P. L. BARTHOLOMEW.

PAPER BAG MAKING MACHINE.

APPLICATION FILED JUNE 7, 1918.

1,298,276.

Patented Mar. 25, 1919.

9 SHEETS—SHEET 1.

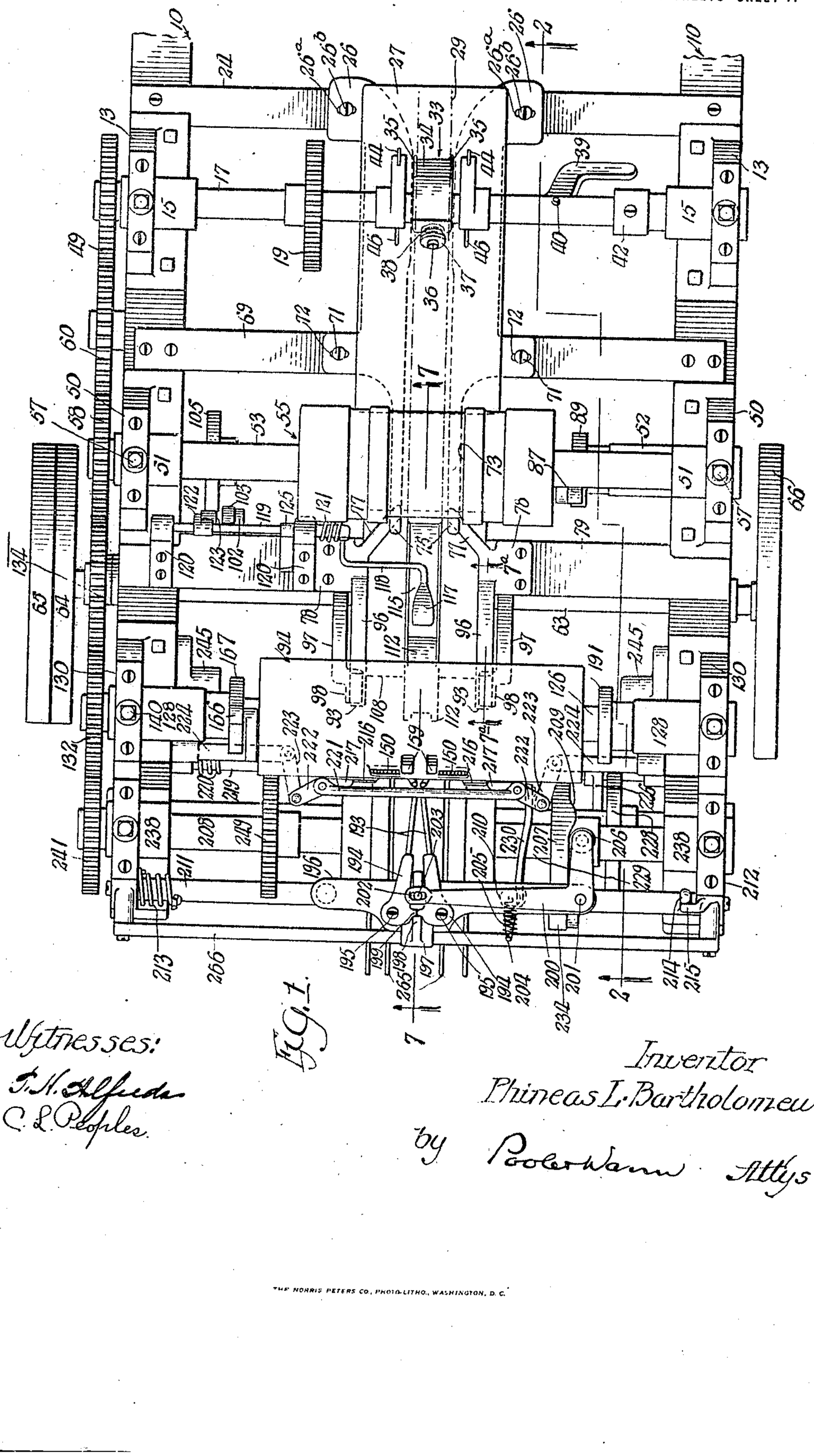

Fig. 1.

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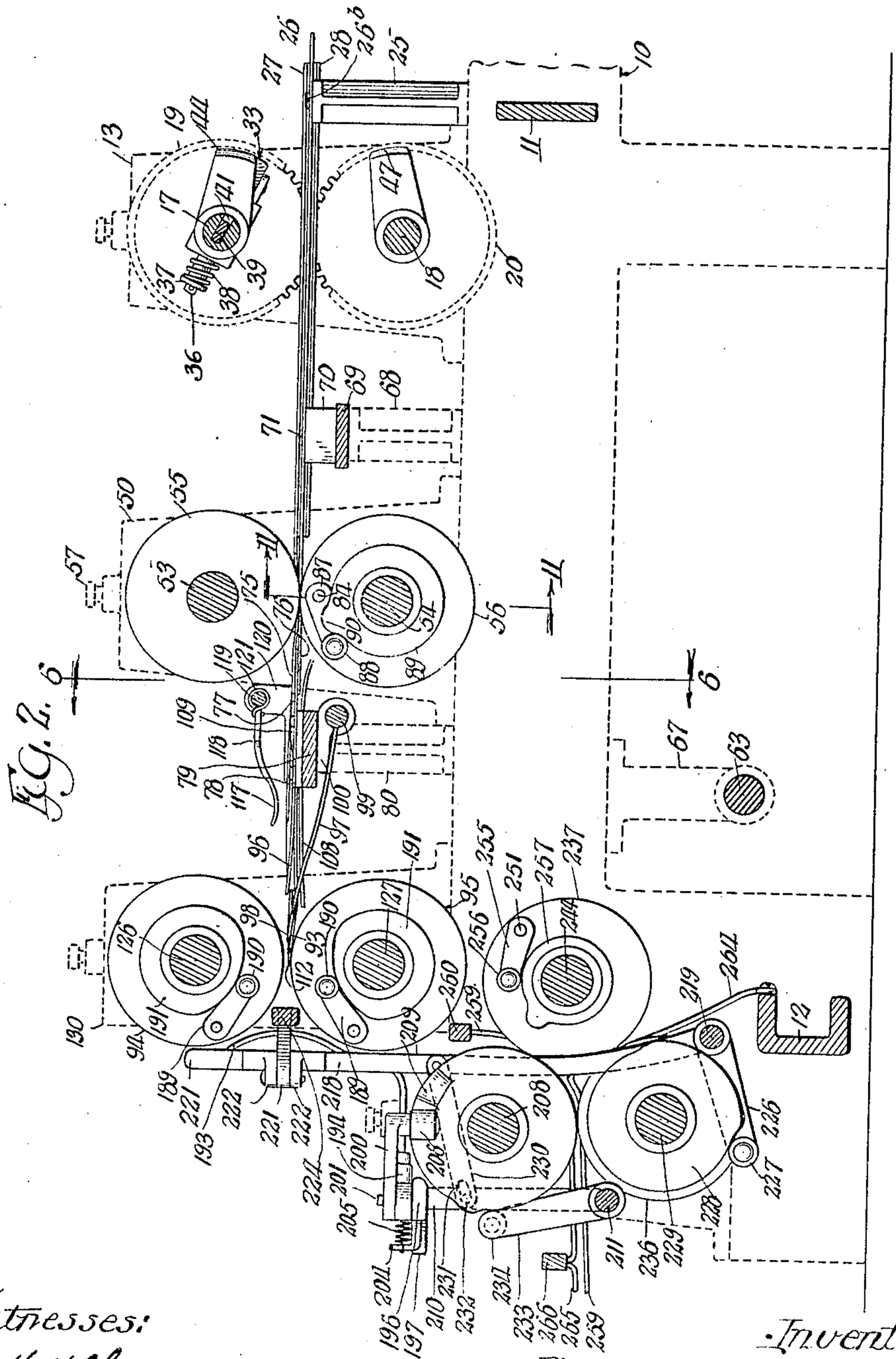

Fig. 2.

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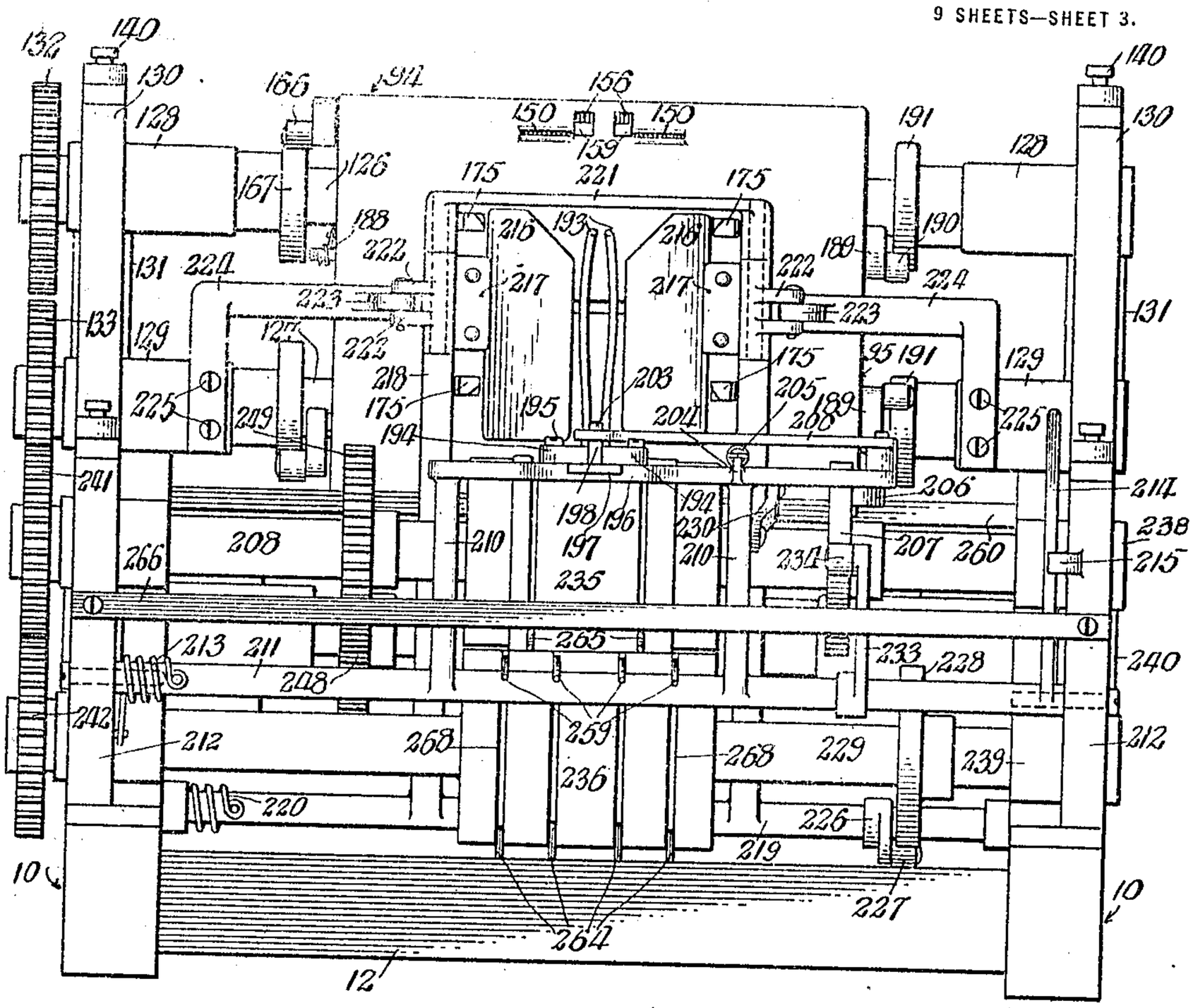

Fig. 3.

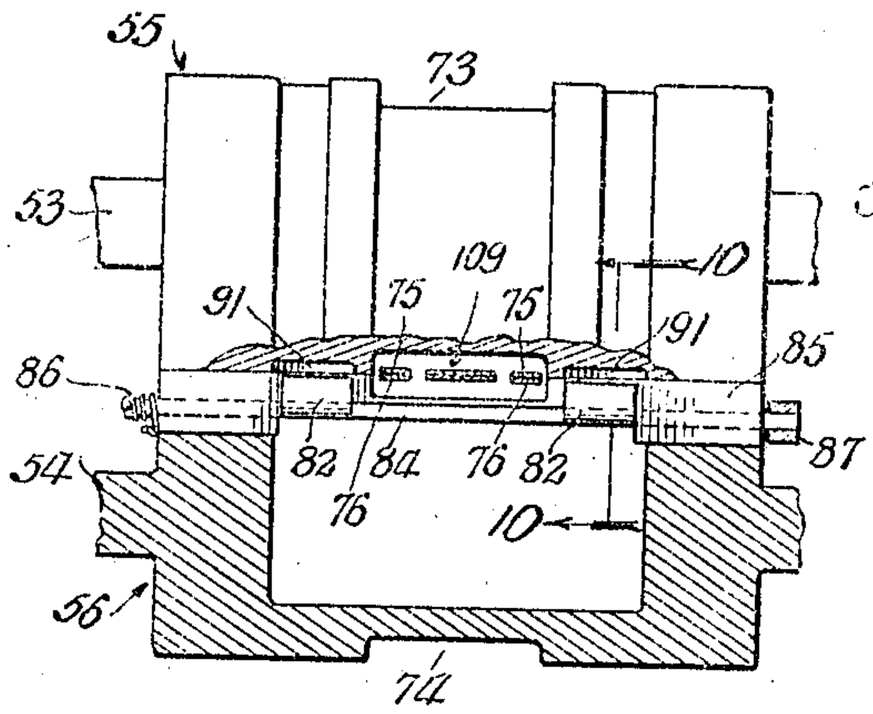

Fig. 11.

