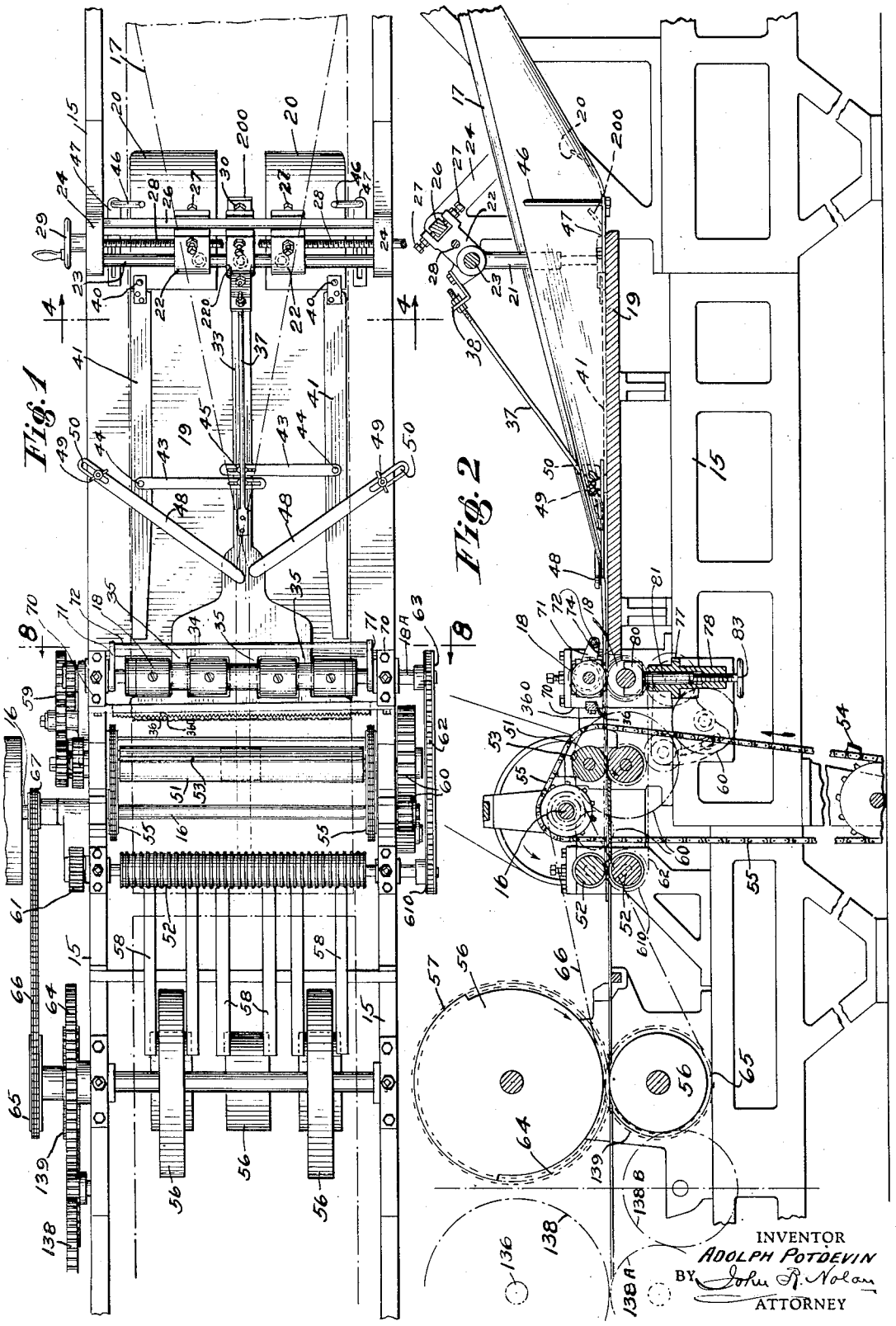
Dec. 29, 1931. A. POTDEVIN 1,838,704

BAG MAKING MACHINE

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BAG MAKING MACHINE

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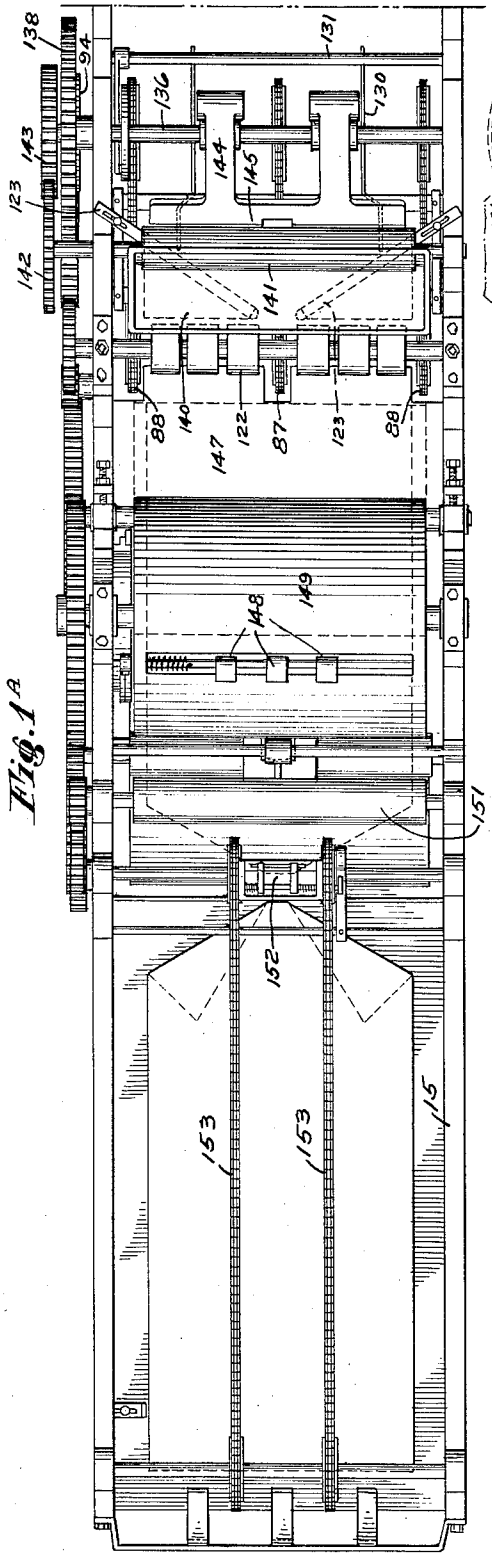


