

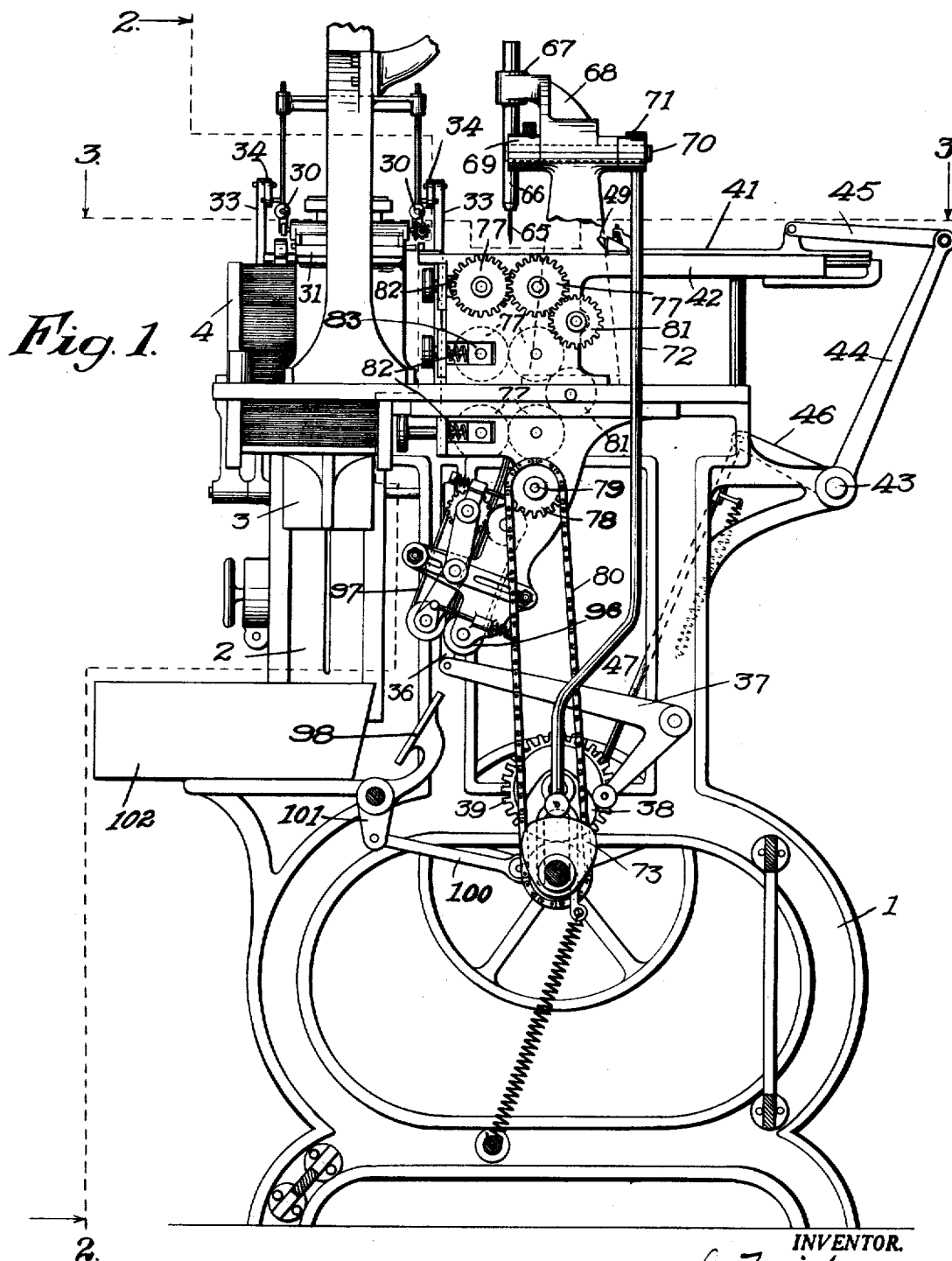
Feb. 6, 1923.

1,444,004

A. NOVICK.
MACHINE FOR MAKING PAPER DRINKING CUPS, ENVELOPES, AND THE LIKE.

FILED MAR. 31, 1921.

7 SHEETS-SHEET 1



INVENTOR.

BY

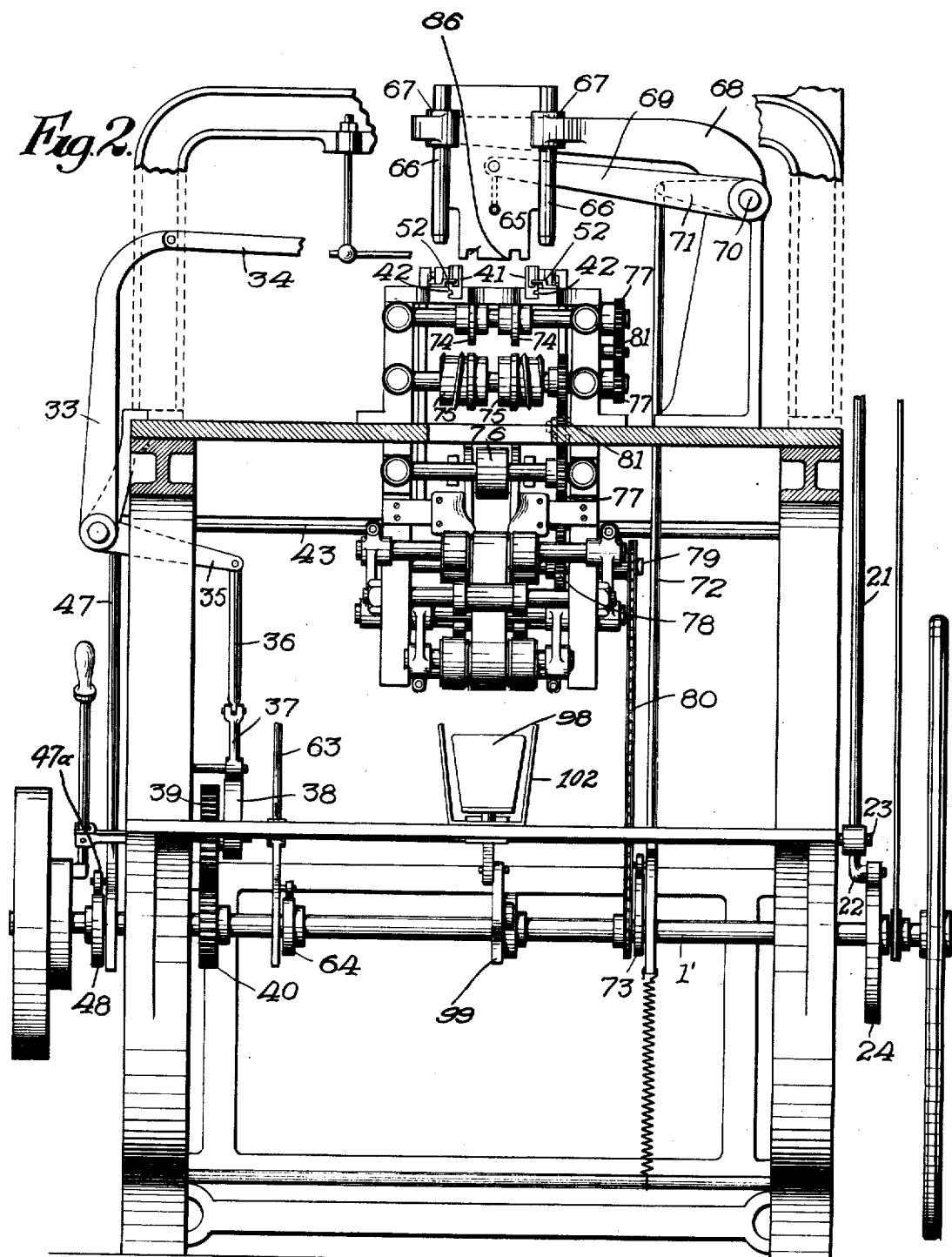
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Fig. 3.