Witnesses:
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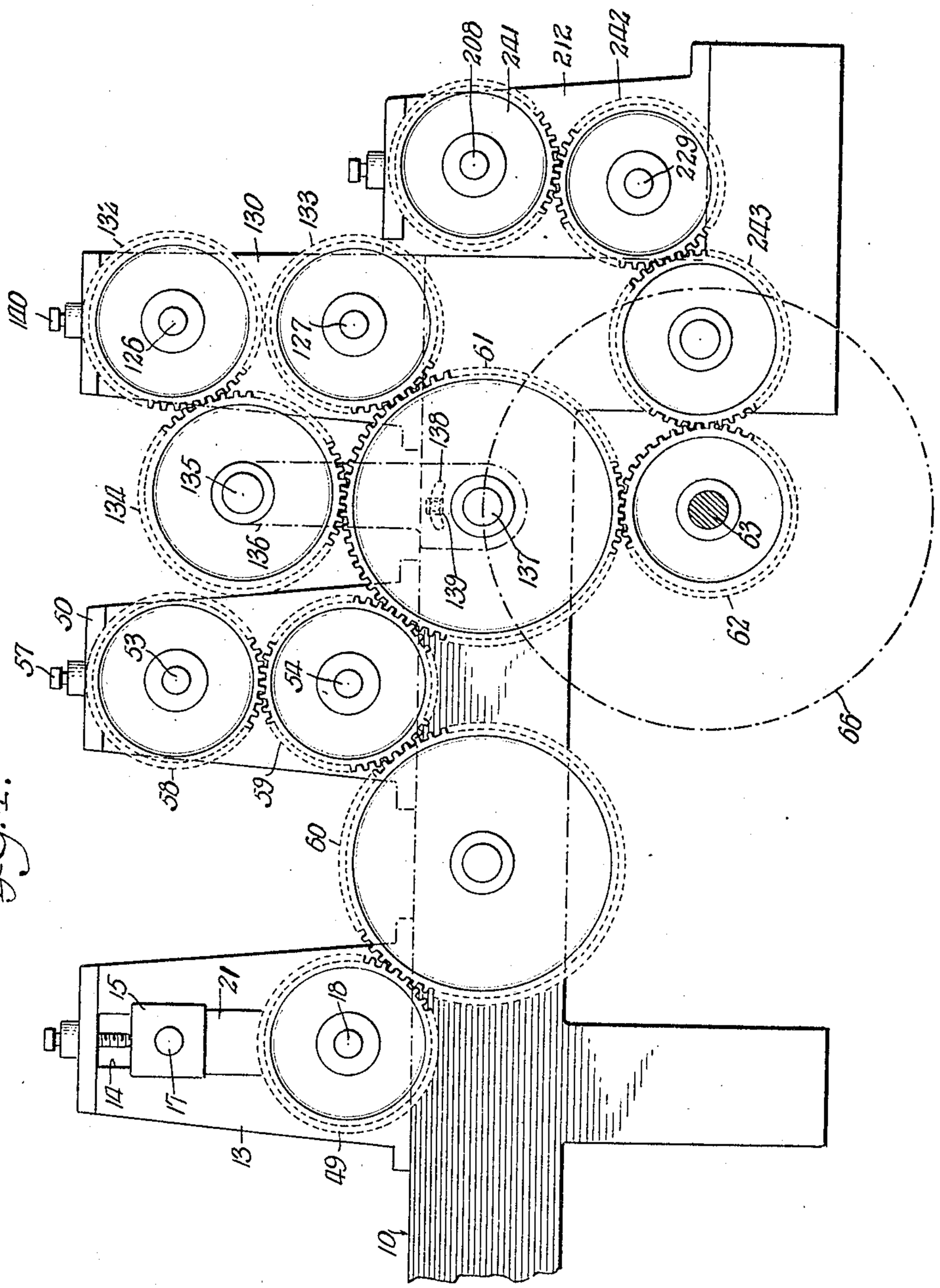

Fig. 4.

Witnesses.
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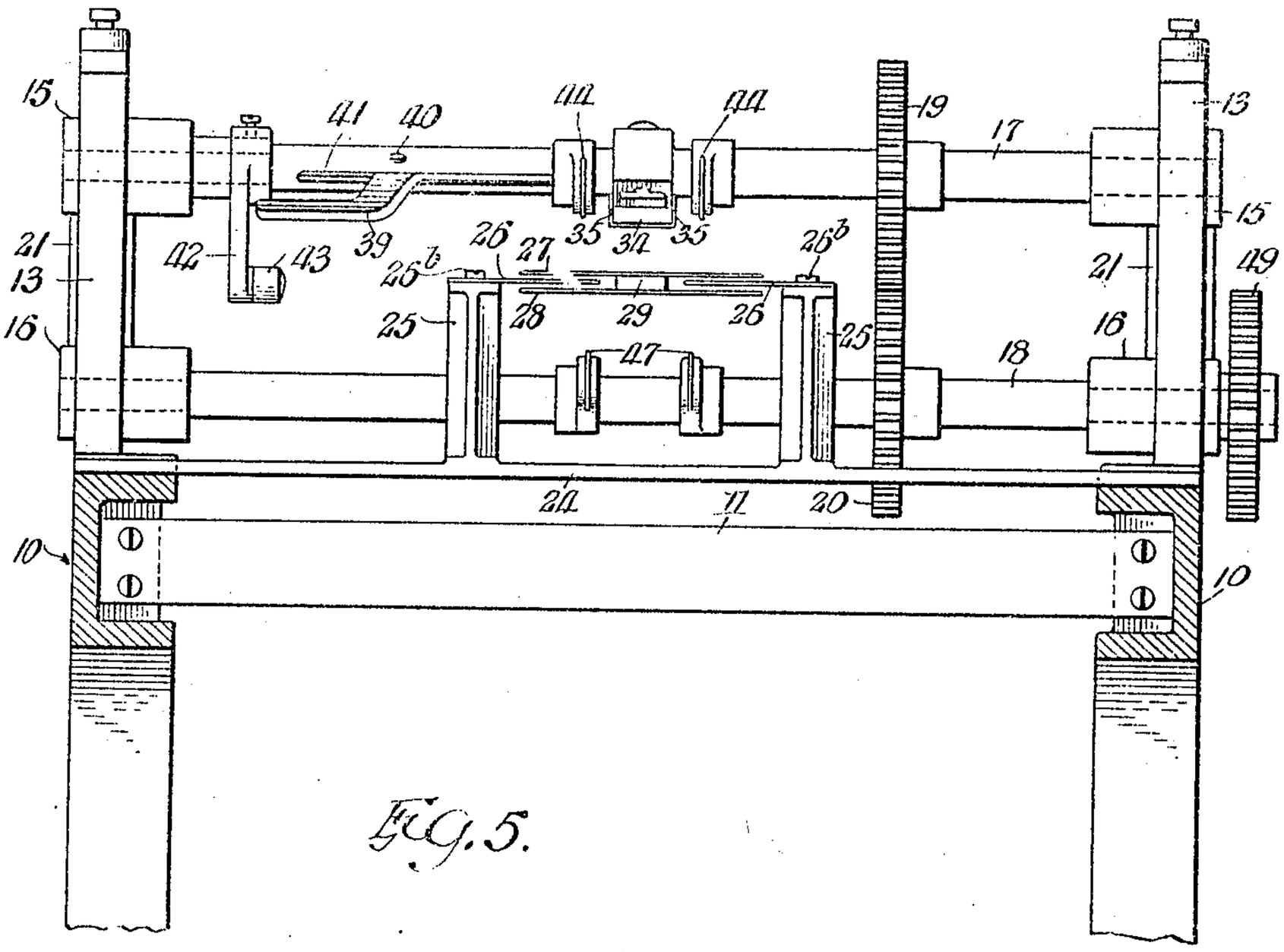

FIG. 5.

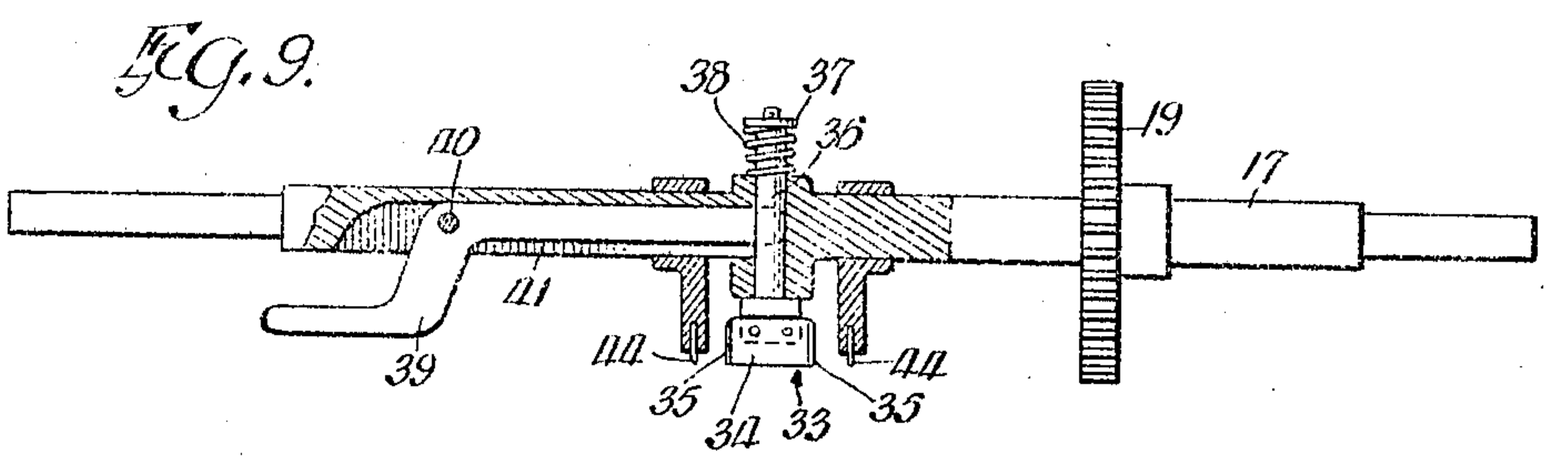

FIG. 9.

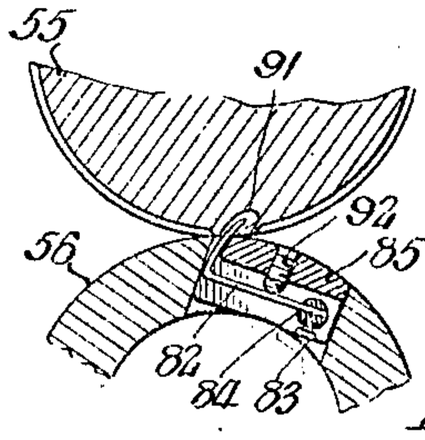

FIG. 10.

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9 SHEETS—SHEET 6.

Fig. 6.