Fig. 1A

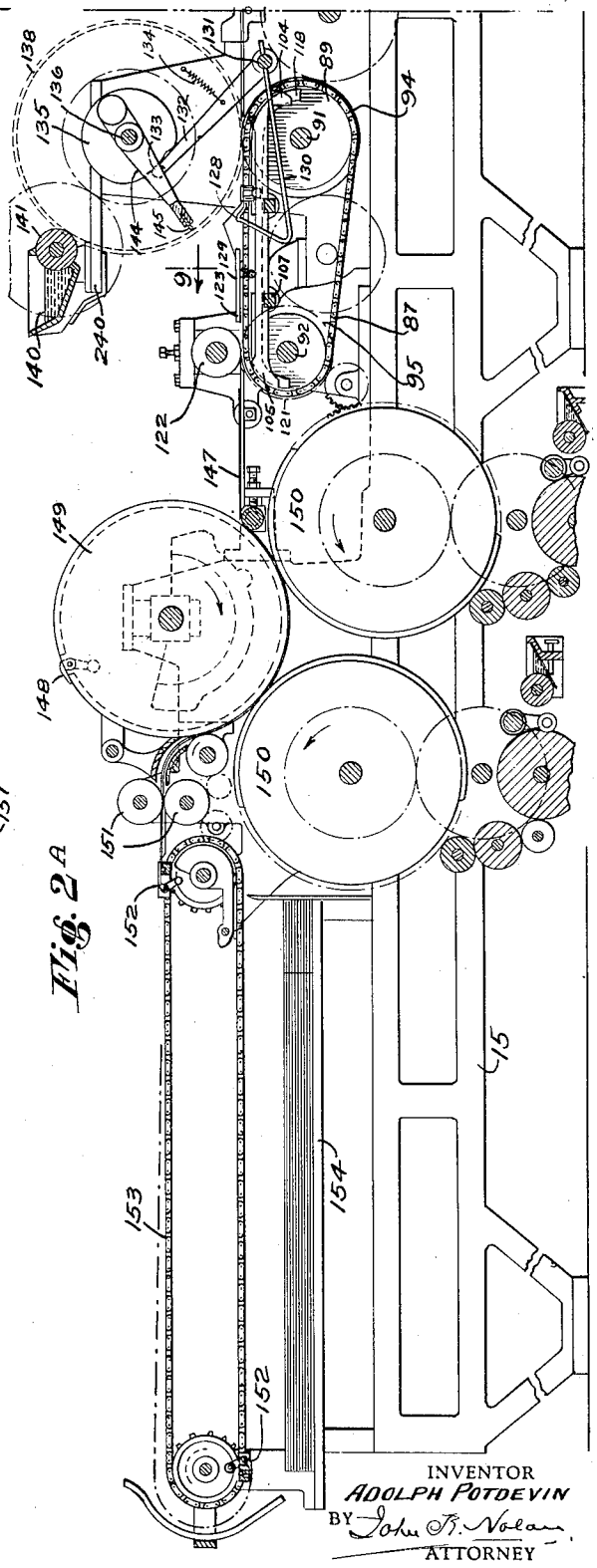


Fig. 2A

INVENTOR
ADOLPH POTDEVIN
BY John B. Nolan
ATTORNEY

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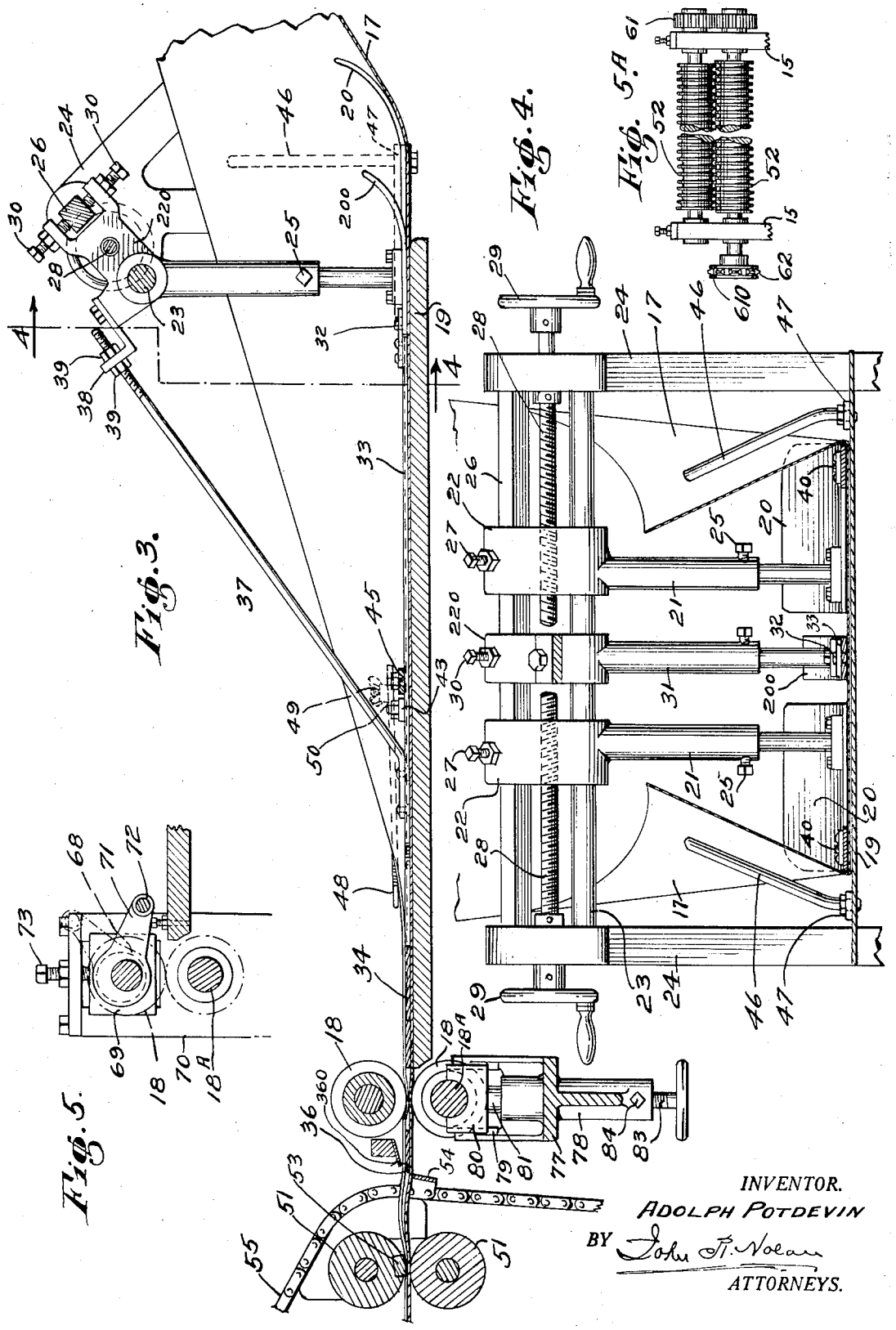


Fig. 3.

Fig. 5A.

Fig. 5.

INVENTOR.
ADOLPH POTDEVIN
BY John T. Nolan
ATTORNEYS.

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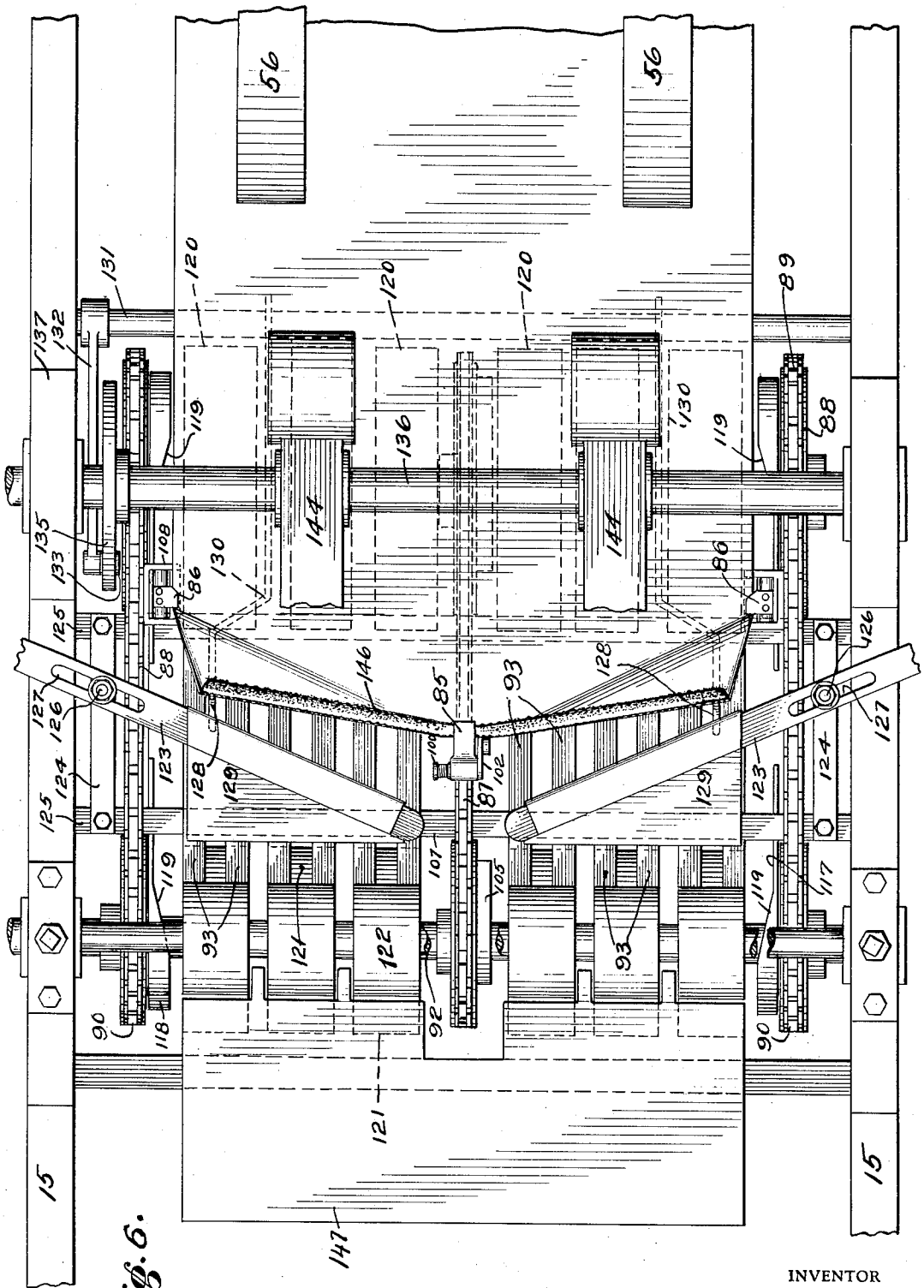


