folded, the further to the left, as shown in Fig. 1, the pair of cylinders 43 and 44 must be adjusted. A roller 48 is also adjustably carried between the cylinder 47 and the pair of cylinders 43 and 44, for coöperation with the belt 50 for delivering the blanks to the folding mechanism. This adjustment of the roller 48 is necessary, because the blank must be released by this roller as soon as it is gripped between the cylinders 43 and 44, and therefore, for operating upon blanks of different sizes, the distance between the roller 48 and the pair of cylinders 43 and 44 must be capable of adjustment. In Fig. 2^a the roller is shown in two positions by full and dotted lines respectively.

In order that the blanks be carried into the folding mechanism singly, we have provided on the periphery of the cylinder 43 a recess 54 similar to that formed on the cylinder 47, this recess extending almost around the entire circumference of the roller 43, leaving a rib 55 between the ends of the recess, which rib coöperates with the cylinder 44 for feeding the blanks into the folding mechanism. A development of the surface of the cylinder 43 is clearly shown in Fig. 4. The circumference of the roller 43 should be of such a length that, with one rotation of the cylinder, the largest size of blank is completely carried through between the cylinders 43 and 44, while, when working on smaller sizes, only a portion of the periphery of the cylinder 43 comes into contact with the blanks. In other words, when a large size of blank is being operated on, the blank is engaged by the entire width of the cylinder, and in order to insure that smaller blanks will be carried through between the cylinders 43 and 44, the recess 54 in the cylinder is tapered to a narrow neck, as shown in Fig. 4, so that, even though the rib 55 may fail to grip the blank, the portions at the sides of the tapered part of the recess will do so. The recess 54 in the cylinder 43 has the further purpose that the point of the flap of the blank is permitted to bend or curl into the recess before it is gripped by the rib 55, and thus permit said rib to get a good grip on the blank.

In order to prevent the blanks from being fed too fast to the folding mechanism, we have provided what may be termed a "gate-keeper", which comprises a rock shaft 57, on which are secured a pair of fingers 56 and 56^a (see Figs. 2 and 8). The shaft 57 has a crank arm 60 secured thereto, to which is pivoted a connecting rod 59 having a bifurcated lower end adapted to straddle the pivot of a cam disk 58, which cam disk causes reciprocation of the connecting rod 59 through the medium of a roller carried by said rod in engagement with the periphery of the cam disk, as shown clearly in Fig. 8. It will thus be seen that, when the shaft 57 is rocked so as to bring the fingers 56 and 56^a into vertical position, as shown in Fig. 2^a, the blanks are held back and prevented from passing between the cylinders 43 and 44 until the rib 55 of the cylinder 43 grips the blank, the timing of the rotation of the cam 58 and the cylinder 43 being such that, as soon as the rib 55 has engaged a blank, the shaft 57 is rocked so as to carry the fingers 56 and 56^a to a horizontal position and thus permit the blank to pass entirely from the cylinders 43 and 44, whereby a blank arriving on the belt 50 in front of the cylinders 43 and 44 before the rib 55 is in position to engage the same, is retained until the rib arrives at the proper point. In this manner, any disarrangement of the blanks during their passage through the drying way is compensated for before the blanks are carried into the folding mechanism. The shaft 57 carrying the fingers 56 and 56^a is, of course, adjustable with the cylinders 43 and 44. It will be understood, of course, that the recess forming the rib 55 could be in the lower cylinder 44, with the same effect.

The gummed flaps of the blanks always have a tendency to curl after being dried, and for this reason it has been customary to remove such curl by hand before feeding the blanks to the folding machine, and which hand work was very expensive. For this reason, we have provided in the present instance, a gum-breaking device which removes the curl before the blanks pass from the drying way to the folding mechanism. This device comprises a member 62 support-

ed transversely of the machine and having a rounded upper edge extending in parallel relation with the cylinders so that the rounded edge thereof lies in close contact with the under surface of the blanks as they pass between the roller 48 and the belt 50. For cooperation with this member, a second member 63 is provided (see Fig. 9), and which latter member is provided with a bifurcated portion adapted to fit over the rounded edge of the member 62. The member 63 is secured at the end thereof to a lever 64, which is fixed on a rock shaft 65, to which is secured a lever 67 having at its lower end a roller in contact with the periphery of a cam disk 66, whereby the shaft is rocked so as to bring the member 63 into and out of contact with the upper surface of the blank as it passes over the member 62, it being understood that the movements of the rock shaft 65 are so timed that it descends toward the member 62 every time a gummed flap is passing over the latter member, whereby the flap is curled in the opposite direction, thus breaking the gum and causing the flap to enter the folding machine in straight condition. If desired, the coacting surfaces of the members 62 and 63 might be provided with thin rollers for preventing any resistance to the passage of the blanks therebetween.