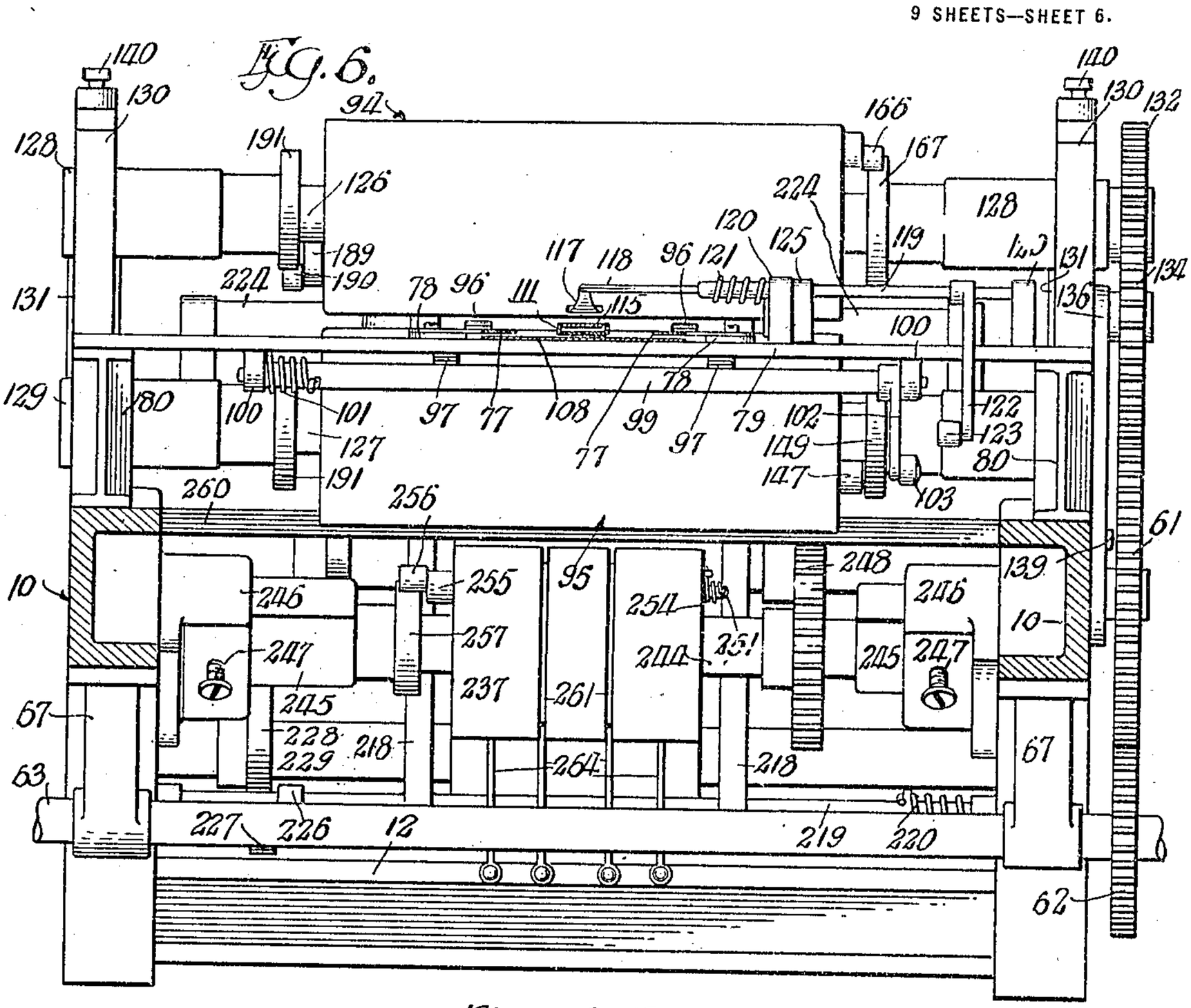
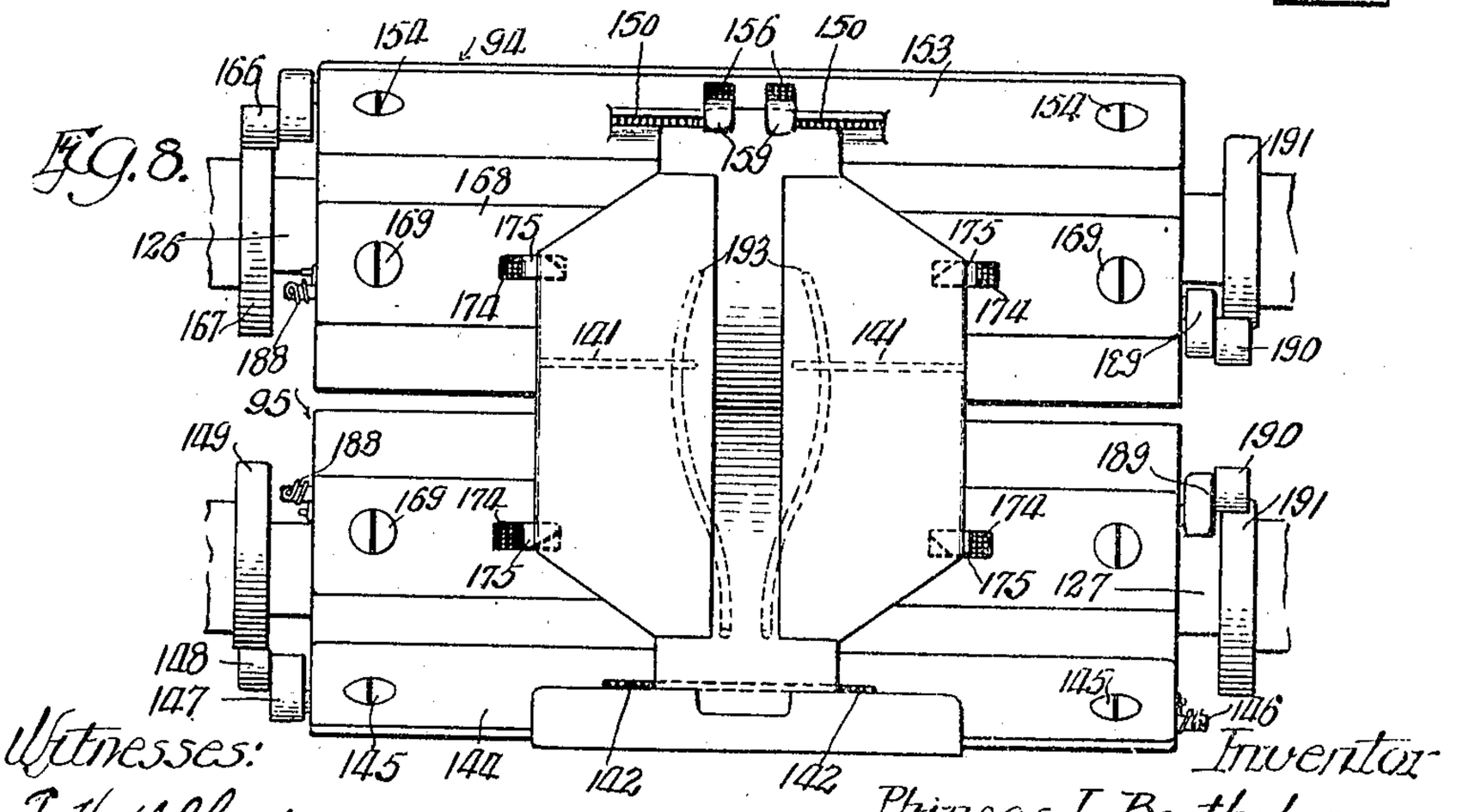


Fig. 8.



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9 SHEETS—SHEET 7.

Fig. 7.

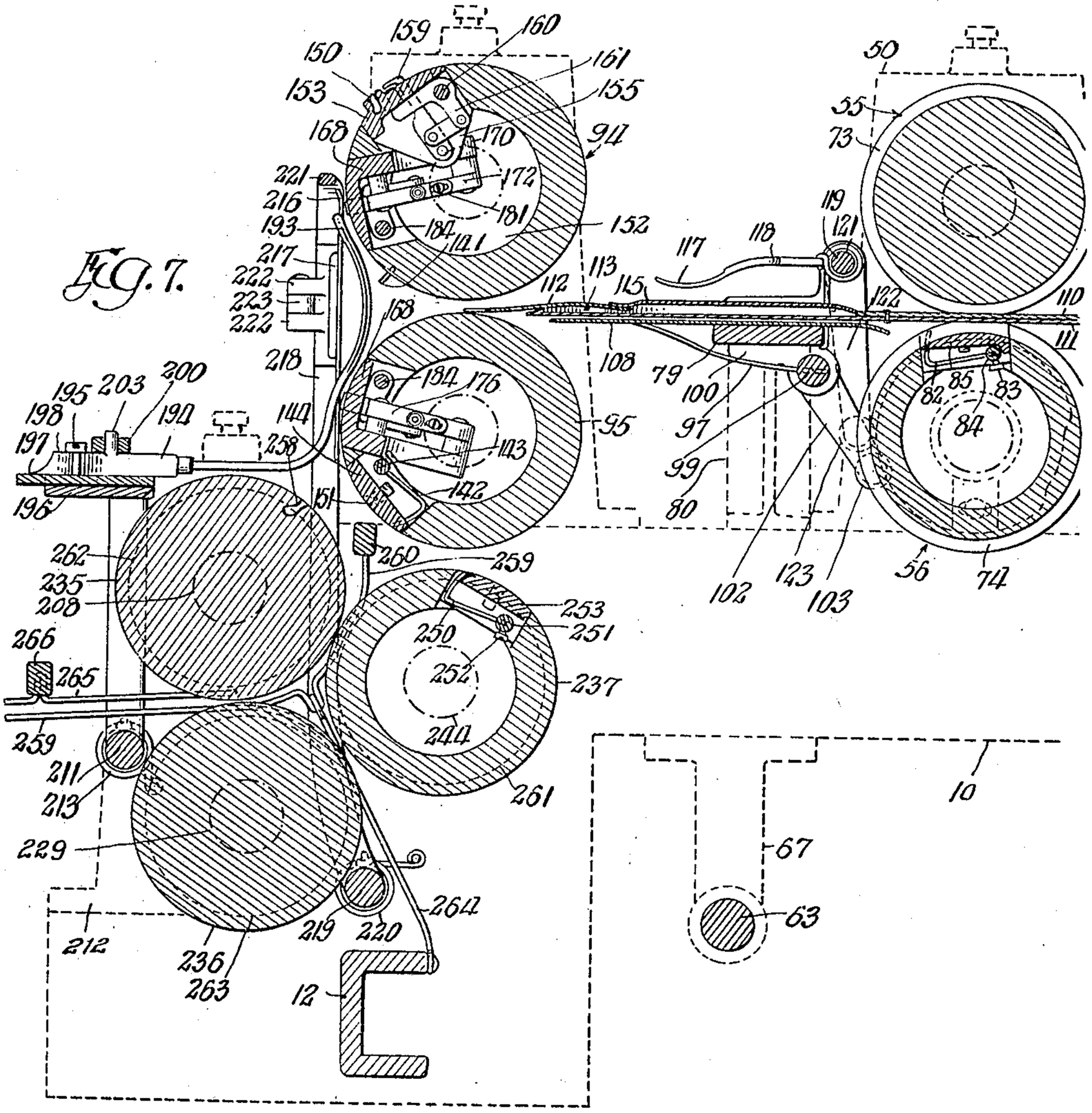


Fig. 7a

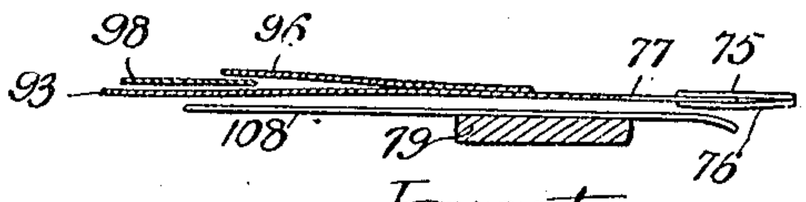
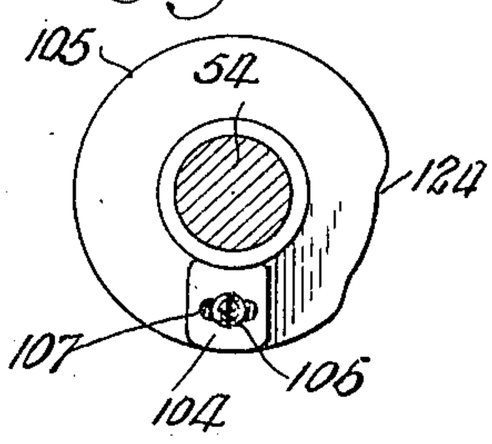


Fig. 21



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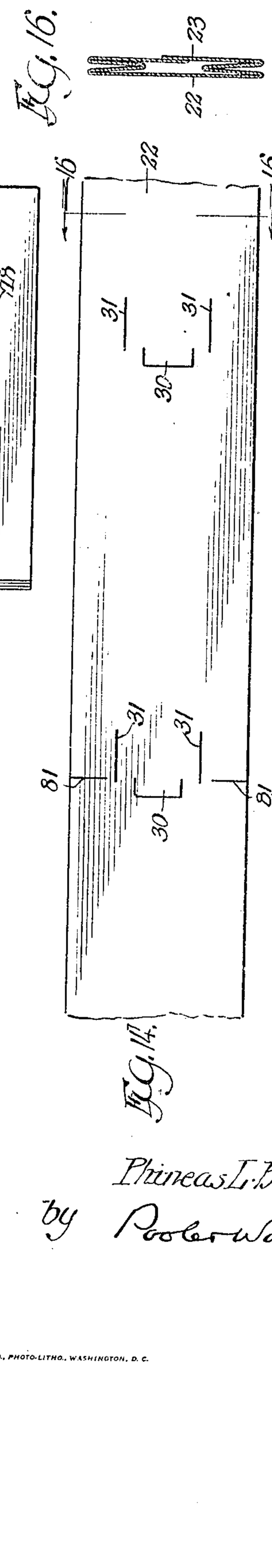

FIG. 16.

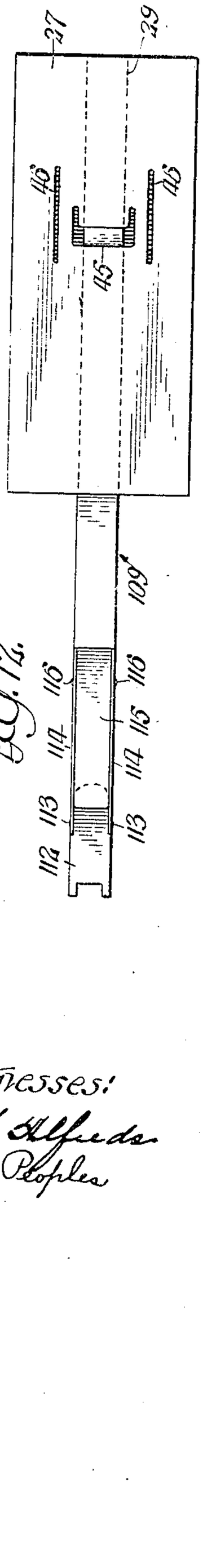

FIG. 12.

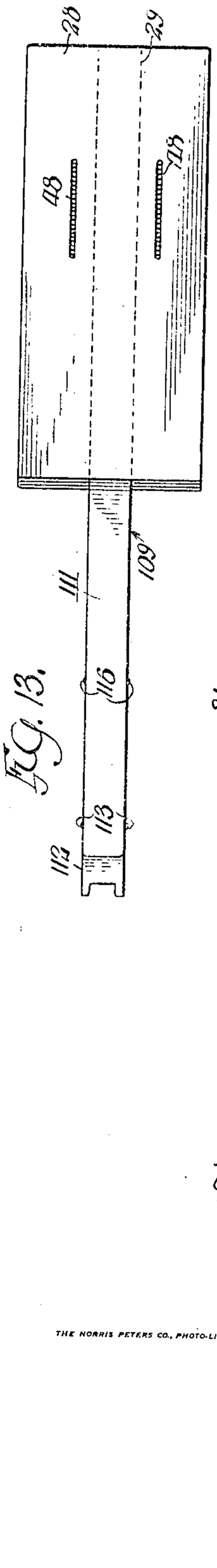

FIG. 13.