Fig. 6.

INVENTOR
ADOLPH POTDEVIN
BY John T. Nolan
ATTORNEY

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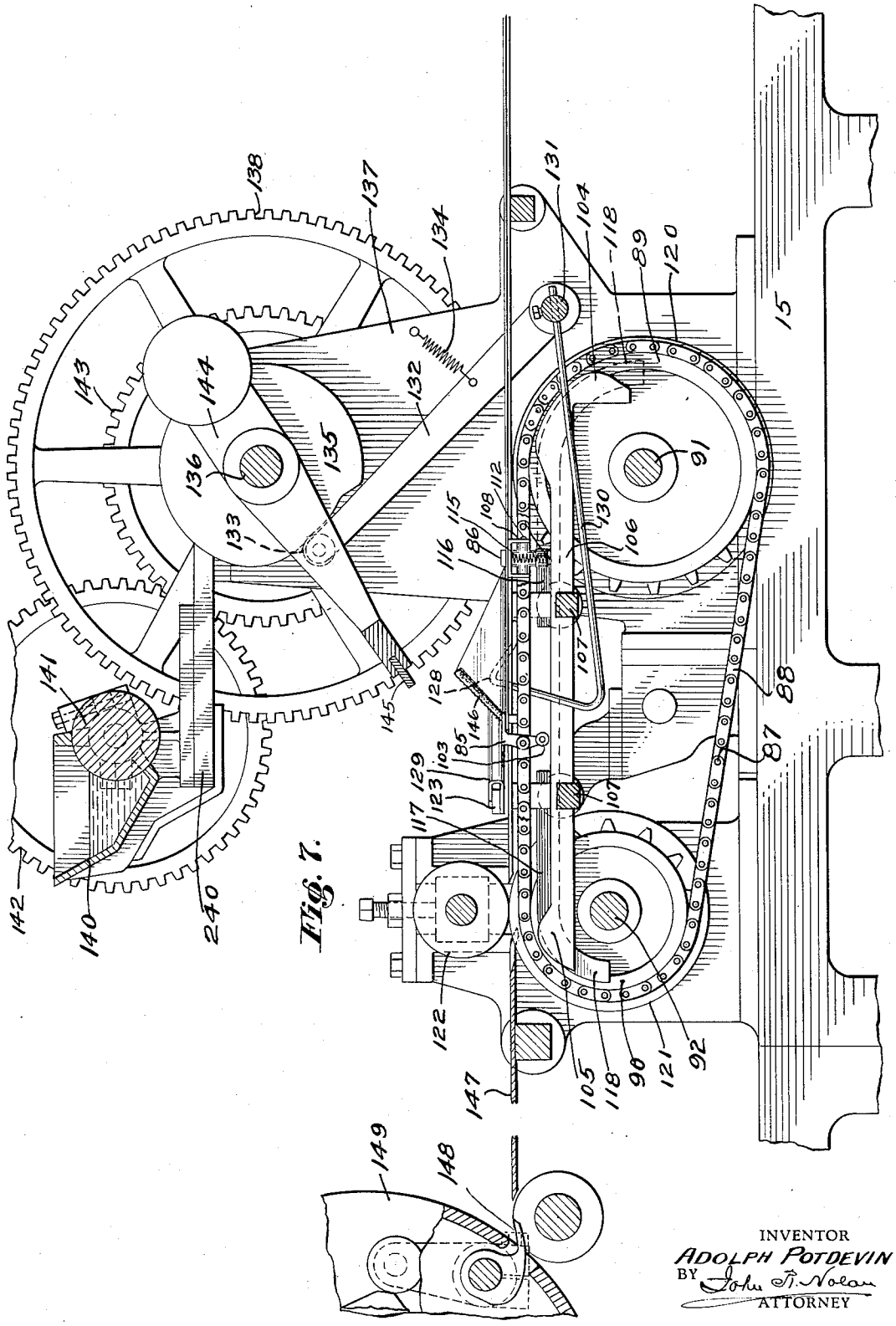


Fig. 7.

INVENTOR
ADOLPH POTDEVIN
BY John F. Nolan
ATTORNEY

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BAG MAKING MACHINE

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Fig. 8.

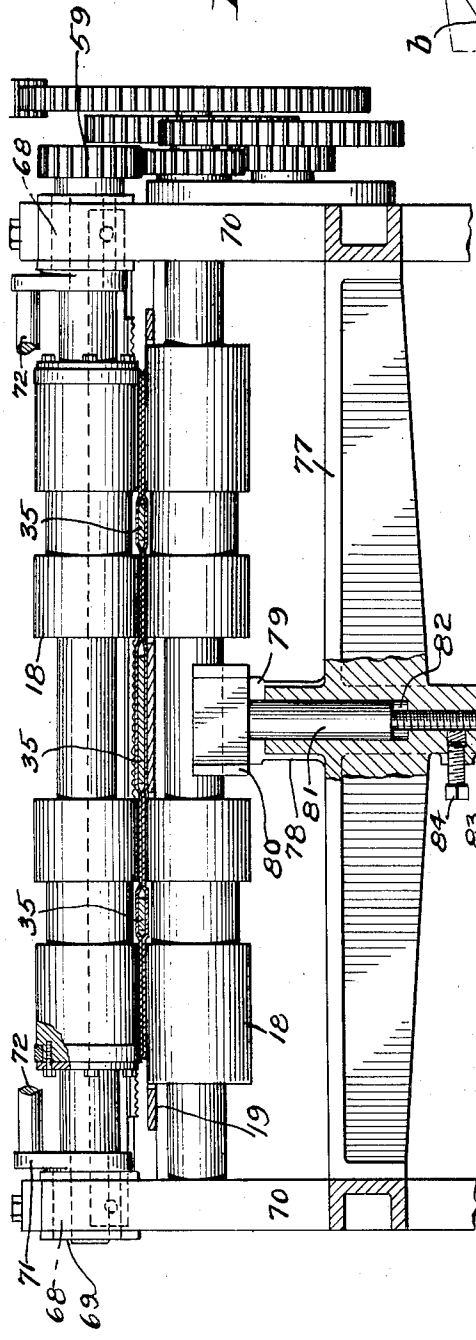


Fig. 11.