The driving of the different cylinders may be accomplished in any suitable manner, provided that the proper relative speeds of rotation be maintained to accomplish the desired purpose. We have indicated in Fig. 1, a driving pulley 69 secured to a main driving shaft 68. A shaft 70 may be mounted in bearings in the frame of the machine and driven by suitable gearing from the shaft 68. A third shaft 71 is indicated in Fig. 1 extending transversely of the machine at one end thereof, and which shaft may be driven by suitable gearing from the shaft 70, and which shaft 71 may be provided with suitable pulleys for operating the cylinders of the feeding mechanism, while the shaft 70 may be provided at its opposite end with suitable gearing for driving the belt drum 40. By providing the shafts with gearing of proper ratio, the feeding apparatus, as well as the carrying belts, may be made to rotate at the proper speed relative to the folding apparatus so that the blanks are delivered to the latter as fast as they can be folded.

From the foregoing it will be observed that we have provided a machine in which the high efficiency of a roller machine is combined with that of a crossout machine, which combination, so far as we are aware, has heretofore been found impracticable, and for that reason all of the roller machines with which we are familiar have been supplied with blanks that have previously been gummed in a separate machine. Moreover, in the machine herein described, the blanks are fed from the bottom of the pile, which results in a tremendous economical advantage, because when they are fed from the top of the pile, as heretofore, the machine must be stopped while a new pile of blanks is being placed in position to be fed.

Having thus described our invention, what we claim is:

1. In a machine of the class described, the combination of a roller folding mechanism, a crossout gumming mechanism, a drying way between said mechanisms, means for feeding blanks to said gumming mechanism in step-by-step sequence, means for feeding blanks to said folding mechanism individually, a gum-breaking device between said drying way and said folding mechanism, and means for operating all of said mechanisms at predetermined relative speeds.

2. In a machine of the class described, the combination of a folding mechanism, a gumming mechanism, means for feeding blanks first to said gumming mechanism in overlapping relation, a drying chamber, means for conveying said blanks from said gumming mechanism through said chamber, means for separating the blanks after their passage through the drying chamber and delivering them individually to the folding mechanism, and means between said delivering means and folding mechanism for restraining successive blanks while a blank is entering the folding mechanism.

3. In a machine of the class described, the combination of a folding mechanism, a gumming mechanism, means for feeding blanks first to said gumming mechanism in overlapping relation, a drying chamber, means for conveying said blanks from said gumming mechanism through said chamber, means for separating the blanks after their passage through the drying chamber and delivering them individually to the folding mechanism, said folding mechanism having a pair of rolls adapted to grip said blanks only during a portion of the rotation of the rolls, and means between said delivering means and said rolls for restraining successive blanks while a blank is passing between the rolls.

4. In a machine of the class described, the combination of a folding mechanism, a gumming mechanism, means for feeding blanks first to said gumming mechanism in overlapping relation, a drying chamber, means for conveying said blanks from said gumming mechanism through said chamber, means for separating the blanks after their passage through the drying chamber and delivering them individually to the folding mechanism, said folding mechanism having a pair of rolls adapted to grip said blanks only during a portion of the rotation of the

rolls, and means between said delivering means and said rolls for restraining successive blanks while a blank is passing between the rolls, and comprising a rockable member having fingers adapted to move into the path of the blanks.

5. In a machine of the class described, the combination of a folding mechanism, a gumming mechanism, means for feeding blanks first to said gumming mechanism in overlapping relation, a drying chamber, means for conveying said blanks from said gumming mechanism through said chamber, means for separating the blanks after their passage through the drying chamber and delivering them individually to the folding mechanism, said folding mechanism having a pair of rolls adapted to grip said blanks only during a portion of the rotation of the rolls, a rockable member having fingers adapted to move into the path of the blanks, and means for rocking said member in synchronism with the rotation of said rolls.

6. In a machine of the class described, the combination of a folding mechanism, a gumming mechanism, means between said folding and gumming mechanisms for breaking the gum, and means for operating said folding and gumming mechanisms and breaking means in predetermined relative sequence.

7. In a machine of the class described, the combination of a folding mechanism, a gumming mechanism, means between said folding and gumming mechanisms for breaking the gum, said means including a stationary member having a rounded edge and a movable member adapted to overlie said rounded edge, and means for operating said folding and gumming mechanisms and gum-breaking means in predetermined relative sequence.

In testimony whereof, we have signed our names to this specification in the presence of two subscribing witnesses.

ALFRED WINKLER.
MAX DÜNNEBIER.

Witnesses:
DR. B. RÜLF,
A. KANTE.