FIG. 14.

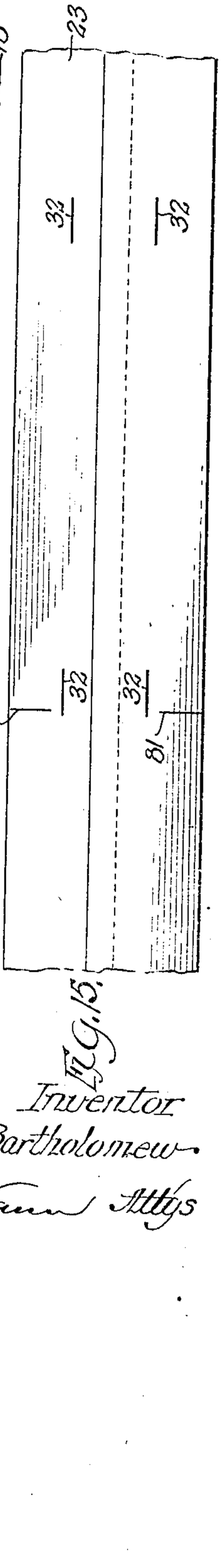

FIG. 15.

FIG. 13.

FIG. 12.

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9 SHEETS—SHEET 9.

Fig. 17.

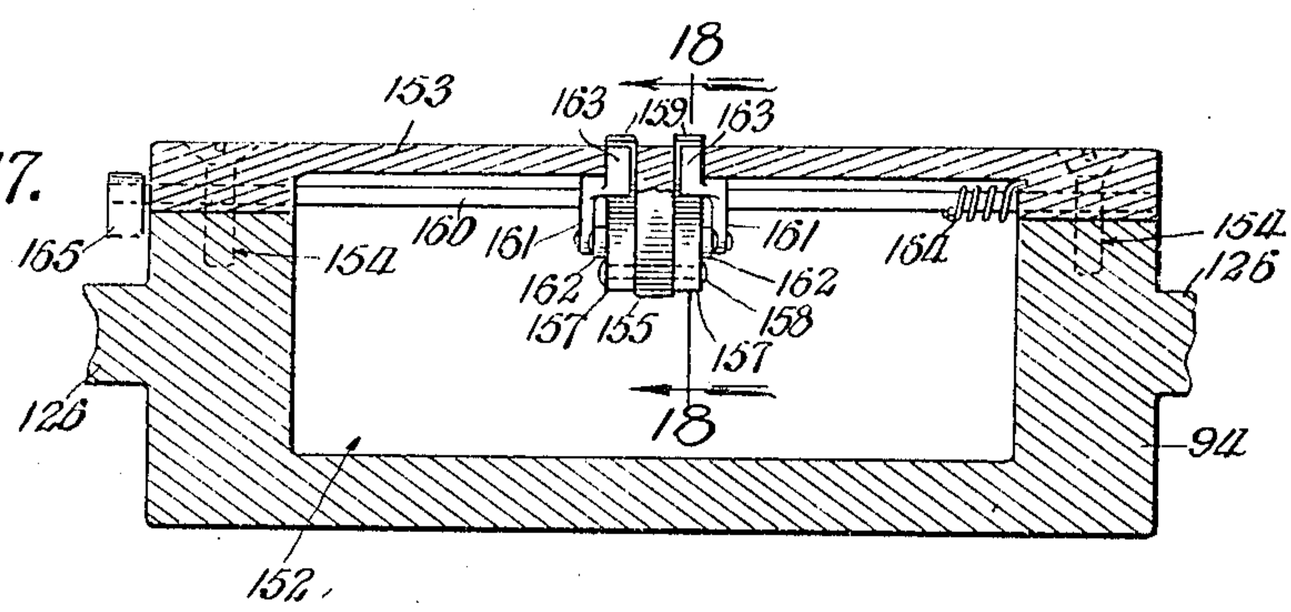


Fig. 19.

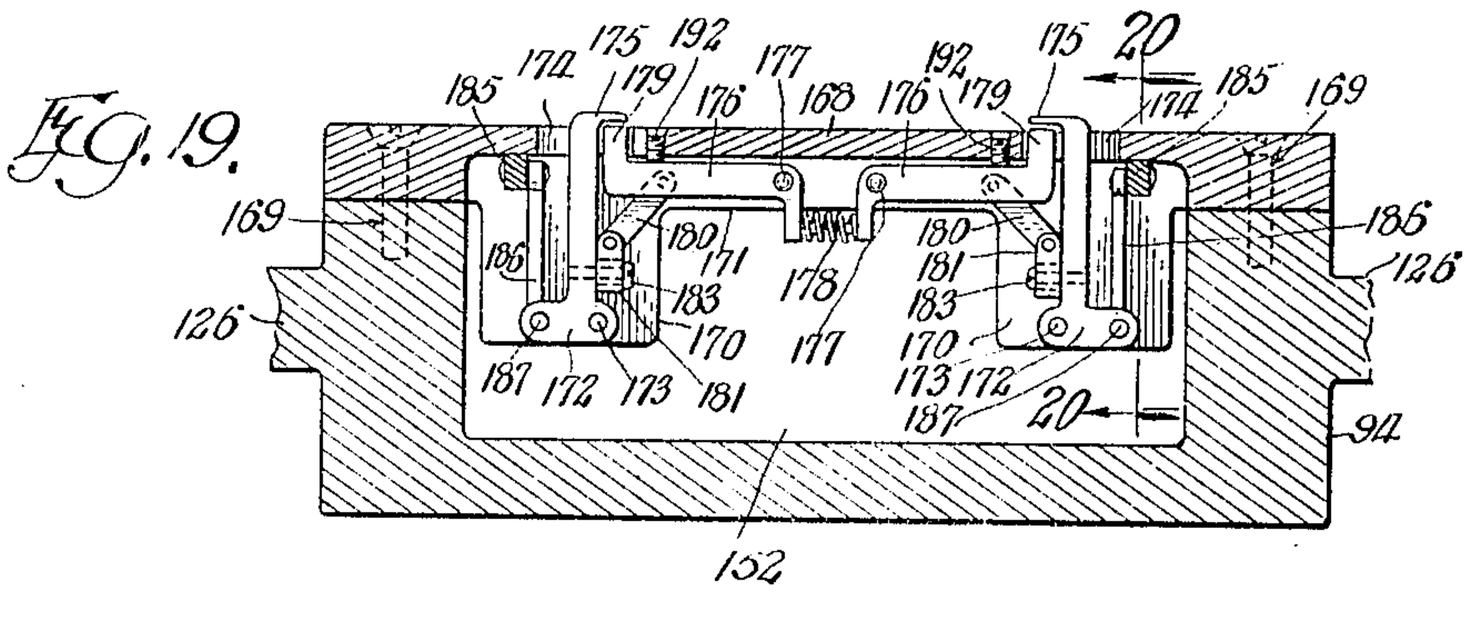


Fig. 18.

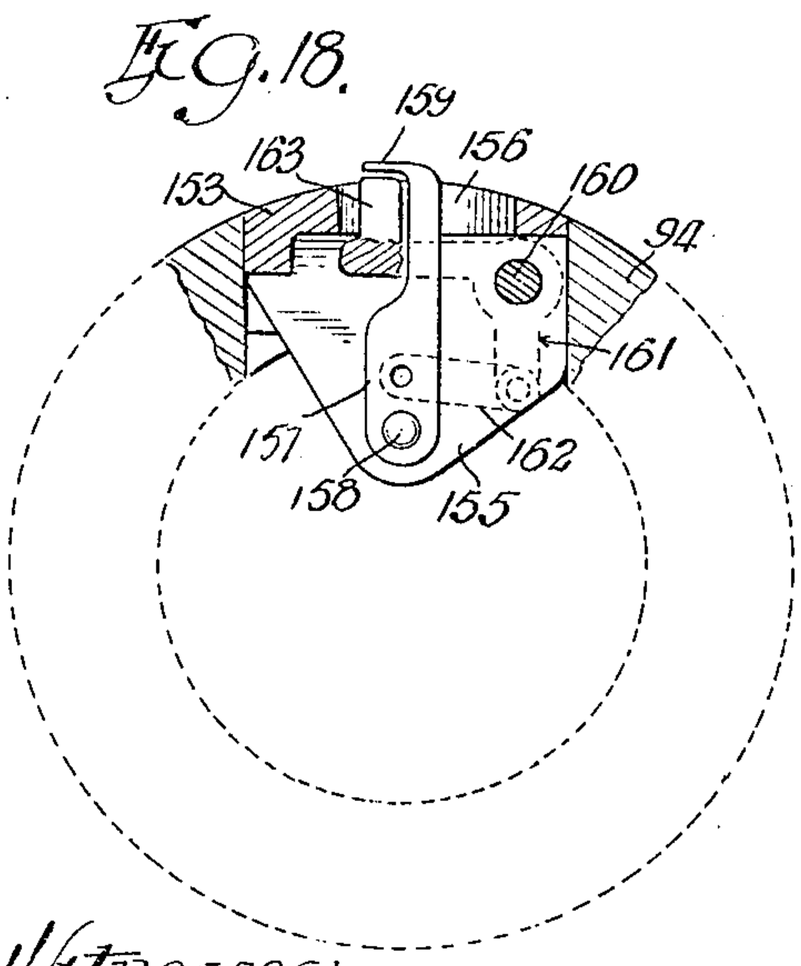
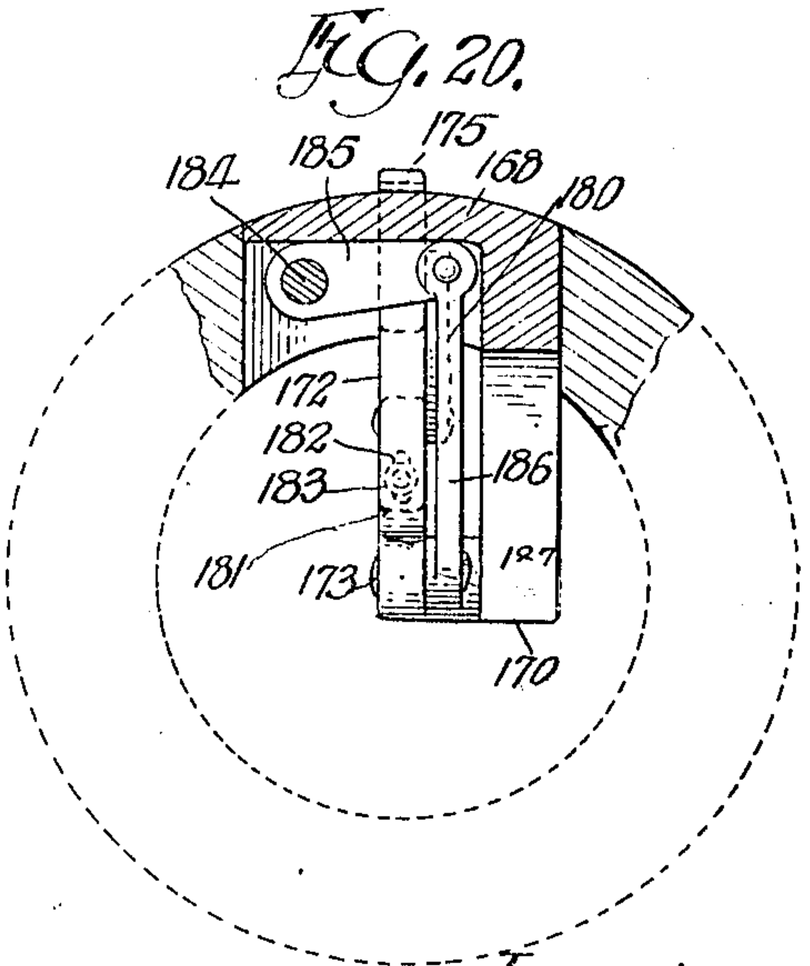


Fig. 20.



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UNITED STATES PATENT OFFICE.

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PAPER-BAG-MAKING MACHINE.

1,298,276. Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed June 7, 1918. Serial No. 238,662.

To all whom it may concern:

Be it known that I, PHINEAS L. BARTHOLOMEW, a citizen of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented new and useful Improvements in Paper-Bag-Making Machines, of which the following is a specification.

This invention relates to paper bag making machines, and more particularly to those machines of the rotary type, in which a diamond fold is formed for the bottom of each bag, the body of the latter being formed of a bellows folded tube.