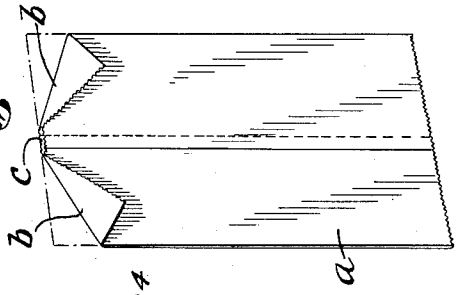


Fig. 9.

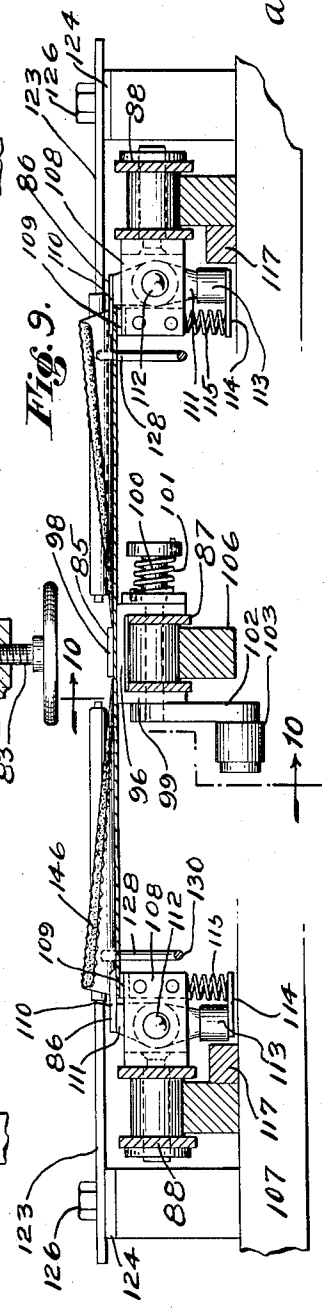
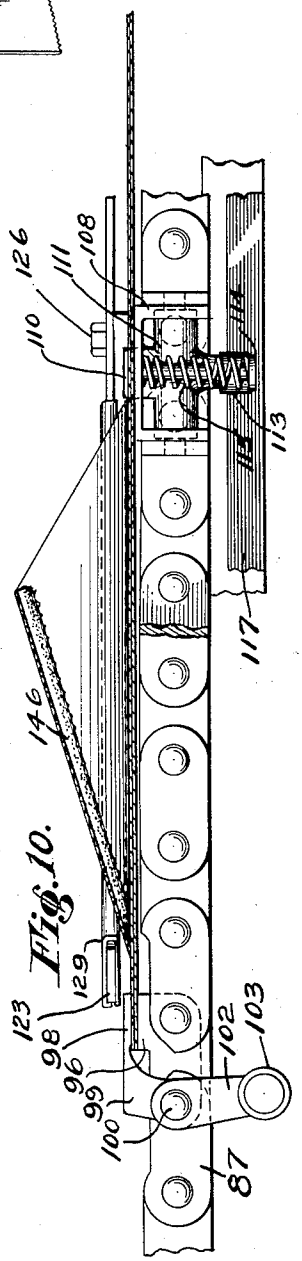


Fig. 10.

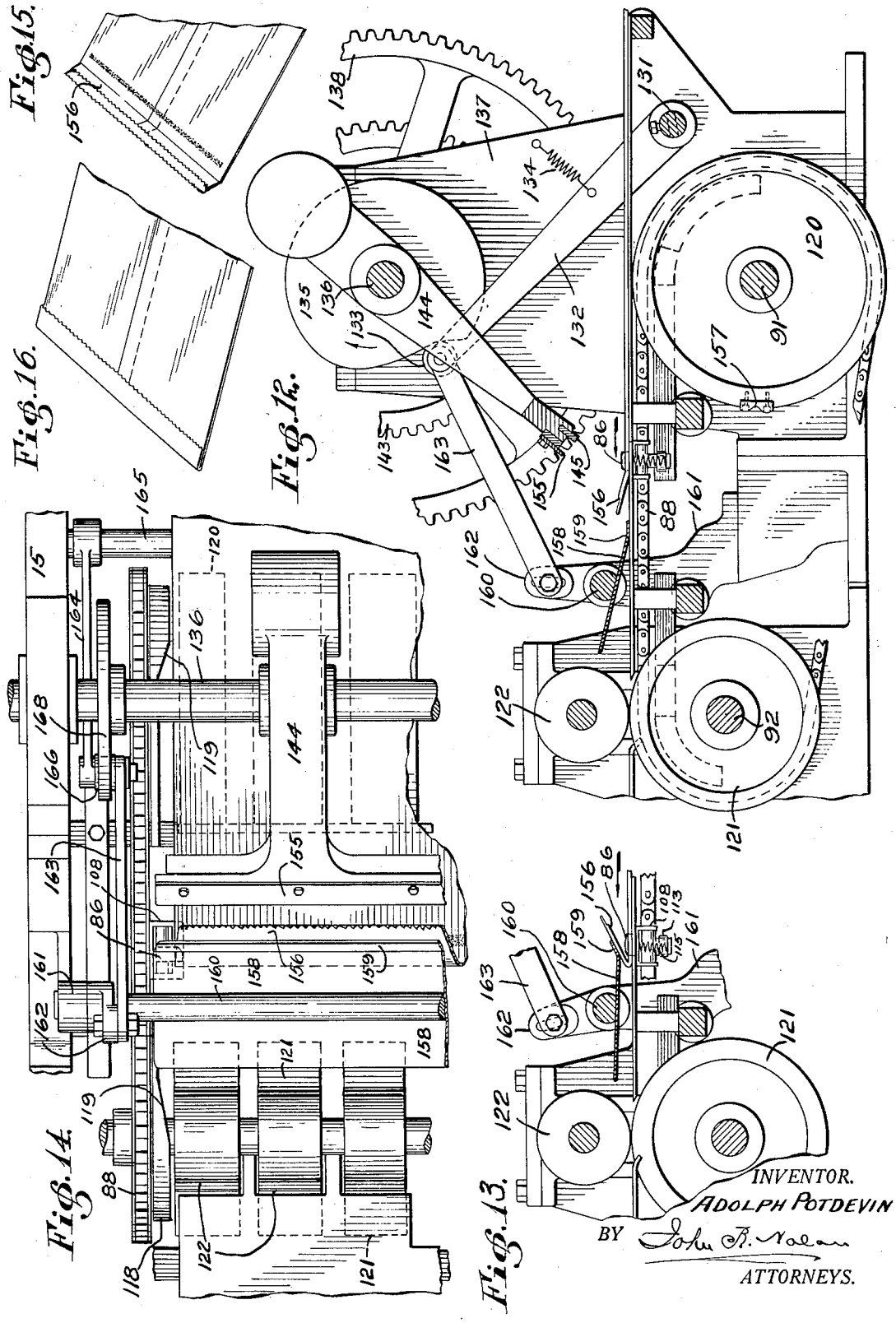


INVENTOR
ADOLPH POTDEVIN
BY John B. Nolan
ATTORNEY

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Patented Dec. 29, 1931

1,838,704

UNITED STATES PATENT OFFICE

ADOLPH POTDEVIN, OF GARDEN CITY, NEW YORK, ASSIGNOR TO POTDEVIN MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

BAG MAKING MACHINE

Application filed November 2, 1928. Serial No. 316,656.

This invention relates to machines for making paper bags, having reference especially, though not exclusively, to mechanism for making extra large size bags, such as commercial "dry cleaner bags" and "banana bags".