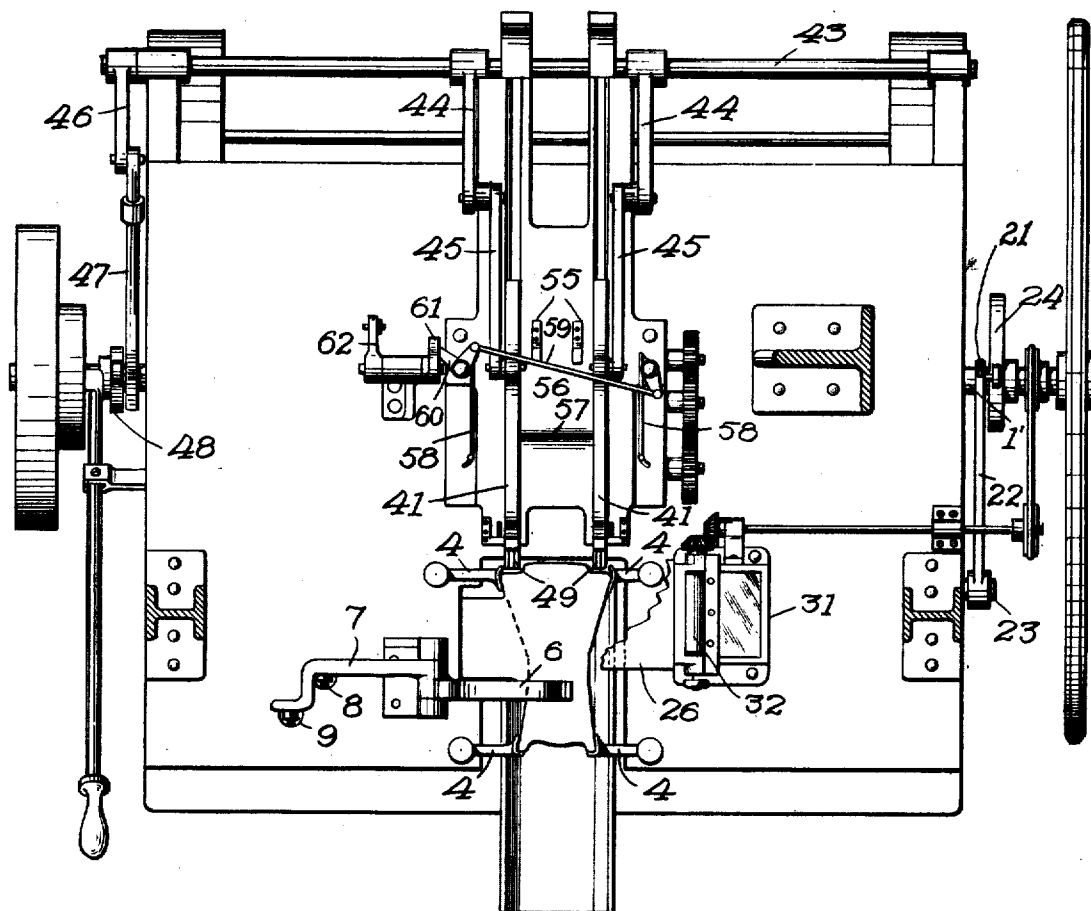


Fig. 4.

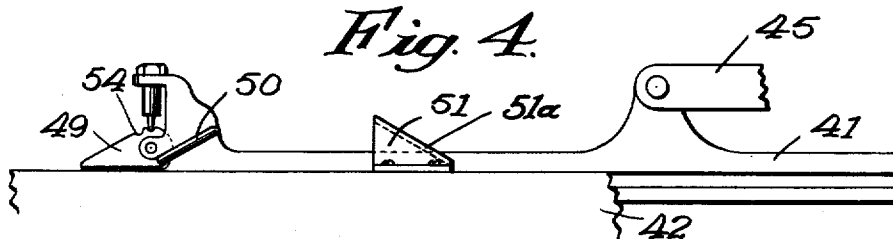
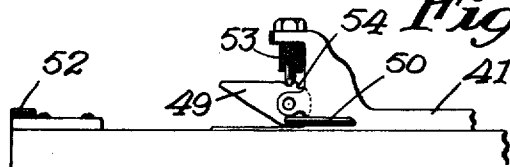


Fig. 5.