Among the objects of my invention is to improve the construction of machines of the kind referred to in the several particulars as will hereinafter more fully appear, and to provide in particular improvements in that portion of the machine which makes and forms a diamond fold for the bottom of the bag. Another object of my invention is to so construct and arrange the parts of the machine that the latter may be operated at a high speed and thus enable the formation and turning out of completed bags at a very rapid rate. A further object of my invention is to provide the cutting knives which operate on the bellows folded tube as it is advanced through the machine and have such cutting knives so mounted that they have movement in the arc of a circle into and out of cutting position. A still further object of my invention is to space the gripper rolls apart so that they do not contact with each other, so that the creaser blades on one gripper roll need not enter slots in the other gripper roll and thereby avoid undue tension or strains on the paper tube when the creaser blades act against the same. A still further object of my invention is to provide an improved form of gripper mechanism for each of the gripper rolls, and so arrange and construct such mechanism that it will positively and rapidly operate to grip interposed portions of the paper tube between the parts. A further object of my invention is to provide a novel construction in spreader arms and ironer plates so that the latter are in front of the gripper rolls and are supported by means located below the gripper rolls; and further to provide a construction so that the swinging movement of the ironer plates into open and closed positions will be relatively small or short, and thereby require but a minimum amount of space to be utilized for this purpose. And another object of my invention is to make the guide strips and depth plates integral so that the former constitute a continuation of the latter; and further to provide a novel form of tongue plate, which when actuated serves to raise a lip cut in the upper layer of the paper tube toward the upper gripper roll, so that a set of gripper fingers therein may readily and quickly grip such lip at the proper time during the operation of the machine.

The invention consists further in the matters hereinafter described and more particularly pointed out in the appended claims.

In the accompanying drawings—

Figure 1 is a top plan view of a paper bag making machine embodying the features of my invention;

Fig. 2 is a vertical longitudinal sectional view taken on the indirect line 2—2 of Fig. 1;

Fig. 3 is a front elevational view of said machine;

Fig. 4 is a side elevational view of said machine and showing the arrangement of gears in the train of gearing at that side of the machine;

Fig. 5 is a rear elevational view of said machine;

Fig. 6 is a transverse vertical sectional view taken on line 6—6 of Fig. 2;

Fig. 7 is an enlarged fragmentary vertical sectional view taken on line 7—7 of Fig. 1;

Fig. 7ª is a fragmentary vertical sectional view taken on line 7ª—7ª of Fig. 1;

Fig. 8 is a front elevational view of the two gripper rolls with the surrounding portions of the machine removed for the sake of clearness of illustration and showing the paper tube gripped by the several sets of gripper fingers in said gripper rolls in the formation of the diamond fold;

Fig. 9 is a longitudinal sectional view with parts in elevation, taken through one of the shafts provided with a set of cutters at the rear end of the machine;

Fig. 10 is an enlarged fragmentary vertical sectional view taken on line 10—10 of Fig. 11;

Fig. 11 is a sectional view with parts in elevation, taken on line 11—11 of Fig. 2;

Fig. 12 is a top plan view of the forming plate and attached tongue plate, said parts being shown removed from the machine;

Fig. 13 is a bottom plan view of the parts shown in Fig. 12;

Fig. 14 is a top plan view of a bellows folded tube after being cut by the several sets of cutting knives embodied in my machine;

Fig. 15 is a bottom plan view of the folded tube shown in Fig. 14;

Fig. 16 is a transverse sectional view taken on line 16—16 of Fig. 14;

Fig. 17 is a longitudinal sectional view taken through the upper gripper roll and showing the set of gripper fingers therein which engage the lip cut in the paper tube;

Fig. 18 is an enlarged transverse sectional view taken on line 18—18 of Fig. 17;

Fig. 19 is a longitudinal sectional view taken through said upper gripper roll and showing the second set of gripper fingers therein;

Fig. 20 is an enlarged vertical sectional view taken on line 20—20 of Fig. 19; and

Fig. 21 is a side elevational view of one of the cam members, to be hereinafter referred to in detail.

In the drawings, I have shown in detail a paper bag making machine embodying the features of my invention, and, as shown, the same comprises a supporting frame embracing two longitudinally extending side members 10, 10 laterally spaced apart and maintained in such spaced relation by cross-bars or the like, there being one cross-bar 11 at the rear end of the machine and another cross-bar 12 at the front end of the machine, as shown in Fig. 2. When reference is made herein to the front and rear ends of the machine, the rear end is intended to mean the receiving end of the machine, that is, the end at which the bellows folded tube is fed thereinto, and the front end is intended to mean the delivery end of the machine. Secured to and projecting upwardly from the side members 10 at the rear end of the machine are two upright standards 13, 13, each having a vertical slot 14 (Fig. 4) therein to receive two bearing boxes 15, 16, in which are journaled the associated ends of horizontally arranged shafts 17, 18, upon which are mounted intermeshing gears 19, 20 so that one shaft will be rotated by the other. The bearing boxes 15, 16 are spaced apart by an interposed spacing block 21, as shown in Figs. 4 and 5. In Figs. 14 and 15, I have shown a portion of a bellows folded tube, the same having a bellows fold in the sides thereof, as shown in Fig. 16. Said tube is formed by suitable mechanism (not shown) beyond the rear end of the machine parts illustrated in the drawings, and has an upper layer 22 and a lower layer 23, the latter having its longitudinal meeting edges overlapped and sealed together. The blank tube is fed into my machine from the rear end thereof and advances toward the front end of the machine between the shafts 17, 18. For supporting the folded tube as it is advanced through the machine, I provide the following construction. Extending across the rear end of the machine in the rear of the standards 13, 13 is a cross-bar 24, as shown in Figs. 1 and 5. Secured to and projecting upward from said cross-bar are two upright standards 25, 25, laterally spaced apart the required distance and having the same height. Secured to each standard 25 is a relatively flat depth plate 26, 26 projecting toward each other but having their opposed edges spaced apart, as shown in Figs. 1 and 5. Said depth plates have adjustable connection with the standards 25, 25 by elongated slots 26^a and fastening screws 26^b, so that said plates may be adjusted toward and from each other for accommodating them to the depth of the bellows fold at the sides of the tube and into which said plates extend. Said depth plates extend toward the front of the machine and terminate short of the two gripper rolls, to be hereinafter referred to. Associated with said depth plates is a forming plate composed of two relatively flat plates 27, 28 vertically spaced apart, as shown in Fig. 5, by an interposed spacing strip 29. Said forming plates are located above and below said depth plates and the latter project into the space provided between the same. The folded paper tube in being fed into my machine envelops the forming plates 27, 28, that is, the upper layer 22 of the paper tube extends over and above the top plate 27, and the lower layer 23 of the tube extends beneath and under the bottom plate 28, with the bellows fold in each side of the tube extending into the space between the forming plates 27, 28 and having the depth plates 26, 26 projecting thereinto.

For the purpose of cutting a lip 30 (Fig. 14) and two longitudinally extending cuts 31, 31 in the upper layer 22 of the tube and offset outwardly from the base of the lip and for forming two longitudinal cuts 32, 32 in the bottom layer 23 of said tube, I provide cutting mechanism on the shafts 17, 18. The upper shaft 17 is provided intermediate its ends with the cutting devices for cutting the lip 30 and the longitudinal cuts 31, 31, while the lower shaft 18 is provided with cutting devices for cutting the slots 32, 32. Mounted on said shaft 17 is a cutting knife 33 having a form to cut a lip 30 of the shape shown in Fig. 14, that is, said knife 33 is provided with a body portion 34 having at each end thereof transverse end portions 35, 35, both extending outward from the body portion 33 on the same side thereof. Said

knife 33 is secured to one end of an endwise movable rod 36 extending transversely across the shaft 17 in a guide-way provided therein for that purpose. The opposite end of the rod 36 projects beyond the shaft and has an enlarged portion or head 37, against which bears a spring 38 encircling the rod and bearing against the shaft 17 for the purpose of normally maintaining the cutter 33 out of cutting position. For moving the rod 36 in a direction against the tension of the spring 38 for forcing the cutter into cutting position, I provide an operating arm 39 pivoted intermediate its ends by a pin 40 in a longitudinal groove or slot 41 in the shaft 17, as shown in Figs. 5 and 9. One end of said arm 39 engages the rod 36 so that the arm when rocked upon coming into contact with a fixed cam arm 42, the cutter 33 will be moved downward from the shaft 17. Said cam arm 42 is provided with a hub encircling the shaft 17 and being fixedly secured to the bearing box 15 thereof, and also is provided at its outer end with a roller 43 to permit the contacting end of the arm 39 to readily pass thereover during the rotation of the shaft 17. Fixed to the shaft 17 are two cutting knives 44, 44, one on each side of the cutting knife 33 and being in the form of blades arranged transverse to the shaft 17 so that when they are rotated with the shaft they will be brought against the upper layer of the paper tube being advanced beneath the shaft to cut the longitudinal slots 31, 31 therein. In that portion of the upper forming plate 27 immediately beneath the shaft 17 there is formed a recess 45 (Fig. 12) having the shape of and designed to receive the cutting knife 33 as the latter passes such part in the cutting of the lip 30 in the upper layer of the paper tube. Said upper plate 27 is also provided with two longitudinal slots or recesses 46, 46 designed to receive the cutting knives 44, 44 as such parts pass each other in the cutting of the slots 31, 31 in the upper layer of the paper tube. Secured to the lower shaft 18 are two cutting knives 47, 47, both being in the form of blades arranged transverse to the shaft and designed when rotated thereby to cut the slots 32, 32 in the lower layer 23 of the paper tube. The lower forming plate 28 is provided with longitudinally extending slots or recesses 48, 48 permitting said knives 47, 47 to enter the same in the rotation of the shaft 18. (See Fig. 13.) One end of said shaft 18 extends beyond one of the side members 10 of the machine and has secured thereto a gear wheel 49, which meshes with a number of gear wheels in a train of gearing to be presently referred to.

Secured to and projecting upward from the side members 10, are two upright standards 50, 50 located forward of the standards 13, 13 heretofore referred to. Each standard 50 is provided with a vertical slot or guide-way adapted to receive bearing boxes 51, 52, in which are journaled the associated ends of shafts 53, 54, upon which are mounted the feed or drawing rolls 55, 56, one being located above the other and between which passes the bellows folded tube in being drawn into the machine by said rolls. Said rolls have rolling contact with each other, and for the purpose of allowing the upper roll 55 to yield vertically I interpose springs (not shown) between the bearing boxes 51 of such rolls and the fixed parts of the standard thereabove, and adjust the tension of said springs by set screws 57. For imparting rotary movement to said feed rolls, I provide at one end of the shafts thereof intermeshing gear wheels 58, 59, as shown in Fig. 4. The gear wheel 59 meshes with an intermediate gear wheel 60, which in turn meshes with said gear wheel 49 on the shaft 18, so that power may be transmitted from the former to the latter. Said gear wheel 59 also meshes with an intermediate gear wheel 61, which in turn meshes with a gear wheel 62, the latter being on the main driven shaft 63 of the machine. Said shaft 63 is provided at one end with a fixed and a loose pulley 64, 65, respectively, and at the other end with a hand wheel 66, which may be used in turning over the machine manually in the initial feeding of the paper tube thereinto. Said shaft 63 extends across the machine below the side members 10, 10 thereof, and is journaled in brackets 67, as shown in Figs. 2, 6, and 7. Secured to and extending upward from the side members 10 are two upright standards 68 located between the standards 13 and 50, as shown in Fig. 2. Secured to said standards and extending across the machine is a cross-bar 69, over which extend the depth plates 26, 26. Said depth plates are secured to spacing blocks 70 interposed between the depth plates and the cross-bar 69 for the purpose of spacing the latter above the former and thereby permitting the bellows folded tube to be fed across and over said cross-bar in its advance through the machine. Said depth plates 26 are secured to said blocks 70 by fastening screws 71, 71, which may extend through elongated slots 72, 72 in the depth plates, so that the latter may be adjusted toward and from each other. Said depth plates 26 have their ends at the rear of the machine curved outward to form an enlarged passage way, as shown in Fig. 1, to permit the folded tube to be readily fed therebetween and thereby avoid square corners or other obstructions to the movement of the tube onto the depth plates. The portions of the depth plates extending between the standards 25 and the cross-bar 69 are relatively wide, but said depth plates decrease in width throughout those portions