An object of my invention is to provide a former of novel construction upon which a web of paper is folded into flat tubular form preparatory to the severance of the tube at the delivery end of the former into bag lengths, which former has capacity for easy and precise adjustment to adapt it to the formation of symmetrical tubes of various widths.

Another object is to provide simple and efficient means for adjusting and supporting the feed rolls at the delivery and severing end of the former.

Another object of my invention is to provide a novel construction and operation of feed and pinch rolls, whereby a slackness of the web, which facilitates the tube severing operation, is secured.

Another object is to provide tube forwarding, pasting and folding mechanisms of simple and efficient construction and operation whereby tubular bag lengths, as rapidly as they are produced, are uniformly folded and sealed at their leading ends.

With these and other objects in view my invention comprises novel features of construction and combinations of parts whereof preferred forms of embodiment will be hereinafter described; the scope of the invention then being defined in the appended claims.

In the drawings—

Figures 1 and 1A are plans of succeeding portions of a machine embodying my invention, for making "dry cleaner bags", the means for supplying the web and for applying paste to the longitudinal edge of the web before its passage to the "former", being omitted.

Figs. 2 and 2A are longitudinal vertical sections, partly in elevation, of the mechanisms illustrated in Figs. 1 and 1A, respectively.

Fig. 3 is a longitudinal vertical section through the former and adjuncts.

Fig. 4 is a transverse vertical section, as on the line 4—4 of Figs. 1 and 3.

Fig. 5 is a sectional detail of the feed-rolls which precede the pinch rolls, showing the adjustable bearing for the upper feed roll.

Fig. 5A is an elevation of grooved friction feed rolls which succeed the pinch rolls.

Fig. 6 is a plan of the end folding mechanism shown in Fig. 1A, the paste-applying devices for the end folds being omitted.

Fig. 7 is a longitudinal vertical section through the end folding mechanism, including the paste-applying devices.

Fig. 8 is a transverse section through the former, adjacent the feed rolls, as on the line 8—8 of Fig. 1.

Fig. 9 is a similar section, as on the line 9—9 of Fig. 2A.

Fig. 10 is a longitudinal section of a portion of the machine in a plane adjacent the tube carrier of the folding mechanism, as on the line 10—10 of Fig. 9.

Fig. 11 illustrates a "dry cleaner bag", such as is produced by the machine.

Fig. 12 is a longitudinal section of a modified form of the forwarding and end-folding mechanisms, showing an oscillatory folding member in down or inclined position preparatory to the engagement of the leading end of a tube therewith.

Fig. 13 is a similar view of a portion of such mechanisms, showing the folding member in raised or horizontal position and as engaged with the end of the tube.

Fig. 14 is a plan of a portion of the modified forwarding and end-folding mechanisms.

Fig. 15 is a perspective view of one end of the leading end of the paper tube indicated in Fig. 12.

Fig. 16 is a similar view showing the end of the tube as closed and sealed to produce a "banana bag".

Referring to the drawings, 15 designates the main supporting frame, and 16 the main driving shaft from which motion is transmitted to the various moving elements of the machine. The web of paper 17 to be operated upon passes from a roll (not shown) at one end of the machine to and about a suit-

able forming element, and thence to the bite of a pair of feed rolls 18 which are effective to advance the web and insure its progressive folding into a flat tube form by the forming element. Paste is applied in the usual manner to one of the longitudinal edges of the web before its association with the forming element, which pasted edge, when the web is folded, overlaps the adjacent folded edge of the web and affords a longitudinal seam for the tube, as usual. The means for applying the paste is of any usual or approved construction, and therefore it requires no illustration or description herein.

The tube forming element, in its preferred construction, includes a horizontal base plate 19 which is supported on and between the sides of the main frame in substantially the same horizontal plane as the bite of the feed rolls 18. Overhanging the forward or receiving end of the base plate are the rearward edges of two curved guide plates 20 which are so arranged that the upper surface of the advancing web travels in contact therewith and is thereby deflected down and uniformly upon the surface of the base plate.

The guide plates 20 are symmetrically adjustable in a horizontal plane toward and from each other. To that end, each of the guide plates is secured to and supported by the foot of a hanger 21 depending from an inclined bracket 22 which is slidably mounted at its lower end on a transverse rod 23 fixed to and between a pair of side structures 24 on the supporting frame. The hanger preferably comprises two telescopic members, whereof the upper or larger member is provided with a suitable set screw 25 by means of which the lower or smaller member, together with the attached guide plate, can be secured in any desired position of vertical adjustment. The upper end of each bracket 22 is bifurcated to embrace a cross-bar 26 which is also supported by the structures 24, and the limbs of the brackets are provided with set-screws 27 adapted to be screwed against the bar to lock the bracket 22 in any predetermined position of adjustment along the rod 23. (See Figs. 1 and 4).

Journaled in the side structures 24 are the outer ends of screw-shafts 28 which are screwed into the respective brackets 22, so that when the brackets are released from the bar 26 and the screw shafts are properly rotated the brackets, together with the respective guide plates 20, are moved either toward or from the longitudinal center line of the machine, as desired. The screw-shafts 28 are provided with suitable operating hand wheels 29, or the like. Mounted on the cross-members 23, 26 is a central bracket 220 which is fixed to the cross-bar 26 by screws 30. This bracket supports an adjustable telescopic hanger 31 to the foot of which is secured a curved guide member 200 for the progressing web of paper. To this guide member is secured, as at 32, one end of a relatively thin mid bar 33 which is slightly spaced above and extends longitudinally of and parallel with the upper surface of the base plate 19. The rearward end of the bar 33 is expanded, as at 34, (Fig. 1) and is formed with connecting portions 35 which extend freely between the spaces of the feed rolls 18 and merge thence in a serrated severing edge portion 36.

The rearward end of the mid bar 33 is suitably supported above the base plate by an upwardly and forwardly inclined rod 37 the lower end of which is fixed to the mid bar and the upper end of which rod is threaded and slidably fitted in an angle piece 38 on the central bracket 220. This threaded end is equipped with nuts 39, by the manipulation of which the rod can be longitudinally positioned to effect nice vertical adjustment of the mid bar in respect to the base plate.

Pivoted, as at 40, to each of the guide plates 20 is a relatively thin side former bar 41 which is above the base plate 19 and extends longitudinally of and adjacent the lateral edge of the plate to a point in proximity to the feed rolls. (See Fig. 1). The two bars 41 are respectively supported intermediate their ends by cross-bars 43, each of which latter is pivoted, as at 44, to the adjacent former bar 41 and is connected at its inner end to the mid bar 33 by means of a bolt 45 passing through a slot in the bar 43. Hence when the bolt nuts are slackened the pivoted bars 41 can be accurately adjusted toward or from the center of the machine to impart any proper degree of taper or angularity to the outer edges of the respective side former bars in relation to the longitudinal axis of the machine as may be requisite to ensure the free passage and delivery of the flat paper tube as it progresses along the forming devices toward the feed rolls.

It is to be noted that when the bolt nuts are slackened, the pivoted ends of the side former bars are movable simultaneously with the guide plates 20, thereby insuring the proper co-operative relation of the side former bars and the guide plates in accordance with the predetermined width of the tube to be produced; and that then the angular or inclined relation of the side bars in accordance with the width of the tube, can be effected, as previously described.

Upwardly and inwardly inclined guide rods 46, which are supported by a pair of side brackets 47 adjacent the outer edges of the respective guide plates 20, are adapted to deflect the longitudinal sides of the paper upwardly and inwardly as it progresses beneath the guide plates and toward the feed rolls 18.

As the partially folded web progresses along the former to the feed rolls, the upwardly and inwardly inclined sides of the web are fully folded down, so their longi-

tudinal edges overlap, by means of a pair of folding arms 48 which converge from the outer sides of the base plate 19 to and upon the mid bar 33. These arms 48 are adjustably secured at their outer ends to the margins of the base plate by means of suitable bolts 49 passing through slots 50 in the respective bars. When the nuts of the bolts are slackened the arms can be set to any desired angular position with relation to each other and to the mid bar, and then by tightening the nuts the arms can be effectually locked in their respective positions of adjustment.