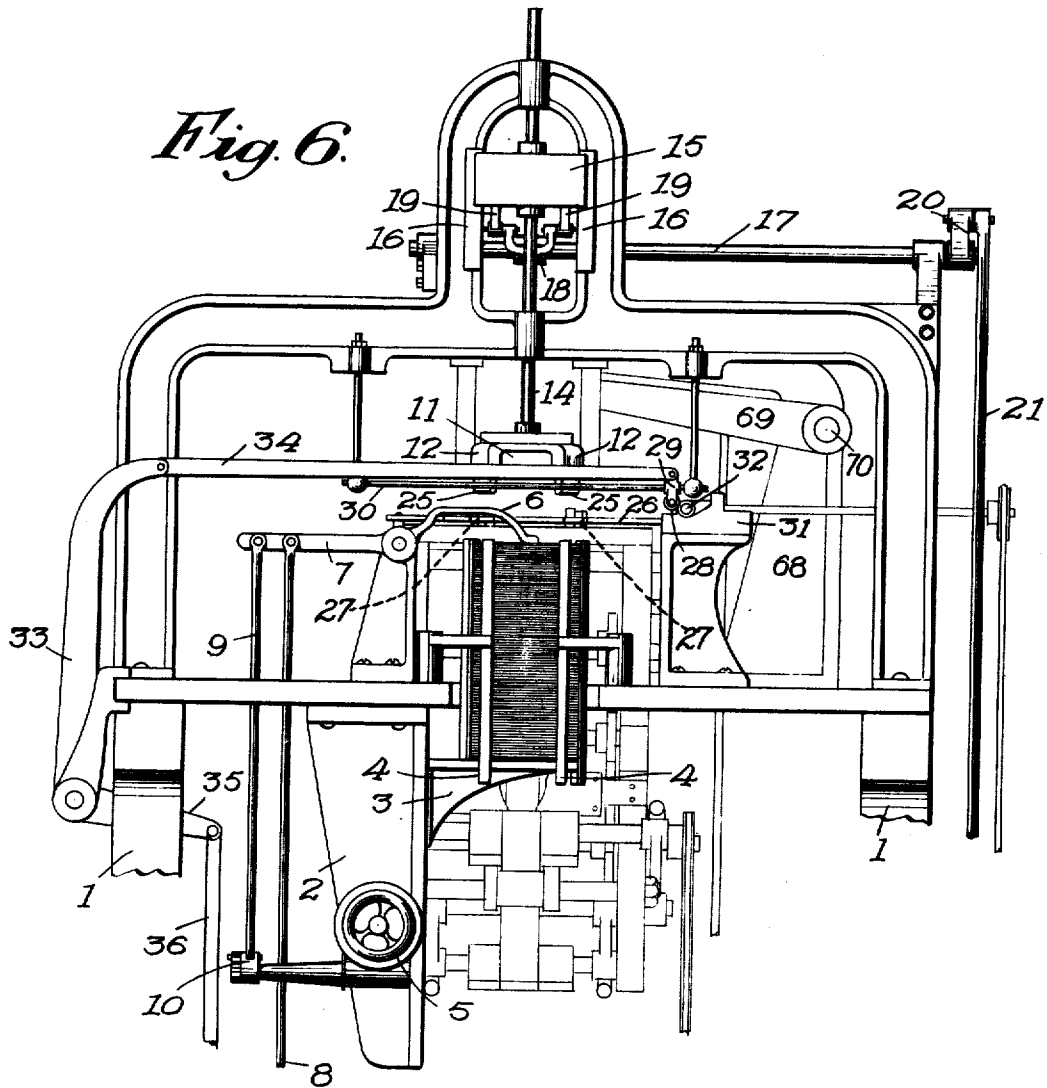
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7 SHEETS-SHEET 4