which extend from said cross-bar to the ends of said plates, and are made relatively narrow, as shown in Fig. 1, so that the registering annular grooves 73, 74 in the feed rolls may be made no wider than necessary to permit the forward end portions of the depth plates to extend therebetween and thus enable the portions of the rolls on each side of said grooves to engage against and feed the interposed portions of the paper tube. The inner or opposed edges of the depth plates are spaced substantially the same distance apart throughout their entire length, so that the depth plates will guide the folded tube throughout the length thereof through the feed rolls and be maintained in positions adjacent the innermost fold of the bellows fold in the sides of the tube even though the portions of the depth plates extending between the feed rolls are very much narrower than the rearward portions of said plates. This is provided so that the inner edges of the portions of the depth plates between said shafts 17, 18 will engage the inner folded edges of the bellows fold and serve to guide the paper tube accurately into the machine and hold the tube against displacement when operated upon by the rotating cutters on the shafts 17, 18, while the remaining inner edges of the depth plates will not engage the folded inner edges of the bellows fold and thus avoid undue friction on the sides of the paper tube during its advance through the machine. As shown by dotted lines in Fig. 1, it will be noted that the opposed edges of the portions of the depth plates forward of the shafts 17 and 18 are spaced apart or are so cut as to be spaced apart a distance slightly greater than the distance that the opposed edges of said plates immediately between said shafts 17 and 18 are spaced apart. The forward ends of the depth plates terminate at a point forward of the feed rolls, and each is provided with two vertically spaced parts 75, 76 to receive therebetween the rear end of an angularly arranged guide strip 77, 77, the latter being formed integral with a side plate 78 secured to a cross-bar 79 extending across the machine forward of the standards 50. Said cross-bar 79 is secured at its ends to two upright standards 80, 80 on the side members 10 of the machine frame, as shown in Fig. 2. Said guide strips 77, 77 are arranged at an angle to the direction of feed of the folded tube through the feed rolls 55, 56, and converge outward from the associated ends of the depth plates 26, as clearly shown in Fig. 1. When that portion of the tube which is cut by the knives on the shafts 17, 18 reaches the feed rolls 55, 56, I again cut the tube transversely from its folded side edges inward toward the base of the lip 30 by slots 81, 81, as shown in Figs. 14 and 15. Said cuts 81, 81 terminate short of the longitudinal cuts 31, 32, previously formed, so as to leave unsevered portions of the tube between the inner ends of said cuts and said longitudinal cuts. Said cuts 81, 81 are formed by cutting knives 82, 82 mounted in the lower feed roll 56, as shown in Figs. 7, 10, and 11. Said knives have a shearing action and cut through all of the layers of the folded tube from the lower layer upward. Each knife 82 is secured by a set screw 83 to a shaft 84 extending lengthwise of the lower feed roll and rockably mounted therein. To facilitate assembly and removal of the parts for repair or otherwise, said rock shaft 84 is mounted in a removable section 85 of the lower feed roll, as shown in Fig. 10. At one end of said shaft 84 is a coiled spring 86 having one end secured to the shaft and the other end secured to a fixed part of the roll 56, so as to rock said shaft in one direction. At the other end of the shaft 84 is secured an arm 87 provided with a roller 88 (Fig. 2) bearing against the peripheral surface of a fixed cam 89, the latter having a radial projection 90 for the purpose of rocking the rod 84 and causing the cutters 82, 82 thereon to be swung outward through suitable slots in the lower roll for the purpose of cutting through the portions of the folded tube between said upper and lower rolls. The spring 86 rocks the rod in the opposite direction for the purpose of retracting the knives out of cutting position. It will be noted that the knives 82, 82 are rocked in an arc of a circle, the center of which is the rod 84. To receive the cutting edges of said knives 82 when the latter are rocked into their full cutting position, the upper roll 55 is provided with arch-shaped slots or recesses 91, 91, as shown in Fig. 11. Said cam 89 encircles the shaft 54, as shown in the drawings, and is preferably fixed to a stationary part of the machine frame, such as for instance the bearing box of the shaft 54. To regulate the outward movement of the cutter blades 82, I provide for each a set screw or adjustable stop member 92 (Fig. 16).

The guide strips 77 extend into the bellows fold at the sides of the tube to a point adjacent the innermost folded edge thereof and thereby engage the uncut portions of the tube beyond the inner ends of the transverse cuts 81, 81. Said guide strips 77 being angularly arranged, it follows that the tube will be fed onto the guide strips with the upper layer properly separated from the lower layer without the possibility of the severed portions of the tube at the cuts 81, 81 being displaced in passing over the guide strips, such as would happen in case the guide strips terminated short of the inner ends of the cuts 81, 81.

Extending forward from the plates 78, 78 are guide strips 93, 93, one for each of said plates, said strips being arranged parallel to

each other and terminating at their forward ends beneath the gripper rolls 94, 95, as shown in Figs. 1 and 2. Secured to each plate 78 is another guide strip 96, 96, one being located above the associated guide strip 93, said guide strips 93 and 96 being spaced apart vertically, as shown in Fig. 2, for the purpose of separating the upper and lower layers of the paper tube, as it is fed toward the gripper rolls. Said upper strips 96 are shorter than the lower guide strips 93 and have their forward ends terminating short of the forward ends of the lower guide strips 93, as shown in Figs. 1, 2, and 7a. In order to raise the upper layer of the paper tube toward the upper gripper roll 94 as the paper tube feeds beyond the forward ends of the upper guide strips 96, I provide vertically movable members 97, 97 arranged on each side of the upper and lower guide strips 93, 96 and having their forward ends 98, 98 so shaped as to be positioned above the lower strips 93 and forming in effect continuations of the upper strips 96, as shown in dotted lines in Fig. 1 and in full lines in Fig. 7a. Said members 97, 97 are connected at their opposite ends to a rock shaft 99 located beneath the cross-bar 79 and being journaled in brackets 100 secured to the under side of said cross-bar, as shown in Figs. 2 and 7. To rock the shaft 99 in one direction, I provide a spring 101 (Fig. 6) coiled about the shaft and having one end connected therewith and the other end connected with the associated fixed bracket 100. To rock said shaft against the tension of the spring, I secure to the shaft an arm 102 having at its outer end a roller 103 adapted to be actuated by a lug 104 (Fig. 21) secured to one of the side faces of the cam 105 fixed to the revolving shaft 54 of the lower feed roll 56. To adjust the time of operation of the rock shaft 99, I secure the lug 104 adjustably to the face of the cam 105 by a set screw 106 extending through an elongated slot 107 in said block 104. As the shaft 99 is rocked, the members 97, 97 are moved up and down in a vertical plane, and when they are moved up they serve to carry therewith the portion of the paper tube after leaving the forward end of the upper guide strips 96 and carry such portion of the paper tube upward toward the upper gripper roll 94, so that the gripper fingers therein will be enabled to grip the proper portions of the paper tube. Extending across the space between the upper and lower guide strips 93, 96 is a flat plate 108, designed to support the lower layer of the paper tube as it passes over the same. Said plate is secured to the cross-bar 97 in any preferred manner and has its rear end extending rearward of said cross-bar and terminating short of the feed rolls 55, 56, as shown in Fig. 2. Such end of the supporting plate 108 is curved downward, as shown in said figure, so as to avoid hindering the advance of the paper tube from the feed to the gripper rolls, as is apparent.

The forming plates 27, 28 have their forward ends terminating short of the feed rolls 55, 56, as shown in Figs. 1 and 2, so as to support the upper layer of the paper tube as it is advanced to said feed rolls. Extending forward from the center of said forming plates is an extension 109 extending between the feed rolls 55, 56 through the annular grooves 73, 74 thereof and terminating in a tongue plate, to be presently described, at the gripper rolls 94, 95, as clearly shown in Figs. 1, 2, and 7. As shown in Fig. 7, said extension comprises an upper strip 110 and a lower strip 111 suitably secured together with the upper strip terminating short of the lower strip, the latter having its forward end terminating short of the gripper rolls 94, 95 and extending over and across the supporting plate 108. Projecting forward of the forward end of the lower strip 111 is a tongue plate 112 pivoted by horizontally arranged pins 113 extending through upright flanges 114 formed at the sides of the lower strip 111 (Figs. 12 and 13). Said pivot pins are located near the rear end of the tongue plate 112, so that the forward end of the latter is heavier than the rearward end and thereby drops by gravity under normal conditions into a lowered position resting against the forward end of the lower strip 111. For the purpose of swinging the forward end of the tongue plate 112 upward when desired, I provide an actuating strip 115 located between the side flanges 114 of the bottom strip and being attached adjacent its rear end to the side flanges 114 by fastening pins 116. Said strip 115 is so formed that its free forward end overlaps the rearward end of the tongue plate 112 and normally remains in its upper position with the rear end of the tongue plate 112 bearing upward against the same. When said strip 115 has its forward end moved downward, it acts against the raised rear end of the tongue plate 112 and forces the forward end thereof upward. When such force is relieved, the forward end of the tongue plate immediately drops downward and its rear end is brought up beneath the forward end of the strip 115. To accomplish this result mechanically, I provide an actuating finger 117 preferably in the form of a relatively wide, flat blade, as shown in Fig. 1. Said blade is located above the strip 115, and when raised out of contact therewith is spaced upward therefrom a distance sufficient to permit the upper layer of the paper tube to pass therebeneath, as shown in Figs. 2 and 7. Said finger 117 is connected with an arm 118

having its opposite end secured to a rock shaft 119 journaled in brackets 120 secured to the upper face of the cross-bar 79. Encircling said shaft 119 at one end thereof is a spring 121 having one end connected with the shaft and the other end connected with the associated fixed bracket 120 so as to rock the shaft 119 in one direction. Adjacent the other end of said shaft 119 is secured an arm 122 having at its free end a roller 123 adapted to bear against the periphery of the cam 105 fixed to the shaft 54 of the lower feed roll 56. Said cam 105 is provided at one place in its periphery with a groove or notch 124 adapted to receive the roller 123 for the purpose of throwing the finger or blade 117 down against the strip 115 to rock the outer end of the tongue plate 112 upward so as to carry therewith the lip 30 of the upper layer of the paper tube against the upper gripper roll to permit the set of gripper fingers therein to engage said lip in the formation of the diamond fold. To prevent the blade 117 from coming into contact with the strip 115 at a force greater than necessary to actuate the parts, I provided a stop member 125 on the rock shaft 119. Said stop member 125 has sufficient resiliency to yield when brought into contact with the upper surface of the cross-bar 97 when the finger 117 is moved downward to effect the raising of the outer end of the tongue plate 112.

The gripper rolls 94, 95 are located one above the other, as shown in the drawings, and each is mounted on a shaft 126, 127, respectively. Said shafts have their ends journaled in bearing boxes 128, 129, received in vertical guide-ways (not shown) provided in upright standards 130 secured to the side member 10 of the machine frame at the forward end of the latter. Said bearing boxes are spaced vertically apart by a spacing block 131 located in the vertical slot or guide-way in each standard and interposed between said bearing boxes, as shown in Fig. 3. For rotating said gripper rolls, each shaft thereof is provided at one of its ends with a gear wheel 132, 133, the latter being on the shaft of the lower gripper roll and meshing with the intermediate gear wheel 61, as shown in Fig. 4, so that power may be transmitted to the lower gripper roll from the main driven shaft 63. The gear wheel 132 on the shaft of the upper gripper roll is preferably maintained out of mesh with the gear wheel 133, but is in mesh with an intermediate gear wheel 134, which meshes with the intermediate gear wheel 61. Said gear wheel 134 is loosely mounted on a stub shaft 135 at the upper end of a bracket 136 having its lower end rockably mounted on the stub shaft 137 of the gear wheel 61. Said bracket 136 is provided intermediate its ends with an arc-shaped slot 138, through which extends a set screw 139 threaded into the adjacent side member 10 of the machine frame. By reason of such construction the gear wheel 134 may be swung in an arc of a circle about the stub shaft 137 for adjusting it toward and from the gear wheel 132, as shown in Fig. 4. For permitting the upper gripper roll 94 to yield vertically, I may provide springs (not shown) bearing downward on each of the bearing boxes 128 and having an adjusting screw 140 at the upper end of the standard 130 for varying the tension of said springs. As illustrated in Figs. 2, 6, 7, and 8, the gripper rolls 94, 95 do not contact with each other, this being brought about by spacing the gripper rolls vertically apart so as to permit the lower guide strips 93, 93 and the forward ends 98 of the rocking members 97 to project into the center of the space between the gripper rolls. The upper gripper roll 94 may have a diameter slightly less than that of the lower gripper roll 95 so as to provide the space referred to. Due to this fact, the gear wheel 132 for the upper gripper roll is not in mesh with the gear wheel 133 for the lower gripper roll, so that said rolls may be rotated at the same rate of speed. The driving gear wheel 134 for the upper gripper roll in being adjustably mounted in the manner set forth may be maintained in proper mesh with said gear wheel by adjusting the gear wheel 134 for that purpose, and as the gear wheel 132 is not in mesh with the lower gear wheel 133, it follows that this adjustment may be made without interfering in any manner with the rotation of the gear wheel 133, and furthermore to maintain the space desired between the upper and lower gripper rolls without interfering with the lower gear wheel 133. The upper gripper roll 94 is provided with alined creaser blades 141, 141 extending longitudinally of the gripper roll and projecting radially outward from the outer cylindric surface thereof. By spacing the gripper rolls apart, it is unnecessary to provide receiving slots or grooves in the lower gripper roll for the creaser blades, as the latter may project out a sufficient distance to come very close to the cylindric surface of the lower gripper roll. Said creaser blades 141 crease the folded tube transversely so as to aid in the formation of the diamond fold, and by spacing the gripper rolls apart the creaser blades when brought into contact with the paper tube will not place any undue strain or tension thereon, as would likely to tear or fracture the same should the blades be required to enter receiving slots or grooves in the lower gripper roll. Moreover, with my arrangement the tube is not displaced by being stretched endwise, and thereby maintains the same in proper

position to be engaged by the gripper fingers, to be presently referred to. This is essential because there must be no allowance made for lost motion between the gripper fingers and the interposed part of the paper tube, as the gripper fingers must grip firmly and positively at the proper time. It is necessary, therefore, that the portions of the paper tube be in accurate position to permit the gripper fingers to grip at the required places and at the instant necessary in the rapid rate of speed at which my machine is operated. Moreover, by spacing the gripper rolls apart the tongue plate 112 is permitted to extend far enough into the space between the gripper rolls so that when actuated it will raise the lip 30 against the upper gripper roll to permit the gripper fingers to effectively grasp the same. To cut the unsevered portions of the paper tube between the innermost ends of the cuts 81 and the base of the lip 30, I provide two circular actuated knives 142, 142, secured to a rock shaft 143 extending longitudinally of and located within the lower gripper roll 95, as shown in Fig. 7. Said shaft 143 is mounted in a removable section 144 forming a part of the outer surface of the lower gripper roll so that access may be had to the rock shaft and knives for the purpose of sharpening the cutting edges of the knives or repair or otherwise. There are two of said knives 142, so that the folded paper tube will be cut outward from each side of the base of the lip 30 and thereby completely severed through both its upper and lower layers from the lip outward, and thus permitting the end of the tube to be opened up for forming the diamond fold. As shown in Fig. 8, said section 144 is secured to the lower gripper roll by fastening screws 145 or the like. Said shaft 143 has one end extending beyond the end of the section 144 and has encircling the same a spring 146, one end connected with the shaft and the other end connected with the section 144, so as to maintain the knives within the lower gripper roll. For rocking the knives outward, the other end of the shaft is provided with an arm 147 having a roller 148 bearing against a cam 149 fixed to one of the bearing boxes 129 of the lower gripper roll so that in the rotation of the latter the knives 142 will be rocked out beyond the cylindric surface of the lower gripper roll for the purpose of severing the paper tube. The upper gripper roll 94 is provided with two arc-shaped grooves or slots 150 to receive said knives 142. It will be noted that the knives are moved about an arc of a circle, the center of which is a rock shaft upon which they are mounted. To regulate the distance that said knives are swung outward, I provide an adjustable stop member 151 therefor, as shown in Fig. 7 and being made and serving the same purpose as the stop member 92 for the cutters 82 in the lower feed roll 56, as shown in Fig. 10.