Immediately back of the feed rolls 18 are two spaced apart sets of rolls 51, 52 which engage the progressing web. The first pair 51 constitute intermittently acting pinch rolls whereof one is provided with a longitudinal rib 53 which bites and clamps the tube against the lower roll 51 at predetermined intervals during the progress of the tube, thus temporarily retarding the advancement of the latter. At this instant the tube is in proper position for severance as defined by the serrated edge portion 36 of the bar 33 and by a complementary serrated severing bar 360 which is fixedly supported above and parallel with the edge portion 36, whereupon a travelling bar 54, which is carried by a pair of spaced endless chains 55, is brought forcibly against the lower surface of the tube, immediately in front of the severing members, in a manner to sever a bag length from the body of the tube, substantially as described in my prior Letters Patent of the United States No. 1,176,164 dated March 21, 1916.

The secondary rolls 52 are circumferentially grooved, as shown, the grooves of one alternating with those of the other thereby constituting frictional feed rolls which co-act with a pair of drawing rolls 56 to move the successively severed bag lengths rearwardly. One of the latter rolls is provided with a segmental gripping portion 57 which periodically engages each succeeding bag length and moves it in proper time to end folding instrumentalities which will be hereinafter described. Spaced apart strips 58 (Fig. 1) for the support of the bag lengths are located between the feed rolls 52 and the drawing rolls 56.

The feed rolls 18 and the pinch rolls 51 are geared together through a suitable gear train 59, and the pinch rolls are also geared to the main shaft through co-acting variable speed gears 60. The feed rolls 52 are geared together by co-acting gears 61, and the shaft of the lower roll 52 is equipped with a sprocket wheel 610 which is connected by a chain 62 with a similar wheel 63 on the shaft of the lower feed roll 18. Also the shafts of the drawing rolls 56 are connected by co-acting gears 64, and the shaft of the lower roll 56 carries a sprocket wheel 65 which is connected by means of a chain 66 with a sprocket wheel 67 on the drive shaft. The ratio of the spur and sprocket gearing referred to is such as to insure the proper sequential operations of the various mechanisms associated therewith.

The timed relation of the gearing just described is such that the feed rolls 18 and 52 travel at approximately the same peripheral speed, whereas the rolls 51 travel at a slower peripheral speed and engage the web periodically by means of the rib 53 on the upper roll 51, thereby temporarily retarding the speed of the advancing web and producing in the space between the feed rolls 18 and 51 a slackness of the web which facilitates the severing of the tube into bag lengths.

It is to be noted that the feed rolls 18 feed or draw the material which comes from the supply roll, through the tube forming and seam pasting instrumentalities, and advance the formed and pasted tube between the pinch rolls 51 and the frictional feed rolls 52. When the speed of the rolls 52 is changed, by variation of the length controlling gearing 60, the speed of these rolls, which are geared to the rolls 18 by means of the sprockets 63, 610 and chain 62, will change at the same ratio. The rolls 52, by virtue of their staggered groove formation, engage the paper by frictional contact only, and hence as soon as the raised portion 53 of the pinch roll 51, (which constantly travels at a slower surface speed than the feed rolls 18, 52) engages the tube, prior to the severing of the same, all that portion of the tube that has passed the center line of the roll 51 will travel at the same surface speed as the latter.

With proper relative adjustment the grooved feed rolls 52 by their frictional contact with the interposed advancing tube web temporarily retard the travel of the web during the engagement of the rib 53 with the advancing web, without rupturing the web. The frictional feeding contact of the rolls 52 also permits the withdrawing and advancing of the bag tube at an increased speed by the rolls 56 to the forwarding and end folding devices hereinafter described.

According to a feature of my invention the upper feed roll 18 has provision for its uniform vertical adjustment in respect to the complementary lower roll in order to vary the bite of the rolls to meet the requirements of different thickness of paper, and in addition means are provided for effectually supporting the lower roll midway between its ends in order to counteract downward stress upon the roll and ensure the parallelism of the rolls, as follows: The shaft of the upper roll 18 is journaled in eccentrics 68 which are rotatably mounted in vertically movable bearing boxes 69 on standards 70 on the sides of the main frame, and which heads are provided with forwardly projecting arms 71 connected by a cross-rod 72, by the manipulation of which the eccentrics can be simultaneously

moved to effect the engaging or disengaging the upper and lower feed rolls 18. Upward or downward adjustment of the upper roll is effected by screws 73 bearing on top of the boxes 69.

Supported by and between the sides of the main frame, directly beneath the lower roll 18, is a stout cross-bar 77 having a centrally bored and transversely slotted bearing member 78. Slidably fitted in the slot 79 is a vertically movable head 80, the upper surface of which is recessed to receive the central bearing of the lower roll 18. A guide stem 81 depends from the head into the central bore 82 of the bearing member, and a hand-operated screw 83, which is threaded in the lower end of such member, bears against the foot of the stem, thus affording a convenient means to adjust the stem and supporting head vertically with respect to the opposing roll, all in effect to preserve the parallel alignment of the two feed rolls, the center portion of which might spring apart under heavy adjusting pressure. The adjusting screw 83 is conveniently held in place by means of a radial lock screw 84 in the wall of the bearing member. (See Figs. 2, 3 and 8).

The preferred mechanism for forwarding, folding and sealing one end of each succeeding bag length will now be described. The tube is delivered by the drawing rolls 56 to a series of suitably-located travelling grippers which grip the leading end and the two side edges of the tube and positively pull it lengthwise of the machine. In the present instance there are three grippers, to wit, a central gripper 85 adapted to engage the leading end of the tube midway between the side edges of the tube, and two lateral grippers 86 adapted to engage the respective side edges of the tube somewhat away from its leading end. These grippers are respectively carried by a central chain 87 and side chains 88, all which chains pass around corresponding pairs of front and rear sprocket wheels 89, 90 fast on two parallel transverse shafts 91, 92 journaled in suitable bearings in the main frame. The upper runs of the respective chains travel in a horizontal plane slightly below and parallel with suitably-disposed track strips 93. The shafts 91, 92 bear gears 94, 95 included in a suitable gear train from the drawing rolls 56.

The central gripper comprises a lower jaw member 96 fixed to the chain 87, and also a co-operating movable jaw member 98 which is formed on a bracket piece 99 pivoted to the chain by a cross-pin 100. A suitable torsional spring 101 secured to the cross-pin and the bracket tends to maintain the jaw 98 normally in closed or gripping relation to the lower jaw. Depending from the bracket is an arm 102 having a lateral anti-friction roll 103, which at suitable locations in the route of the chain encounters cam members 104, 105 at the respective ends of a longitudinal bar 106 that is supported in parallelism with the upper run of the chain by means of cross-bars 107. (See Figs. 6 and 7.) The cam members are so located as to intercept the roll 103 of the gripper operating arm 102 as the gripper approaches and rounds the top of the wheel 89 and as the gripper reaches and rounds the wheel 90. When the roll rides on the cam 104 the gripper is opened against the action of the spring 101 and is maintained temporarily in open position so as to receive the leading end of the advancing tube, whereupon the arm escapes the cam 104, and the gripper, closing, grasps the end of the tube and positively pulls it bodily until the gripper arm roll 103 engages the cam 105, whereupon the gripper is opened and the tube released.

The side grippers are similar to each other in construction and operation, saving that their positions are reversed. Each of these grippers embodies a bracket 108 which is affixed to the inner side of the adjacent chain 88 in diagonally spaced relation to the vertical plane of the central gripper. Fixed to the bracket is a jaw member 109 with which co-acts a movable jaw 110 carried by the upper arm of a vertical lever 111 which is fulcrumed in the bracket, as at 112. The lower arm of the lever is provided with an anti-friction roll 113, and also with a laterally extending foot 114 between which and the bracket is interposed a suitable spring 115. This spring tends to maintain the jaw 110 normally in closed or gripping relation to the jaw 109. (See Fig. 9.)