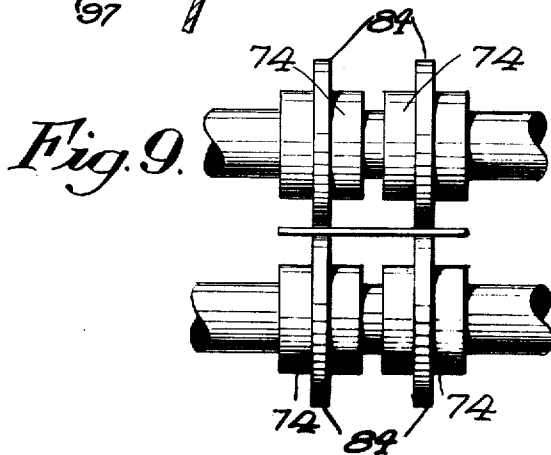
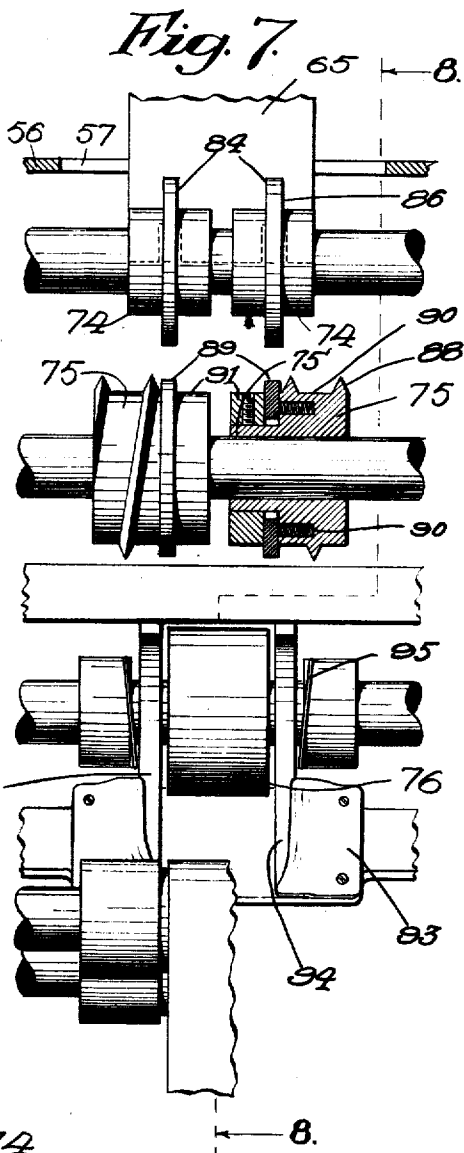
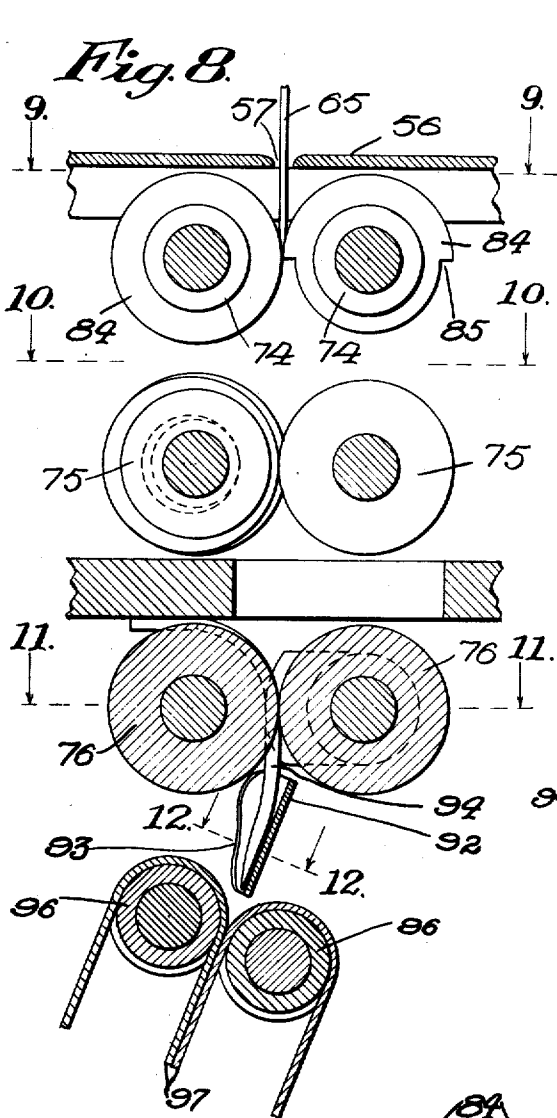
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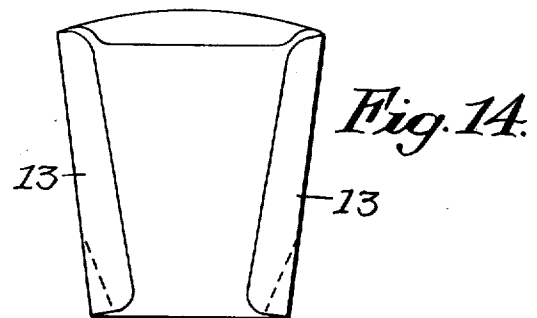
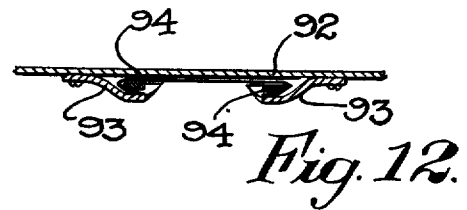
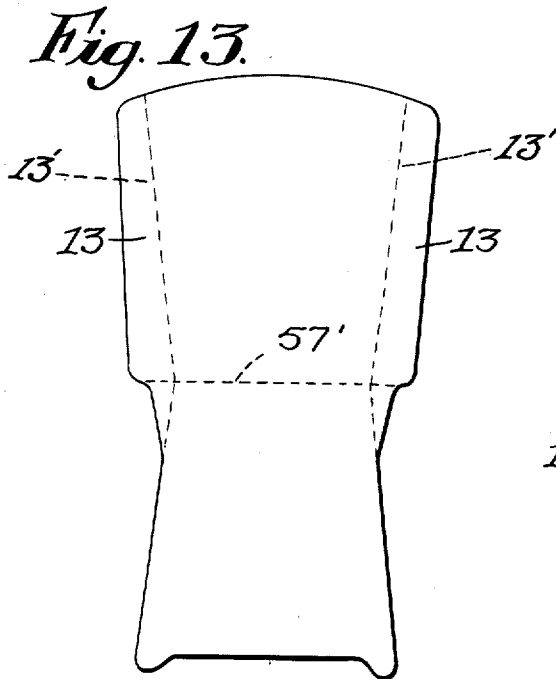
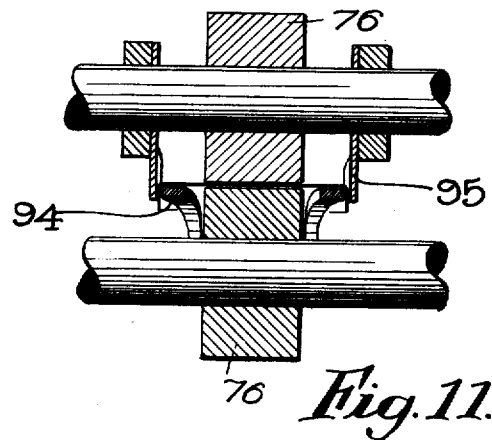
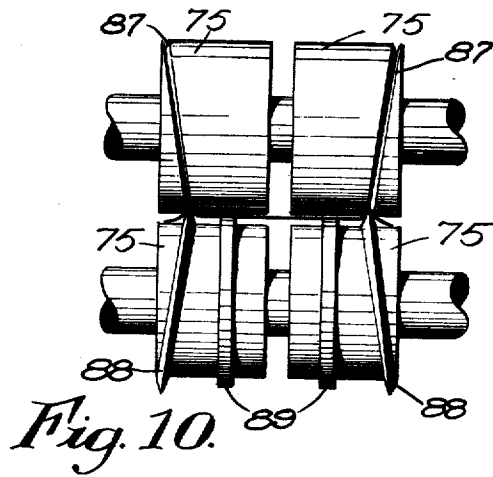
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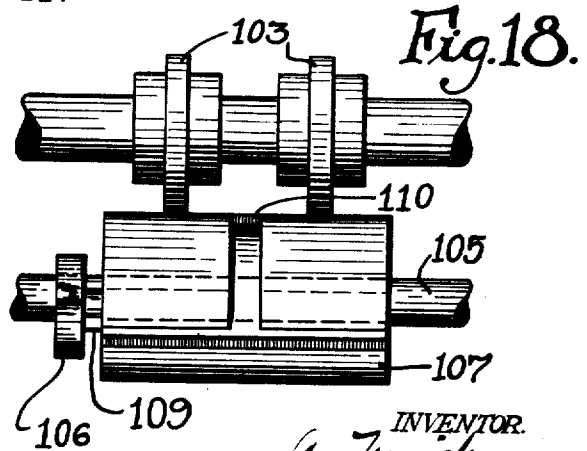
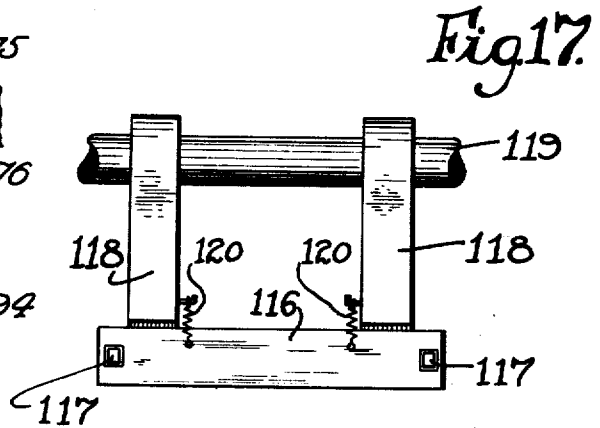
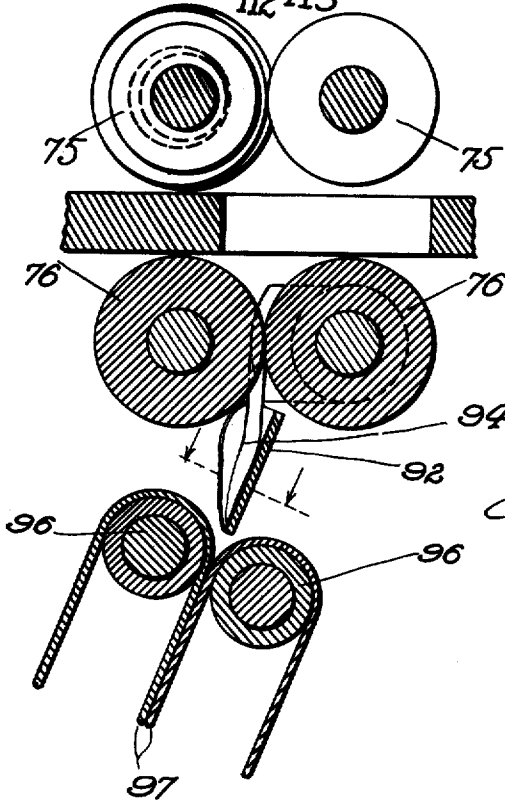
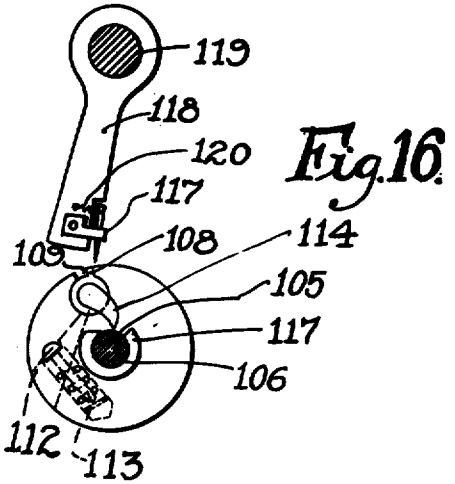
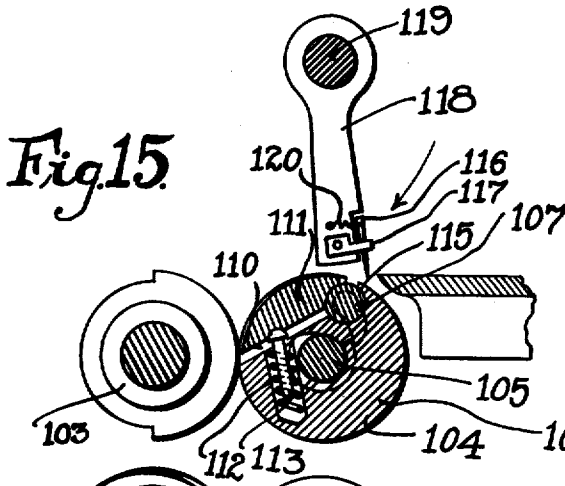
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7 SHEETS-SHEET 7