The upper gripper roll 94 is provided with two sets of gripper fingers, one set being adapted to grip the lip 30 over the end thereof and the other set being adapted to grip the upper layer of the paper tube at the sides thereof and at points remote from the lip, as shown in Fig. 8. The lower gripper roll is provided with one set of gripper fingers adapted to grip the lower layer of the paper tube at the sides thereof, as shown in the same figure. I will now describe the construction and operation of the several sets of gripper fingers. As shown in Figs. 17 to 20, both inclusive, the upper gripper roll 94 is made hollow to provide a chamber 152. Said gripper roll is provided with an outwardly opening slot normally closed by a removable section or plate 153 secured in place by fastening screws 154. Said section 153 is provided with a plate 155 extending into the chamber 152 of the upper gripper roll and being located substantially midway between the ends of the section 153, as shown in Fig. 17. At each side of said plate 155, the section 153 is provided with an elongated slot 156 extending transversely of the plate, as shown in Fig. 18. At each side of said plate is a gripper finger 157 having its inner end secured to the plate 155 by a pivot pin 158. The other end of the gripper finger 157 projects outward through the slot 156 and is provided with an overhanging gripping flange 159 located outside of the cylindric surface of the upper gripper roll. Extending longitudinally of the gripper roll 94 is a rock shaft 160 passing through the plate 155 at one side of the gripper fingers 157 and having its ends journaled in the ends of the removable section 153. Secured to said rock shaft 160 are two bell crank levers 161, one on each side of the plate 155. The inner end of each bell crank lever is connected by a link 162 with the associated gripper finger 157 at a point outward from its pivot pin 158, as shown in Fig. 18. At the other end of each bell crank lever 161 is an outwardly extending gripper dog 163 located in the slot 156 and adapted to be rocked toward and from the overhanging flange 159 of the associated gripper finger 157. Encircling the shaft 160, adjacent one end thereof, is a coiled spring 164 having one end connected with the shaft and the other end connected with a fixed part of the gripper roll. Said shaft 160 has its opposite end extending outward beyong the side of the gripper roll and is there provided with an arm 165 having a roller 166 bearing against the periphery of a cam 167 fixed to one of the bearing boxes 123 of the upper gripper roll, as shown in

Figs. 3 and 8. From the construction described, it follows that when the shaft 160 is rocked in one direction, the gripper fingers 157 are swung away from the associated gripper dogs 163, and the latter are swung inward toward the center of the gripper roll 94, so as to permit the lip 30 of the paper tube to be fed into position to be gripped between such parts when the shaft is rocked in the opposite direction. Said gripper fingers 157 and gripper dogs 163 are located adjacent each other so as to grip the lip 30 over the outer edge thereof, as shown in Fig. 8. The grooves or slots 150 for the cutting knives 142 are located adjacent said gripper fingers, as shown in said figure. For the second set of gripper fingers in the upper gripper roll 94, I provide a removable section 168 secured to the gripper roll by fastening screws 169. Extending inward from said section 168 are two plates 170 connected together by an integral flange or rib 171 extending between them, as shown in Fig. 19. For each plate 170 there is a gripper finger 172, both made alike and secured to the plate by a pivot pin 173 at the inner end of the gripper finger. The other end of each gripper finger extends outward beyond the outer surface of the gripper roll 94 through an elongated slot 174 provided in the section 168. The outer end of each gripper finger 172 is provided with an overhanging gripping flange 175. For each gripper finger 172 there is a bell crank lever 176 mounted on the flange 171 by a pivot pin 177. The inner ends of said bell crank lever 176 extend inward toward the center of the gripper roll 94 and have interposed therebetween a spring 178. The other end of each bell crank lever 176 is so formed as to provide a gripper dog 179 extending outward through the slot 174, and adapted to be rocked toward and from the overhanging flange 175 of the associated gripper finger 172. Each bell crank lever 176 is connected, adjacent its swinging end, with the associated gripper finger 172 by a link 180, which in turn is pivotally connected with a block 181 provided with an elongated slot 182 so that it may be adjustably connected with the gripper finger 172 by a set screw 183, so as to adjust the space between each gripper dog 179 and its coacting gripping flange 175. Extending lengthwise of the gripper roll 94 is a rock shaft 184 located to one side of the plates 170, as shown in Fig. 20. Secured to said shaft is an arm 185 connected with a link 186 extending toward the center of the gripper roll and being connected at its inner end by a pivot pin 187 to the innermost end of the gripper finger 172. Said rock shaft 184 has one end thereof extending beyond the gripper roll 94, and encircling the same is a coiled spring 188, which has one end connected with the shaft and the other end connected with a fixed part of the gripper roll so as to rock the shaft in the opposite direction. The other end of the shaft extends beyond the opposite side of the gripper roll and has secured thereto an arm 189 provided with a roller 190 bearing against the periphery of a fixed cam 191 secured to one of the bearing boxes 128, in which the shaft of the upper gripper roll is journaled. From the construction described, it follows that, when the shaft 184 is rocked, the gripper fingers 172 and gripper dogs 179 are moved toward and from each other for the purpose of gripping therebetween the appropriate portions of the paper tube fed to the gripper rolls and to release such parts after the diamond fold has been formed. To limit the outward movement of the gripper dogs 179 and thus prevent such parts from coming into contact with the gripping flanges 175 in the opening and closing thereof, I provide set screws 192, 192 threaded into the removable section 168 and designed to contact with the bell crank levers 176. The lower gripper roll 95 is provided with a set of gripper fingers made exactly like and operating in the same manner as the gripper fingers 172 and associated parts, and in the drawings like parts have been indicated by like reference characters.

Located in front of the gripper rolls 94, 95 is a pair of spreader arms 193 adapted to be swung apart for the purpose of breaking the innermost folded edges of the bellows fold in the sides of the tube in the opening up of the end of the tube in forming the diamond fold. Said arms 193 when closed occupy the position shown in Fig. 3. Each spreader arm is made substantially alike and is made L-shaped in form so as to have an upright portion extending in front of the gripper rolls and a horizontal portion extending forward from said gripper rolls, as shown in Fig. 1. The forward end of each spreader arm is connected with a member 194 pivoted at its forward end by a pivot pin 195 on a transverse bar 196 arranged in front of said gripper rolls. Mounted on said bar 196 is a plate 197 adapted to be moved endwise transversely of said bar. Said plate is provided with an upstanding rib 198 extending between said members 194, as shown in Fig. 1. Each of said members 194 is provided with a lug 199 extending into a slot provided in said rib 198 so that when said plate 197 is moved endwise said members 194 will be rocked toward and from each other about their pivot pins. To give such motion to said plate 197, I provide a bell crank lever 200, pivoted by a pivot pin 201 on said cross-bar 196. One end of said bell crank lever is provided with a slot 202, into which extends an upright pin or lug 203 fixed to said plate 197. Extending outward from said cross-bar 196 is a fixed lug 204, to which

is connected one end of a spring 205, the other end of the spring being connected with the bell crank lever 200, so as to maintain the spreader arms 193 normally in closed position. The other end of said bell crank lever 200 extends toward the gripper rolls and is provided with a roller 206 bearing against the side face of a rotatable cam 207 fixed to a shaft 208 extending across the machine and to be hereinafter referred to. Said cam 207 is provided with a laterally projecting part 209 adapted when brought into contact with the roller 206 to actuate the bell crank lever 200 for moving the spreader arms 193 apart or into open position for the purpose heretofore mentioned. In order to manually throw or move said spreader arms 193 bodily outward from the gripper rolls 94, 95 and thus permit the operator to gain access to the portions of the gripper rolls behind said spreader arms, I secure said cross-bar 196 to two upwardly extending arms 210, as shown in Figs. 2 and 3. The lower ends of said arms 210 are secured to a rock shaft 211 extending across the machine frame and having its ends journaled in upright standards 212 at the sides of the same. Surrounding said rock shaft 211, adjacent one end thereof, is a coiled spring 213 having one end secured to the shaft and the other end secured to a fixed part of the adjacent standard 212 so that said spring will rock said shaft in a direction to normally hold the spreader arms 193 in position closely adjacent to the gripper rolls. Said rock shaft 211 is provided at the other end with an upwardly projecting hand lever 214 so that the spreader arms 193 may be swung bodily outward away from the gripper rolls by the operator of the machine, when desired. To limit the outward swinging movement of the hand lever 214, there is provided a fixed stop member 215 on the adjacent standard 212.

Also located in front of the gripper rolls 94, 95 are two ironer plates 216 adapted to fold portions of the paper tube inward against the front of the gripper rolls in the forming of the diamond fold, as shown in Fig. 8, after the spreader arms 193 have been moved apart to accomplish their function. Said ironer plates 216 are vertically arranged and each consists of a relatively flat plate of metal or other desired material, and is secured to a bracket 217 rotatably mounted on an upright post 218, the lower end of which is secured to a rock shaft 219 extending across the machine frame beneath the gripper rolls and having its ends journaled in the side members 10 of the machine frame. Encircling said shaft is a coiled spring 220 having one end secured to the shaft and the other end secured to a rigid part of the machine frame. The upper ends of said posts 218 terminate short of the top of the upper gripper roll 94, and are secured together by a suitable cross-bar 221 so that when said rock shaft 219 is rocked said posts 218 will be moved in unison. Each bracket 217 is mounted on its post 218 so that it may be swung about the same for the purpose of swinging the ironer plates 216 into open and closed positions. As shown in Fig. 3, each bracket 217 is provided with a pair of ears 222 having pivoted therebetween one end of a link 223, the other end of which is pivoted to an arm 224 extending transversely of the machine and being rigidly secured by fastening members 225 to the associated bearing block 129 of the shaft of the lower gripper roll. Secured to said rock shaft 219 is an arm 226 having a roller 227 bearing upwardly against the periphery of a rotatable cam 228 secured to a shaft 229, to be hereinafter referred to. From the construction described, it is clear that, when said cam 228 is revolved, the rods 218 are swung toward and from the gripper rolls 94 and 95, thereby causing the ironer plates 216 to be swung into their open and closed positions. By the construction described, the ironer plates may be swung into and out of their closed positions with a relatively small amount of movement, due to the fact that the ironer plates are mounted on the rockable frame and thereby requiring but a limited amount of space to be utilized in the operation of the parts. Moreover, I am able to get a very short throw of the ironer plates and thus gain a quick action in the operation of the machine, which is very essential in machines of this character because they are operated at a very rapid rate of speed and form paper bags at a considerable number per minute. One of the frame members 218 is provided with an outwardly extending arm 230 having an elongated slot 231 (Fig. 2) at its outer end, into which extends a fixed pin 232, provided on one of the upright arms 210, so that when the hand lever 214 is grasped and swung outward to move the spreader arms 193 bodily outward away from the gripper rolls the frame of the ironer plates will also be swung outward, thereby causing said ironer plates to be swung into their open position. The spring 220 on the rock shaft 219 returns the frame of the ironer plates and the latter into closed position after the hand lever 214 is released. Said rock shaft 211 is provided with an upwardly extending arm 233 having a roller 234 bearing against the periphery of said cam 209 so that when the latter rotates it will move the spreader arms 193 outward a sufficient distance to move them away from the gripper rolls to permit the paper tube to be drawn down away from the gripper rolls after the formation of the diamond fold.

Located below the lower gripper roll 95 are three feed rolls 235, 236, and 237, as clearly

shown in Fig. 7. The feed rolls 235 and 236 are located one above the other and are spaced forward beyond the gripper rolls but below the same, as shown in said figure. The upper feed roll 235 is mounted on said shaft 208, having its ends journaled in bearing boxes 238, which are mounted in vertical slots or guideways (not shown) in the standards 212. The lower feed roll 236 is mounted on said shaft 229, having its ends journaled in bearing boxes 239, also located in the vertical guideways in the standards 212. Said bearing boxes 238, 239 are spaced apart vertically by an interposed spacing block 240, as shown in Fig. 3. At one end of the shaft 208 is a gear wheel 241 meshing with a gear wheel 242 on said shaft 229. Said gear wheel 242 meshes with an intermediate gear wheel 243, which in turn meshes with said gear wheel 62 on the main driven shaft 63, so that power may be transmitted to said shafts 208 and 229 for the purpose of rotating the feed rolls 235 and 236 at the required rate of speed and in the desired directions. The feed roll 237 is located rearward of the feed rolls 235, 236, and has rolling contact with both of them, as shown in Fig. 7. Said feed roll 237 is mounted on a shaft 244 having its ends mounted in bearing boxes 245, which in turn are received in slotted brackets 246 having springs (not shown) for the purpose of yieldingly holding the feed roll 237 against the feed rolls 235 and 236, there being adjustable screws 247 associated with said brackets 246 for the purpose of varying the tension of the springs therein. For rotating said feed roll 237, I provide a gear wheel 248 on said shaft 244, which gear wheel meshes with a gear wheel 249 on the shaft 208 of the uppermost feed roll 235. To completely sever the uncut portion of the bottom layer of the folded tube from the section of the tube having previously passed through the gripper rolls, I provide a cutting knife 250, as shown in Fig. 7. Said knife is secured to a rock shaft 251 by a set screw 252, said shaft extending lengthwise of the feed roll 237 and having its ends journaled in a removable section 253 provided in said feed roll. One end of said shaft 251 extends beyond the feed roll, and has a spring 254 encircling the same, as shown in Fig. 6. Said spring has one end connected with the shaft and the other end connected with a fixed part of the roll so as to rock the shaft in one direction. The other end of said shaft also extends beyond the feed roll 237 and is provided with an arm 255 having a roller 256 bearing against the periphery of a fixed cam 257 secured to the associated bearing block 245 of the shaft 244. Said knife 250 has movement about the arc of a circle, the center of which is the rock shaft 251 and when moved outward is projected beyond the outer cylindric surface of the feed roll 237 to a slot provided in the latter for that purpose and adapted to be received into an arc-shaped slot 258 provided in the feed roll 235.