Supported adjacent the upper run of each of the chains 88 in proximity to its respective sprocket wheels 89, 90 are rail sections 116, 117 having curved portions 118 about which the chain freely passes. Each of the curved portions is formed on its inner side with a cam surface 119 (Fig. 6) which lies in the path of and intercepts the roll 113 of the gripper lever 111 as the gripper approaches the top of the adjacent wheel. Hence when the rolls of the two side grippers engage and ride against the opposing cam surfaces 119 in the vicinity of the sprocket wheels 89, the gripper jaws 110 are opened against the stress of the springs 115 and are maintained temporarily in open position so as to receive the adjacent lateral edges of the advancing tube, whereupon the gripper jaws closing, grasp the edges of the tube and positively pull the latter bodily along. When the rolls 113 engage the cam surfaces 119 in the vicinity of the sprocket wheels 90, the gripper jaws 110 are forcibly opened, thus releasing the tube.

From the foregoing it will be seen that the leading end and the two side edges of the tube are simultaneously gripped by the three travelling grippers, and that the tube is

thereby positively and uniformly pulled along until it is finally released by the opening of the grippers.

Fast on the shaft 91 are a series of spaced-apart rolls 120 which support the tube in its travel, and also fast on the shaft 92 are a series of spaced-apart feed rolls 121 between which, and a series of upper rolls 122 the leading end of the tube is drawn by the travelling grippers.

As previously mentioned the spaced relation of the end and side grippers determines the angularity of the respective end folds of the bag. The folding is effected by means of a pair of converging bars 123 during the traverse of the tube and after the paste has been suitably applied to the end portions of the tube to be folded. (See Figs. 1A, 6, 7, 9 and 10.) These bars overhang the path of the tube and converge to points adjacent the median line of travel of the tube, each bar being secured at its outer end to a longitudinal rail section 124 supported on cross-bars 125 between the sides of the main frame. The bar is preferably secured to the adjacent rail 124 by means of a single bolt 126, thus permitting limited vertical flexibility of the bar. Preferably also the bar is slotted, as at 127, for the passage of the bolt so as to permit longitudinal adjustment of the bar.

As the leading end of the paper tube approaches the angularly disposed bars 123 such end is slightly raised by the action thereunder of vertically-movable fingers 128, and hence the under surface of the raised end of the progressing tube impinges against the opposing diagonal faces of the bars and passes thereunder, the end of the tube thus being gradually deflected and folded on opposite diagonal lines which are symmetrically defined by the relative positions of the end and side grippers. (See Fig. 6.) Sheet metal plates 129 attached to the respective bars afford extended ironing surfaces for the end folds of the progressing tube.

In the present instance the fingers 128 are formed by the angularly bent free ends of a pair of spaced-apart rods 130 which are secured at their forward ends to a rock-shaft 131 having its bearings in the sides of the main frame. (See Fig. 7). Fast on one end of this shaft is an upwardly and rearwardly inclined arm 132 having at its upper end a roll 133 which is held by means of a suitable spring connection 134 in contact with a cam 135 on a transverse shaft 136 having its bearings in standards 137 on the main frame. Fast on the shaft 136 is a spur wheel 138 which is driven through gears 138A, 138B from a gear 139 on the driven shaft of the lower drawing roll 56, thus rotating the shaft 136 and the cam 135 thereon. The contour of this cam is such that the arm 132 is periodically vibrated to effect the timely motion of the rock-shaft 131 and the finger bearing rods 130 supported thereby.

Any suitable means may be employed for supplying paste to the margin of the leading end of the tube preparatory to the folding operation. In the present instance a paste-containing trough 140 (Figs. 1A and 7) is supported on brackets 240 projecting from the standards 137, which trough is provided with a longitudinal paste carrying roll 141. The shaft of this roll bears a gear 142 in mesh with a gear 143 on the adjacent driven shaft 136, thus effecting the continuous rotation of the paste roll. Fast on and rotatable with the shaft 136 is a counterpoised frame 144 having at its outer end a paste-applying blade 145 which in its rotation wipes paste from the surface of the roll and applies a streak 146 thereof along the margin of the leading end of each succeeding tube as such margin approaches the diagonal folding bars 123.

When the bag is released by the travelling grippers 85, 86 the rolls 121, 122 advance the bag across a horizontal supporting plate 147 to the grippers 148 of the impression cylinder 149 of a suitable printing mechanism, which mechanism includes the usual form cylinders 150. (Fig. 2A.) Each succeeding bag, printed on one side, is delivered by the impression cylinder to feed rolls 151 which advance the bag to grippers 152 on a pair of endless take-off chains 153, which grippers are periodically opened and closed and are arranged and adapted to grip each succeeding bag and carry it to and deposit it flatwise upon a receiving bed 154 underlying the lower runs of the take-off chains.

A so-called suspension "dry cleaner" bag, such as illustrated in Fig. 11, is produced by the machine hereinbefore described. A bag of this type comprises a flat tubular body *a* open at its lower end and folded and sealed on diagonal lines *b* at its upper end to provide a central opening *c* for the free passage of the suspension hook of an ordinary garment hanger having a rigid body which is adapted to support a depending garment and also the adjacent end portion of the bag within which the garment is suspended.

In Figs. 12, 13 and 14, inclusive, of the drawings, I have shown a modification of the forwarding, pasting and folding mechanisms to adapt the machine to produce so-called "banana" bags, each of which has a straight instead of a V-shaped closure fold at one end, as indicated in Fig. 16. In this modified construction the central forwarding chain and its end gripper are disconnected, and the side edge grippers are arranged on the two side chains 88 so as to engage the tube at suitable points spaced from the leading end of the tube. The rotary paste frame has secured thereto, adjacent and parallel with the paste-applying strip 145, a rigid creasing blade 155, which, during the application of

a transverse streak of paste to the tube, impinges against the opposing surface of the tube in a manner to indent the surface in advance of the paste line, thereby upwardly deflecting the leading end of the tube, as indicated at 156, Figs. 12 and 15. The tube-supporting rolls 120 on the shaft 91 have grooved inserts 157 which are so disposed that their grooves are in alignment with the rotating blade 155 when it engages the tube.

Immediately in front of the feed rolls 121, 122 is mounted a lifting and folding member comprising an oscillatory plate 158 which extends transversely of and is movable toward and from the path of the paper tube. This plate, which has a slightly inclined forward nose portion 159, is affixed to a transverse rock-shaft 160 having is bearings in brackets 161 at the sides of the main frame. One end of the shaft 160 is provided with a crank 162 which is connected by means of a link 163 with the upper end of the inclined arm 132, previously referred to, which bears a lateral roll 133 that is held by means of a suitably disposed spring connection 134 in operative contact with the cam 135 on the driven shaft 136 of the paste applying mechanism. By virtue of the contour of the cam and connections the rock-shaft 160 is permitted to swing slightly to the right, as viewed in Fig. 12, as the upwardly deflected end 156 of the paper tube approaches the nose of the plate 158, thereby partially turning the rock-shaft and tilting the plate to position its nose in the path of the tube end 156. Hence the tube end passes upon the nose 159. Coincidentally the cam gradually forces the lever 132 to the left, thus moving the plate to a horizontal position as seen in Fig. 13. As the tube continues its progress the end 156 thereof passes beneath the plate 158 and is thereby folded down upon the pasted surface of the tube, passing thence into the bite of the feed rolls 121, 122.

It is to be understood that my invention is not limited to the particular constructions herein disclosed, as the same may be variously modified within the principle of the invention and the scope of the appended claims.