INVENTOR.
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UNITED STATES PATENT OFFICE.

ABRAHAM NOVICK, OF NEW YORK, N. Y., ASSIGNOR TO UNITED STATES ENVELOPE COMPANY, OF SPRINGFIELD, MASSACHUSETTS, A CORPORATION OF MAINE.

MACHINE FOR MAKING PAPER DRINKING CUPS, ENVELOPES, AND THE LIKE.

Application filed March 31, 1921. Serial No. 457,378.

To all whom it may concern:

Be it known that I, ABRAHAM NOVICK, a citizen of the United States, and a resident of the city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Machines for Making Paper Drinking Cups, Envelopes, and the like, of which the following, together with the accompanying drawings, is a specification.

The present invention relates to an improved machine for the manufacture of envelopes, paper drinking cups, or the like. As herein shown and described, the improvements are applied to the manufacture specifically of the well known type of collapsed paper drinking cups now in general use, but it is obvious that the devices of the invention are applicable to other uses, such as the manufacture of envelopes, and other inclosures made of paper, or similar material.

The improvements reside in the construction, arrangement and combination of the various gumming, creasing, folding and scoring instrumentalities for operation on the blanks from which the cups are made, all as pointed out in the following description, reference being had to the accompanying drawings, in which—

Fig. 1 is a side elevation of a machine embodying my invention.

Fig. 2 is a front view of the machine, partly in section on the line 2—2, Fig. 1.

Fig. 3 is a plan view partly in section on the line 3—3, Fig. 1.

Figs. 4 and 5 are enlarged detail views of the reciprocating blank gripping carriage.

Fig. 6 is a partial front elevation, showing particularly the parts that are omitted in the section of Fig. 2.

Fig. 7 is an enlarged detail view, in elevation, of the initial folding, scoring, and side flap folding mechanisms of the machine.

Fig. 8 is a sectional view on the line 8—8, Fig. 7.

Fig. 9 is a sectional view on the line 9—9, Fig. 8.