For preventing the paper tube from being carried around with the lower gripper roll 95 when the gripper fingers thereof release themselves from gripping engagement with the folded tube, I provide two guide wires 259, 259 having their ends anchored in a cross-bar 260 extending across the machine frame between the lower gripper roll 95 and the lowermost feed roll 237, as shown in Fig. 7. Said wires 259 extend downward between the feed rolls 235 and 237, there being registering annular grooves 261 and 262 provided in said gripper rolls for that purpose. Said wires 259 are continued forward horizontally between the gripper rolls 235, 236, the latter having annular grooves 263, which register with the grooves 262 in the upper feed roll 235 for that purpose. Said wires 259 are retained in the positions referred to by securing wires 264 having their upper ends engaged in loops in the wires 259 and their lower ends anchored or secured to the cross-bar 12 at the forward end of the machine. From the feed rolls 235 and 236 the wires 259 extend forward from the machine and form the bottom of the channel through which the paper tube is carried after the diamond fold has been formed by the gripper rolls and the associated parts. To form the upper portion of said channel there are provided two guide wires 265, 265 extending forward from the feed roll 235 and suitably anchored or supported in a cross-bar 266 extending across the machine in front of said feed rolls. The inner ends of said wires 265 terminate in the annular grooves 262 in the feed roll 235 and thereby prevent the paper tube from being carried around with said feed roll 235 in case the paper tube should become adhered to said roll. The bottom of said channel is also formed by two other wires 264, 264 having their inner ends anchored to the cross-bar 12 and extending upward around and over the lower feed roll 236 in annular grooves 268, 268, as shown in Fig. 3.

Briefly, the machine described and shown herein operates in the following manner. The paper stock from which the bag is made is fed from a roll mounted beyond the rear end of the machine parts illustrated in the drawings. The paper sheet is initially of a width equal to the width of the bag when completely opened and spread out flat, and, upon being drawn from the roll of paper, is operated upon by folding devices for folding the paper sheet into the form of a tube, and providing a bellows fold in the sides thereof, as shown in Fig. 16. The longitudinal meeting edges of the folded tube are sealed together by an adhesive applied to the tube as it is advanced through the

machine. Such parts of the complete machine are not shown in the drawings as they are old in the art and their operation well understood, but of course such mechanism will be utilized with the machine construction heretofore described as embodying the features of my invention. When the paper tube reaches the rear end of my machine structure, it is operated upon by the cutting knives 33, 44, and 47 on the shafts 17, 18 for the purpose of cutting the lip 30 and the longitudinal cuts 31, 32. The tube is then advanced to the feed rolls 55, 56 and the transverse side cuts 81 made in the tube, whereupon the tube continues its advance toward and into the space between the gripper rolls 94, 95. The upper and lower layers of the tube are spread apart by the vertically separated strips 93, 96 and further by the separating members 97. The lip 30 at the time it passes over the tongue plate 12 is raised upward toward the upper gripper roll 94 upon the actuation of the finger or blade 117, whereupon said lip is positioned so as to be gripped between the gripper fingers 157 and the associated gripper dogs 163 (Figs. 8, 17, and 18). The tube is then opened in the rotation of the gripper rolls 94, 95, and the second set of gripper fingers 172 and associated gripper dogs 179 in both the upper and lower rolls 94, 95 grip other portions of the paper tube and serve to open the same to permit the formation of the diamond fold. When this has been accomplished, the spreader arms 193 are opened for the purpose heretofore described and then closed, whereupon the ironer plates 216 are moved from their open to their closed position so as to flatten out the protruding portions of the now open end of the paper tube so as to form the diamond fold, as shown in Fig. 8.. When this has been accomplished, the spreader arms and the ironer plates are moved bodily outward away from the front of the gripper rolls by the cam member 207 operating against the arm 233 (Fig. 3) so as to remove such parts from bearing against the now folded paper tube and whereupon the gripper fingers are moved into released position to permit the now folded tube to be drawn downward between the feed rolls 235, 236, and 237 and carried beyond the forward end of the machine parts shown herein, where the folded portion of the diamond fold just referred to is again folded by folding mechanism (not shown) and adhesive applied for the purpose of completing the bottom of the bag being formed. Such folding and adhesive applying mechanism is not shown in the drawings, as it is well known in the art and of course will be utilized with the machine parts embodying the features of my invention.

While I have shown and described herein in detail a paper bag making machine embodying the features of my invention, yet it is of course to be understood that the various details of construction and arrangement of parts shown may be variously modified and changed without departing from the spirit and scope of my invention, and I do not wish to be limited to the exact details of construction and arrangement of parts illustrated, except as pointed out in the appended claims.

I claim as my invention:

1. In a machine of the character described, the combination with a set of gripper rolls, of a set of feed rolls, said gripper rolls being located one above the other and being provided with gripper fingers adapted to grip the upper and lower layers of the bellows folded tube in forming the diamond fold, and said lower gripper roll being provided with two cutting knives having movement in the arc of a circle into and out of slots or recesses in the upper gripper roll for cutting through both layers of the tube from the base of a lip previously formed toward the side edges of the tube, and means for actuating said knives.

2. A gripper roll having a pair of pivotally mounted gripper fingers therein, said gripper fingers projecting outward through slots in said gripper roll and having overhanging gripping flanges at their outer ends, bell crank levers mounted in said gripper roll and each having a gripping dog adapted to be moved toward and from the gripping flange on the associated gripper finger, a link connecting one end of said bell crank lever with the associated gripper finger, a rock shaft to which said bell crank levers are connected, and means for rocking said shaft.

3. A gripper roll having a removable section forming a portion of its outer cylindric wall, a plate connected with said section and extending inward toward the center of said gripper roll, said plate being arranged transverse to the axis of rotation of said gripper roll, a gripper finger on each side of said plate and being pivotally connected therewith, each gripper finger projecting outward through a slot in said section and having at its outer end an overhanging gripping flange, a rock shaft extending through said plate, bell crank levers secured to said rock shaft, one for each gripper finger, an arm on each bell crank lever having a gripper dog adapted to be moved toward and from the gripping flange of the associated gripper finger, a link connecting the other end of each bell crank lever with the associated gripper finger, and means for operating said rock shaft.

4. A gripper roll having a pair of gripper fingers pivotally mounted therein and having their outer ends projecting outward

through slots in said gripper roll and having overhanging gripping flanges at such outer ends, bell crank levers, one for each gripper finger and having a portion forming a gripping dog adapted to be moved toward and from the overhanging flange of the associated gripper finger, the other ends of said levers being spaced apart and having a spring interposed therebetween, a link connecting each bell crank lever with its associated gripper finger, a rock shaft, arms secured thereto, and a link connecting each arm with its associated gripper finger.

5. A gripper roll having a pair of gripper fingers pivotally mounted therein, said gripper fingers having their outer ends projecting outward through slots in the gripper roll and provided at such ends with overhanging gripping flanges, levers pivotally mounted in said gripper roll, one for each gripper finger, and each lever having a gripping dog adapted to be moved toward and from the overhanging flange of the associated gripper finger, means adjustably connecting each lever with its associated gripper finger, and means for actuating said gripper fingers and levers simultaneously.

6. A gripper roll having a pair of gripper fingers pivotally mounted therein, said gripper fingers having their outer ends projecting outward through slots in the gripper roll and provided at such ends with overhanging gripping flanges, bell crank levers, one for each gripper finger and having at one end a gripping dog adapted to be moved toward and from the overhanging flange of the associated gripper finger, a link connected at one end with said bell crank lever, means adjustably connecting the other end of said link with the associated gripper finger, a rock shaft, an arm secured thereto, and a link connecting said arm with the associated gripper finger.

7. In a machine of the character described, the combination with a set of gripper rolls, one located above the other, and means for feeding a bellows folded tube thereto, of two spreader arms, each having a portion extending across the front of said gripper rolls and a bottom portion projecting outward from the lower gripper roll, and mechanical means for moving said spreader arms into open and closed positions.

8. In a machine of the character described, the combination with a set of gripper rolls and means for feeding a bellows folded tube thereto, of a cross-bar located in front of said gripper rolls and below said upper gripper roll, two spreader arms pivoted to said cross-bar and having portions extending therefrom toward said gripper roll and other portions extending upward in front of said gripper rolls, an endwise slidable member mounted on said cross-bar, said spreader arms and said member having coacting parts adapted when said member is moved endwise to effect the swinging of said spreader arms into open and closed positions, and means for moving said member in both directions.

9. In a machine of the character described, the combination with a set of gripper rolls and means for feeding a bellows folded tube thereto, of a cross-bar arranged in front of said gripper rolls and below the upper gripper roll, two spreader arms located in front of said gripper rolls and pivotally mounted on said cross-bar, a plate slidably mounted on said cross-bar, said spreader arms and said plate being provided with coacting parts adapted when said cross-bar is moved endwise to effect the swinging of said spreader arms into open and closed positions, and a bell crank lever pivotally mounted on said cross-bar and having one end connected with said plate and the other end provided with a roller against which operates a revoluble cam.

10. In a machine of the character described, the combination with a set of gripper rolls and means for feeding a bellows folded tube thereto, of a cross-bar located in front of said gripper rolls and below the uppermost one, spreader arms in front of said gripper rolls and being pivotally secured to said cross-bar, means for swinging said spreader arms into open and closed positions, including a rotatable cam, a rock shaft, upright posts connecting said cross-bar with said rock shaft, and an arm secured to said rock shaft and bearing against said cam member.

11. In a machine of the character described, the combination with a set of gripper rolls and means for feeding a bellows folded tube thereto, of two upright members located in front of said gripper rolls, an ironer plate pivotally connected with each of said upright members, means for moving said upright members simultaneously toward and from said gripper rolls, and means connecting each ironer plate with a stationary part of the machine so that said ironer plates may be swung into open and closed positions in the movement of said upright members.

12. In a machine of the character described, the combination with a set of gripper rolls and means for feeding a bellows folded tube thereto, of a rock shaft located below said gripper rolls, two members secured to said rock shaft and extending upward therefrom in front of said gripper rolls, said members being connected together at their upper ends, an ironer plate pivotally connected with each of said upright members so that said ironer plate may be swung into open and closed positions in the swinging of said upright members toward and from said gripper rolls, brackets secured to fixed parts of the machine at each side of said upright members,

links extending between said ironer plates and said brackets and being pivotally connected therewith, and means for actuating said rock shaft.

13. In a machine of the character described, the combination with a set of gripper rolls and means for feeding a bellows folded tube thereto, of a rock shaft located below said gripper rolls, two members secured to said rock shaft and extending upward therefrom in front of said gripper rolls, said members being connected together at their upper ends, an ironer plate pivotally connected with each of said upright members so that said ironer plates may be swung into open and closed positions in the swinging of said upright members toward and from said gripper rolls, brackets secured to fixed parts of the machine at each side of said upright members, links extending between said ironer plates and said brackets and being pivotally connected therewith, and an arm secured to said rock shaft and bearing against a rotatable cam member.

14. In a machine of the character described, the combination with a set of gripper rolls and means for feeding a bellows folded tube thereto, of a rock shaft located below said gripper rolls, two members secured to said rock shaft and extending upward therefrom in front of said gripper rolls and having their upper ends connected together, an ironer plate pivotally connected with each of said upright members and adapted to be swung into open and closed positions in the movement of said upright members toward and from said gripper rolls, fixed brackets, one at each side of said upright members, a link extending between each bracket and associated ironer plate and having pivotal connection therewith, a cross-bar in front of said ironer plate, spreader arms located in front of said gripper rolls and having pivotal connection with said cross-bar, means for swinging said spreader arms into their open and closed position, a second rock shaft, upright members secured thereto and connected with said cross-bar so that said spreader arms will be moved bodily outward from said gripper rolls in the movement of said second rock shaft, a hand lever connected with said second rock shaft, and a link connecting one of said upright members of the ironer plates with one of the upright members secured to said cross-bar, so that said hand lever when actuated in one direction will serve to move both the ironer plates and said spreader arms bodily outward from said gripper rolls.

In testimony that I claim the foregoing as my invention I affix my signature, in the presence of two witnesses, this 31st day of May, A. D. 1918.

PHINEAS L. BARTHOLOMEW.

Witnesses:
EUGENE C. WANN,
CLARA L. PEOPLES.