I claim—

1. The combination with web feeding means, of means for folding a travelling web longitudinally into flat tube form, said folding means comprising a pair of guide members beneath which the web is drawn, means for relatively adjusting said members transversely of the path of travel of the web, longitudinal side bars pivoted to and adjustable with said guide members, and means for varying the spaced relation of the free ends of the pivoted bars independently of the adjustment of the said members.

2. The combination with web feeding means, of means for folding a travelling web longitudinally into flat tube form, said folding means comprising a pair of guide members beneath which the web is drawn, means for relatively adjusting said members transversely of the path of travel of the web, longitudinal side bars pivoted to and adjustable with said guide members, a longitudinal mid-bar supported intermediate the guide members, and connections between the said mid-bar and the respective side bars whereby the free ends of the latter are adjustable independently of the adjustment of the said guide members.

3. The combination with web feeding means, of means for folding a travelling web longitudinally into flat tube form, said folding means comprising a pair of guide members beneath which the web is drawn, means, including screws, for relatively adjusting said members transversely of the path of travel of the web, means for guiding said members in their transverse adjustment, means for securing said members in positions of adjustment, longitudinal side bars pivoted to and adjustable with said guide members, and means for varying the spaced relation of the free ends of the pivoted bars independently of the adjustment of the said members.

4. The combination with web feeding means, of means for folding a travelling web longitudinally into flat tube form, said folding means comprising a pair of guide members beneath which the web is drawn, means including screws, for relatively adjusting said members transversely of the path of travel of the web, means for guiding said members in their transverse adjustment, means for securing said members in positions of adjustment, longitudinal side bars pivoted to and adjustable with the respective guide members, a longitudinal mid-bar supported intermediate the guide members, and connections between the said mid-bar and the respective side bars whereby the free ends of the latter are adjustable independently of the adjustment of the said guide members.

5. The combination with feed rolls for drawing a web of material, of means for folding a web longitudinally into flat tube form as it advances to the rolls, said folding means comprising a pair of guide members, a transverse guide bar, brackets slidable on said bar, pendant means on said brackets supporting the respective guide members, means for simultaneously adjusting the said brackets along the bar, longitudinal side bars pivoted to and adjustable with the respective guide members, an intermediate bracket on the guide bar, pendant means on said intermediate bracket, a longitudinal mid-bar fixed to said latter pendant means, a brace connection between said mid-bar and the intermediate bracket, and connections between the mid-bar and the respective side bars whereby

the free ends of the latter are adjustable independently of the adjustment of the said guide members.

6. The combination with feed rolls for drawing a web of material, of means for folding a web longitudinally into flat tube form as it advances to the rolls, said folding means comprising a pair of guide members, means for relatively adjusting said members transversely of the path of travel of the web, longitudinal side bars pivoted to and adjustable with said guide members, a longitudinal mid-bar supported at one end intermediate the guide members, the said mid-bar extending between and beyond the feed rolls and terminating in a transverse severing edge, and connections between the said mid-bar and the respective side bars whereby the free ends of the latter are adjustable independently of the adjustment of the said guide members.

7. The combination with means for forming and delivering flat paper tubes, of tube forwarding means including travelling grippers for grasping the side edges of each succeeding tube at points in spaced relation to the leading end of the tube, means for periodicaly actuating said grippers to cause them temporarily to grip each succeeding tube, a folding element arranged and adapted to engage the leading end of the tube, and means for raising such tube end as it approaches the folding element, whereby such end encounters the opposing surface of the folding element and is thereby gradually folded upon the body of the tube.

8. The combination with means for forming and delivering flat paper tubes, of tube forwarding means including travelling grippers for grasping the side edges of each succeeding tube at points in spaced relation to the leading end of the tube, means for periodicaly actuating said grippers to cause them temporarily to grip each succeeding tube, a folding element arranged and adapted to engage the leading end of the tube, means for applying paste to the tube in advance of the grippers, and means for raising the leading end of the tube in timed relation to the operation of the paste-applying means.

9. The combination with means for forming and delivering flat paper tubes, of tube forwarding means comprising travelling central and side grippers whereof the latter are in spaced diagonal relation to the former, means for actuating said grippers to cause them temporarily to grip the leading end and the side edges of each succeeding tube, converging folding members overlying the path of travel of the tube, and means for raising the leading end of the tube as it approaches said members, whereby such end encounters the opposing diagonal surfaces of said members and is thereby gradually folded on opposite diagonal lines defined by the relative positions of the said grippers.

10. The combination with means for forming and delivering flat paper tubes, of tube forwarding means comprising travelling central and side grippers whereof the latter are in spaced diagonal relation to the former, means for actuating said grippers to cause them temporarily to grip the leading end and the side edges of each succeeding tube, converging folding members overlying the path of travel of the tube, means for applying paste to the leading end of the tube, said last named means including a rotary paste applying member, means for raising the leading end of the tube as it approaches the folding members, and means for operating the paste-applying means and the end raising means in timed relation to each other.

11. The combination with means for forming and delivering flat paper tubes, of tube forwarding means comprising travelling central and side grippers whereof the latter are in spaced diagonal relation to the former, means for actuating said grippers to cause them temporarily to grip the leading end and the side edges of each succeeding tube, converging folding members overlying the path of travel of the tube, and means for raising the leading end of the tube as it approaches said members, said last named means comprising rock-arms having fingers underlying the path of the tube, and means for vibrating said arms in timed relation to the travel of the grippers.

12. The combination with means for forming and delivering flat paper tubes, of tube forwarding means comprising travelling central and side grippers whereof the latter are in spaced diagonal relation to the former, means for actuating said grippers to cause them temporarily to grip the leading end and the side edges of each succeeding tube, a pair of converging folding bars overlying the path of travel of the tube, means for adjustably supporting the outer ends of the bars, and means for raising the leading end of the tube as it approaches said bars, whereby such end encounters the opposing surfaces of the bars and is thereby gradually folded on opposite diagonal lines defined by the relative positions of the said grippers.

13. The combination with means for forming and delivering flat paper tubes, of tube forwarding means comprising central and side endless travelling members extending longitudinally of the path of the tubes, means for concurrently actuating said members, normally closed grippers on said members, the gripper of the central member being in advance of the grippers of the side members, and means for periodically actuating said grippers whereby the leading end and the side edges of each succeeding tube are engaged by the respective grippers and the tube

is thereby pulled rearward and released, converging folding members overlying the path of travel of the tube, and means for raising the leading end of the tube as it approaches said members, whereby such end encounters the opposing surfaces of the bars and is thereby gradually folded on opposite diagonal lines defined by the relative positions of the said grippers.

14. The combination with means for forming and delivering flat paper tubes, of tube forwarding means comprising central and side endless chains extending longitudinally of the path of the tubes, sprockets for said chains, shafts for said sprockets, means for actuating said shafts, normally closed grippers on the side chains, a normally closed gripper on the central chain in advance of the side grippers, each of said grippers including a cam operated member, cams located in the paths of the respective members whereby the grippers are actuated at predetermined intervals to engage and permit the release of the leading end and the side edges of each succeeding tube, converging folding members overlying the path of travel of the tube, and means for raising the leading end of the tube as it approaches said members, whereby such end encounters the opposing surfaces of the bars and is thereby gradually folded on opposite diagonal lines defined by the relative positions of the said grippers.

15. The combination with means for forming and delivering flat paper tubes, of tube forwarding means comprising travelling central and side grippers whereof the latter are in spaced diagonal relation to the former, means for actuating said grippers to cause them temporarily to grip the leading end and the side edges of each succeeding tube, converging folding bars, including extended ironing members, overlying the path of travel of the tube, and means for raising the leading end of the tube as it approaches said members.

Signed at city of New York, in the county of Kings and State of New York this 24 day of October A. D. 1928.

ADOLPH POTDEVIN.