Fig. 10 is a sectional view on the line 10—10, Fig. 8.

Fig. 11 is a sectional view on the line 11—11, Fig. 8.

Fig. 12 is a sectional view on the line 12—12, Fig. 8.

Fig. 13 is a developed plan view of the blanks from which the drinking cups are made, showing the several lines of fold that are made in the operation of the machine.

Fig. 14 is a plan view of a completed drinking cup forming the product of the machine.

Fig. 15 is a sectional view, similar to Fig. 8, showing a modified form of the initial folding mechanism.

Fig. 16 is a side elevation of said modified initial folding mechanism.

Fig. 17 is a front view of a rotating tucker blade forming part of said modified initial folding mechanism.

Fig. 18 is a top plan view of a pair of rotating elements that form part of said modified initial folding mechanism.

Similar reference characters refer to similar parts in the different figures.

Referring to the drawings, and particularly to Figs. 1 and 6, the spaced side frames 1, 1, of the machine support suitable guideways 2, 2, for a blank table or feed device 3, on which a pile of blanks is held by any suitable means, such as guiding devices 4, 4. As shown in Fig. 3, the devices 4, 4, engage the corners of the stack, so as to hold the entire pile of blanks in proper position for registration and seizure by the picking devices, which in the well known manner remove the blanks one by one from the top of the stack. The blank support or table 3 is adapted to be raised or lowered vertically in its guides 2, 2, by means of a hand wheel 5, which is connected to the usual rack and pinion elevating mechanism, not shown, for manually adjusting the stack of blanks.

The automatic elevation of the stack, for the purpose of compensating for the successive removal of blanks from the top thereof, during the operation of the machine, is accomplished in any well known manner, as for instance by the provision of a pile governor 6, which controls the rack and pinion elevating mechanism. As herein shown, a pivoted feeler arm 7, oscillated continuously by a rod 8 and cam, not shown, makes contact with the top of the stack, and is susceptible of an increased amplitude of throw, as the stack diminishes, which is communicated by means of a rod 9 to a pawl and ratchet device 10. The latter is connected, in the

usual way, to the stack elevating mechanism. In this way, or in any other way well known in the art, the stack of blanks is adapted to be automatically raised so as to maintain the uppermost blank in position to be acted upon by the picker devices hereinafter described.

The picker 11 is adapted to reciprocate above the stack of blanks, and comprises two converging arms 12, 12, which are set at the same angle as the side flaps or edges of the blank, as shown at 13, 13, Fig. 13. The picker 11 is mounted on a vertically reciprocating rod 14, which is slidable in suitable bearings of the upper machine frame, said rod carrying a block 15 which slides upon vertical guide surfaces 16. The rod 14 is reciprocated by a rock shaft 17 and a rock arm 18, the latter having a U-shaped forward end which carries links 19, 19, yoked to the block 15.

The rock shaft 17 is oscillated by a rocker arm 20 and a rod 21 connected to a lever 22, which is pivotally mounted on the machine frame at 23, and is actuated by a cam 24 on the main shaft 1'.

Each arm 12, 12, of the picker 11, carries a gumming die or strip 25, which corresponds to the area to be gummed on the side flaps 13, 13, of the blank, Fig. 13. A stripper plate 26, of any ordinary type, is disposed above the stack of blanks, and is provided with suitable elongated apertures 27, 27, therein, for the passage of the arms 12, 12, of the picker, with their dies 25, 25. Any suitable mechanism may be employed for applying gum to the strip 25, 25, of the picker before its descent through the slots 27 of the plate 26 for engagement with the topmost blank of the stack. As herein shown, such gumming mechanism consists of a gum applying roller 28, which is supported in a frame 29 that travels back and forth upon horizontal rods 30. The roller 28 receives gum from a gum box 31, by means of a gum transferring roller 32 of ordinary construction. The frame 29 is reciprocated back and forth by means of upwardly extending arms 33 and connecting rods 34, the arms 33 being actuated by a rocker arm 35, link 36, bell crank 37, and a cam 38. The cam 38 is carried on a counter shaft, the latter being driven by gears 39 and 40 from main shaft 1'. The machine as herein shown, is so timed that the picker 11 elevates one blank for each half stroke of the travelling gum roller 28, the picker being gummed on the outside stroke for one blank, and on the return stroke for the succeeding blank.

As each blank is raised by the picker mechanism into engagement with the under face of the stripper plate 26, said blank is released from contact with the gumming dies 25 of said picker, and simultaneously

said blank is brought under the action of a reciprocating feed carriage or slide 41, the latter travelling in ways 42 of the fixed framework. The feed slide 41, is reciprocated from a rock shaft 43, which is connected thereto by means of rock arms 44 and links 45. The shaft 43 is oscillated by a rock arm 46 and a link 47, the slotted end of which embraces the shaft 1' and carries a roller 47^a engaging a cam 48 on the left hand end of the shaft 1'. At its forward end the reciprocating feed slide 41 carries suitable gripping devices for seizing the rear edge of the blank on each side of its longitudinal center line just before said blank is stripped from engagement with the picker 11. Any desired form of gripping mechanism may be employed for seizing the edges of the blank. As best shown in Figs. 4 and 5, the grippers consist of suitable pivoted members 49, 49, having rearwardly extending arms 50, 50. These arms are adapted to engage and be operated upon by fixed cams 51, 51, on the guideways 42, 42, which are provided with inclined wings 51^a projecting into the path of movement of the arms 50. On the rearward movement of the closed gripper device 49, the arms 50 engage under surfaces of the inclined portions 51^a of the cams 51, thereby raising the members 49 and releasing the blank that has been seized by said gripper. On the forward movement of the grippers, the said pivoted members 49 remain in their raised position, as shown in Fig. 5, until the edge of the blank is reached, whereupon the elbows of arms 50 strike the flanges 52, 52, and move the members 49 downwardly into their closed position over the edge of the blank. Each gripper is held in its open position or in its closed position, as the case may be, by the engagement of small spring pushed plungers or latches 53, with notches 54, 54 on the edges of the members 49.

The release of the blank by the grippers brings the blank to rest against a pair of end stops 55, 55, on a stationary table 56, the latter having a slot 57 transversely across the same, which registers exactly with the line of fold 57' of the blank shown in Fig. 13. With the blank thus brought to rest on the stationary table 56, in proper position for a folding operation thereon, said blank is subjected to the operation of side joggers 58, 58, which operate in the well known manner to center the same on the table, in co-operation with the stops 55. These side joggers 58, 58, are connected by a cross rod 59, and are operated by means of a bell crank 60, one arm of which is connected to a rocker arm 61. The rock shaft of said rocker arm has another arm 62 which is connected by means of a link 63 with a cam 64 on the main shaft 1'. These jogger devices 58 operate in the usual manner to center the blank

on the table 56, so that the fold line 57' thereof is in substantially exact registration with the slot 57.

With a blank in position on the feed table 56, suitably registered and squared so that the line of fold 57' registers with the slot 57, the same is subjected to the action of a folding blade 65, which is carried by rods 66, 66, that reciprocate vertically in bearings 67 provided by a bracket 68 of the upper machine frame. The reciprocation of the folding blade 65 is accomplished by means of a rocker arm 69, projecting from a short rock shaft 70 upon which is mounted another arm 71 connected by a link 72 to a cam 73 on the main machine shaft 1'. The reciprocation of the folding blade 65 imparts the main or transverse crease to the blank on the line 57' of Fig. 13, and projects said folded blank through the slot 57, with one continuous movement.

As each blank is projected through the slot 57, it is subjected to the action, successively, of a plurality of sets of cooperating rollers 74, 74, 75, 75, and 76, 76 shown in detail in Figs. 7 and 8. Each set or pair of rollers is equipped with intermeshing gears 77, 77, Fig. 1, to insure rotation in unison, the entire train of gears being actuated from a driving gear 78 on a countershaft 79, the latter being rotated by a chain and sprocket connection 80, with the main shaft 1'. Idlers 81, 81, are employed to transmit rotation between the several sets of roller gears 77, 77. The intermeshing gears 77, 77, of each set of rollers are designed to allow slight adjusting movement between the rolls, this being accomplished, as shown in Fig. 1, by making the journals 83 of one of each pair of rollers adjustable, by providing springs 82 for yieldingly urging the journals 83 toward the stationary journals of the other roller.

Referring specifically to Figs. 7, 8 and 9, it will be seen that the first set of rollers 74 provides pairs of cooperating feeding and folding disks 84, 84, one disk of each pair being cut away for a portion of its circumference, as shown at 85, in order to make sharper the initial projection of the folded blank thereby. The uncut portion of the disk 84 is of sufficient circumferential length to accomplish the projection of the once folded blank through said rolls and into the bight of the scoring rolls 75 disposed beneath the same in the path of said blank. The blade 65 is cut away as shown at 86, Fig. 2, to avoid interference with the disks 84.

Referring to Fig. 10, the rolls 75 on one side are provided with spiral depressions 87, 87, corresponding to the converging lines of fold 13', 13' of the blank. The other pair of rolls has spirally formed cooperating projections 88, 88, the latter being adapted to score the blank as it passes between the pairs

of rolls 75, 75, in such a manner as to facilitate the folding of the blank along the lines 13', 13'. As shown in Figs. 7, these rolls 75, 75, are also provided with feed disks 89, 89, the latter being loosely and freely mounted on reduced hub portions 75' of the rolls, and being frictionally engaged by springs 90, 90, seated in recesses in the ends of the rolls. The loose mounting of the feed disks 89, 89, permits their adjustment to compensate for varying degrees of pressure exerted by the springs 82. Collars 91, 91, are fastened upon the hubs 75' of the scoring rollers 75, 75, to retain the feed disks 89 thereon. Springs 90 which engage the faces of the feed rings act as frictional engaging means, to insure the continuous movement of the blanks, and at the same time to compensate the adjustable character of the mechanism, and the ability of the rolls 75, 75, to score the blank more or less deeply, as desired. The ribbed scoring rolls 75 and their feed disks are as heretofore stated spring pressed toward the grooved scoring rolls, the relative positions being adjustable to suit the requirements. The once folded blank passing through the scoring rolls 75 just described, is thereby creased or scored along its flaring side flaps. The scored blank next passes between the feed rollers 76 to the final fold mechanism which comprises side folders 92 of the well known "ploughshare" type that are arranged in the path of the scored blank. The folders 92 consist of the usual overhanging flanges 93, with guiding folding strips 94 supported in the flared receiving ends of the side folders, so as properly to direct the main body of the blank as the side flaps are folded over. Adjacent to the entrance end of the flanged side folders are arranged the rotating blades 95, operating in a plane at right angles to the path of the blank, and inclined slightly from the longitudinal, to engage the scored side flaps, and turn them up so that they may readily enter the folders 92.

As the blank passes through the side folders 92 the inner glued surfaces of the flaps are pressed over into contact with the outer surface of the back of the cup, as shown in Fig. 14, and in this form the cup is passed between the final folding and sealing rollers 96 and belts 97 which firmly press and seal the side flaps and deposit the completed cups on some usual form of packing member 98, as best shown in Fig. 1. The member 98 is operated by a cam 99, links 100 and rocker arm 101 to pack the cups in a suitable receptacle, such as shown at 102.

From the foregoing, it is apparent that I have provided an improved form of a machine by means of which blanks may be formed into completed cups by a continuous movement of the same from the time a blank is removed from the stack until it

emerges from the machine. The making of the first fold by projecting the blank bodily through the slot 57, into the bight of the rolls 74, initiates a rectilinear movement 5 which is continued by the rolls 75 and 76, which at the same time score and turn up the side flaps 13 for entrance into the end folders 93 and the sealing rollers 96. In this way, the machine is well adapted for 10 operation at high speeds with a high rate of production, for once the blanks have been delivered to the folding table, they proceed with an even flow to the packing member 98 without interruption and without being acted upon by any reciprocating or hinged scoring and folding devices, such as have been heretofore employed in machines of this class.

A modification of the means employed 20 for making the bottom fold in the blank is shown in Figs. 15, 16, 17 and 18. Instead of the vertical reciprocating folding blade 65 which is shown in Fig. 8, for driving the blank down through the slot 57 in plate 25 56, it is proposed to use a tucking mechanism in conjunction with the feed rolls. To this end the feed rolls are made as shown in Fig. 15 at 103 and 104, the roll 103 corresponding substantially to the segmental 30 disks 84, 85 of Fig. 8. The roll 104 is in the form of a slotted cylinder, carried by a rotating shaft 105, which is connected by gearing, not shown, to the shaft of roll 103.

Cylinder 104, as shown in Figs. 15 and 35 16, provides an eccentric bore for the reception of an oscillatory member 107, which has a longitudinal projection 108 that occupies a slot 109 along the top of said bore. The material of the cylinder 104 is cut away, 40 as shown at 110, to provide working space for a tail piece 111, the latter being integral with the member 107. The tail piece 111 is normally urged in a clockwise direction by spring 112 and pin 113, to rock the 45 member 107 in the eccentric bore of cylinder 104. This action of the spring 112 is resisted by the contact with a stationary cam 106, of a follower 114 that is secured to the end of member 107. While the follower, in 50 the rotation of roll 104 is on the high part of said cam, the projection 108 remains in open position, as shown in Fig. 14, or in other words out of contact with the edge 115 of slot 109.

For cooperation with the roll 104 is provided a rotating tucking blade 116, the latter being carried loosely upon projections 117, 117, of a pair of arms 118 that are secured to a rotating shaft 119. The blade 60 116, as shown in Fig. 14, rotates in a clockwise direction, and is held yieldingly against the arms 118 by springs 120, the latter permitting when required, the movement of which said blade is susceptible, by reason 65 of its loose engagement with the projections

117. The parts are so timed, that in the counter-clockwise rotation of cylinder 104 the blade 116 and the slot 109 come together substantially in the plane of the blank that is held at rest on table or support 121. The 70 edge of the blade forces the blank into the open slot, between the projection 108 and the edge 115 of said slot, thereby making a transverse tuck in the blank on line 57', Fig. 13. Immediately thereafter the fol- 75 lower 114 drops off the edge 122 of cam 106, and allows the spring 112 to press the projection 108 sharply against edge 115, thereby gripping the tucked-in portion of the blank, to form the bottom fold. 80

Thereafter, the rotation of cylinder 104 carries the slot 109 away from the blade 116, as shown in Fig. 15, this action being permitted by flexible mounting of said blade, as heretofore described. As the rotation of 85 cylinder 104 continues, the follower 114 is carried on to the central portion of cam 106 and the gripper 108 opens up, thereby releasing the blank and allowing it to be projected downwardly by the cooperation of 90 the disks 103 with the surface of cylinder 104. The subsequent operations of scoring, and turning up and folding the side edges of the blank are the same as heretofore described. 95

I claim,

1. In a machine of the class described, the combination with rotary means for advancing a transversely folded blank, of rotary 100 means acting on the blank, following its movement by said first named means, for continuing the movement of said folded blank in the same plane and for scoring said blank along its longitudinal edges on lines oblique to the line of transverse fold. 105

2. In a machine of the class described, the combination with conveying rolls for a transversely folded blank, of scoring rolls for receiving the folded blank from said conveying rolls and operable on the edges 110 of said folded blank to provide scores converging toward said transverse fold.

3. In a machine of the class described, rolls for advancing a transversely folded blank, rolls for continuing the movement of 115 said folded blank in the same plane and for scoring said blank along its edges on lines diverging from said transverse folds, and means for folding said blank on said diverging scores. 120

4. In a machine of the class described, the combination with cooperating rolls for moving a transversely folded blank, of a second set of cooperating rolls for continuing the movement of said folded blank in the same 125 plane, said second set of rolls provided with coacting spiral grooves and projections adapted to impart oppositely inclined scores to said blank diverging from said transverse fold. 130

5. In a machine of the class described, a pair of scoring rolls for operating on the longitudinal edges of a transversely folded blank, and means carried by said scoring rolls for procuring the simultaneous advancement of said blank, said last named means being yieldingly mounted with respect to the scoring grooves and projections.

6. In a machine of the class described, the combination with means for forming a transverse fold in a blank in the same plane, of a plurality of sets of cooperating rollers for advancing said blank, and means carried by one of said sets of rollers for scoring said blank longitudinally on lines diverging from said transverse folds.

7. In a machine of the class described, the combination with means for supporting a blank in flat or extended position, of a pair of cooperating rolls below the plane of support of said blank, one of said rolls having a gripping means thereon, and rotary means above the plane of support of said blank for tucking the same transversely into said gripping means.

8. In a machine of the class described, a pair of cooperating rolls provided with peripheral scoring and feeding portions, one of the feeding portions being independently movable with respect to the scoring portions to compensate for variations in pressure between the scoring portions.

9. In a machine of the class described, a roll provided with peripheral scoring and feeding portions, and frictional means for causing the feeding portion to rotate with the scoring portion.

10. In a machine of the class described, a pair of cooperating rolls provided with pe-

ripheral scoring and feeding portions, one of the feeding portions being frictionally connected to its associated scoring portion.

11. In a machine of the class described, a roll provided with a peripheral scoring portion and a reduced hub portion upon which is loosely mounted an annular feeding portion.

12. In a machine of the class described, a roll provided with a peripheral scoring portion and a reduced hub portion upon which is loosely mounted an annular feeding portion, and frictional means connecting the said feeding portion to the said scoring portion.

13. In a machine of the class described, a stack of blanks, a picker for removing and gumming a blank flatwise, a gripper device for moving the blank lengthwise, and a blade for engaging and delivering the blank to a series of cooperating rolls for scoring and further folding the blank by its continuous movement between the rolls.

14. In a machine of the class described, a stack of blanks, a picker having gumming dies for removing a blank flatwise, a gripper device for moving the blank lengthwise, and a blade for engaging the blank transversely to the gummed portions and delivering it to a series of cooperating rolls for scoring and folding over the gummed portions by the continuous movement of the blank through the rolls.

Dated March 19, 1921.

ABRAHAM NOVICK.

Witnesses:

OWEN W. KENNEDY,
GEO. H. KENNEDY, Jr.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,444,004, granted February 6, 1923, upon the application of Abraham Novick, of New York, N. Y., for an improvement in "Machines for Making Paper Drinking Cups, Envelopes, and the Like," an error appears in the printed specification requiring correction as follows: Page 5, line 11, claim 6, strike out the words "in the same plane" and insert the same to follow the word "blank" in line 13; 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 5th day of June, A. D., 1923.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.