

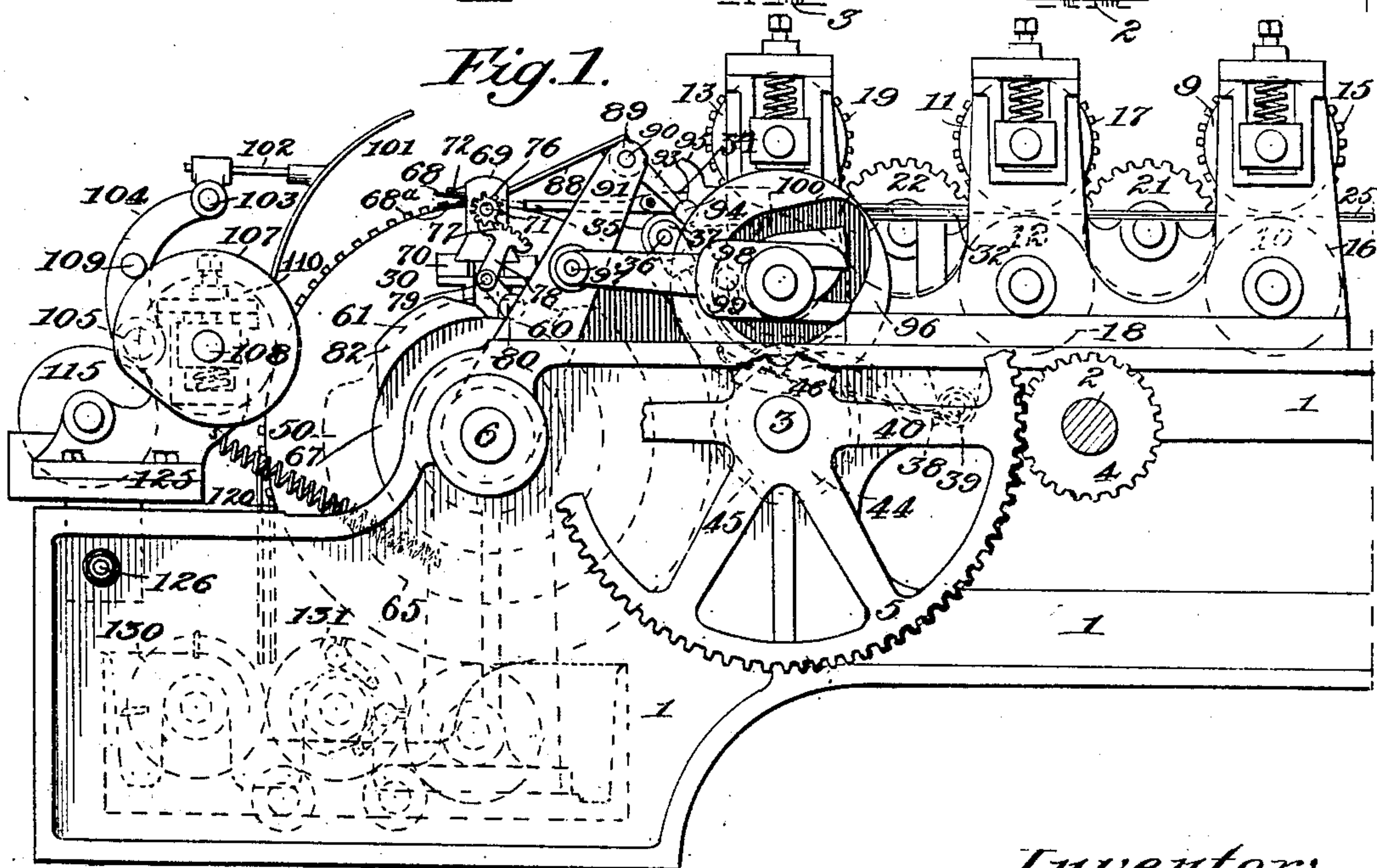
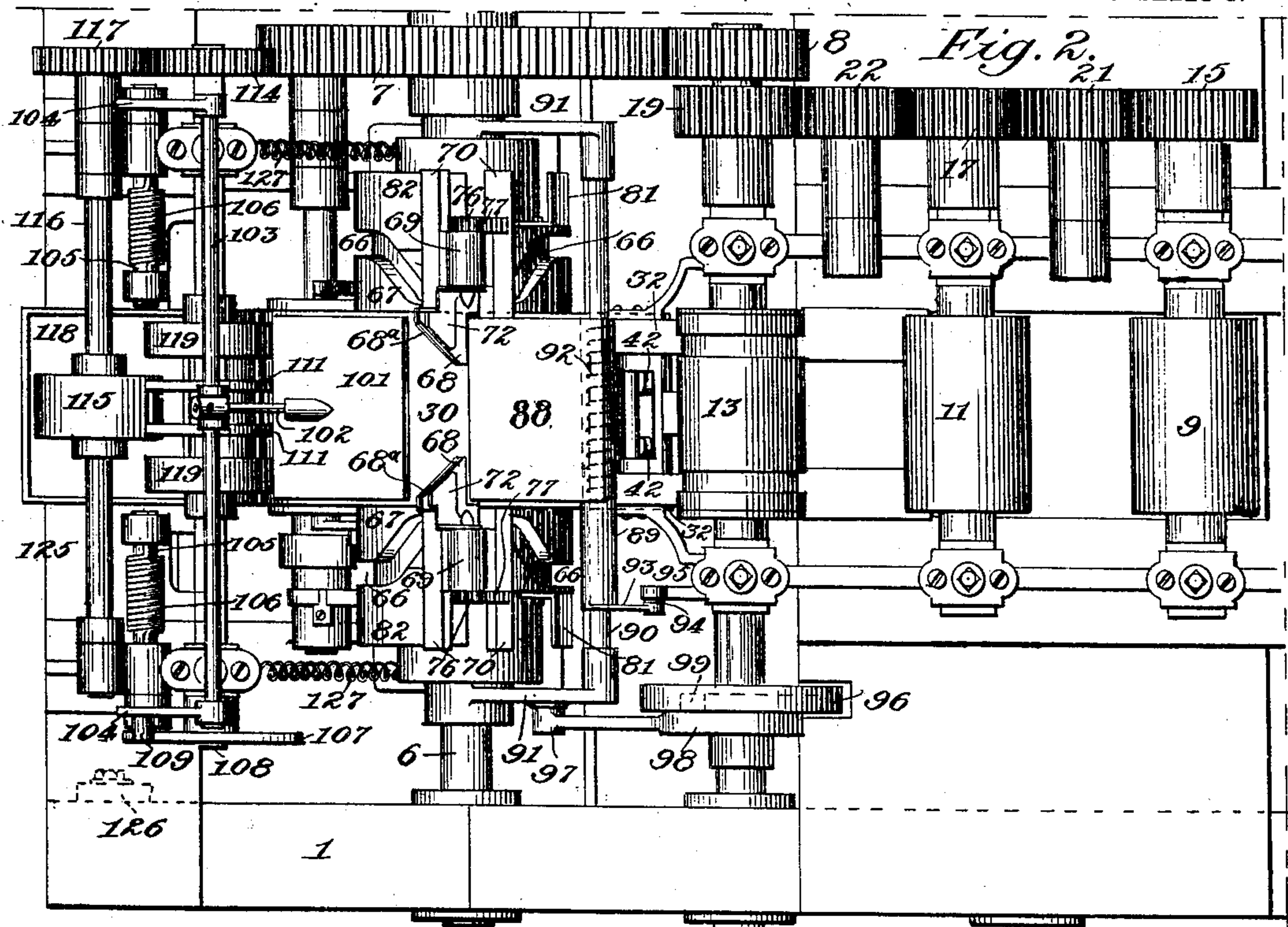
W. C. FULLER.
PAPER BAG MACHINE.

APPLICATION FILED JAN. 23, 1908.

943,534.

Patented Dec. 14, 1909.

5 SHEETS—SHEET 1.



Witnesses:

Walter Dullinger
Augustus D. Oppes

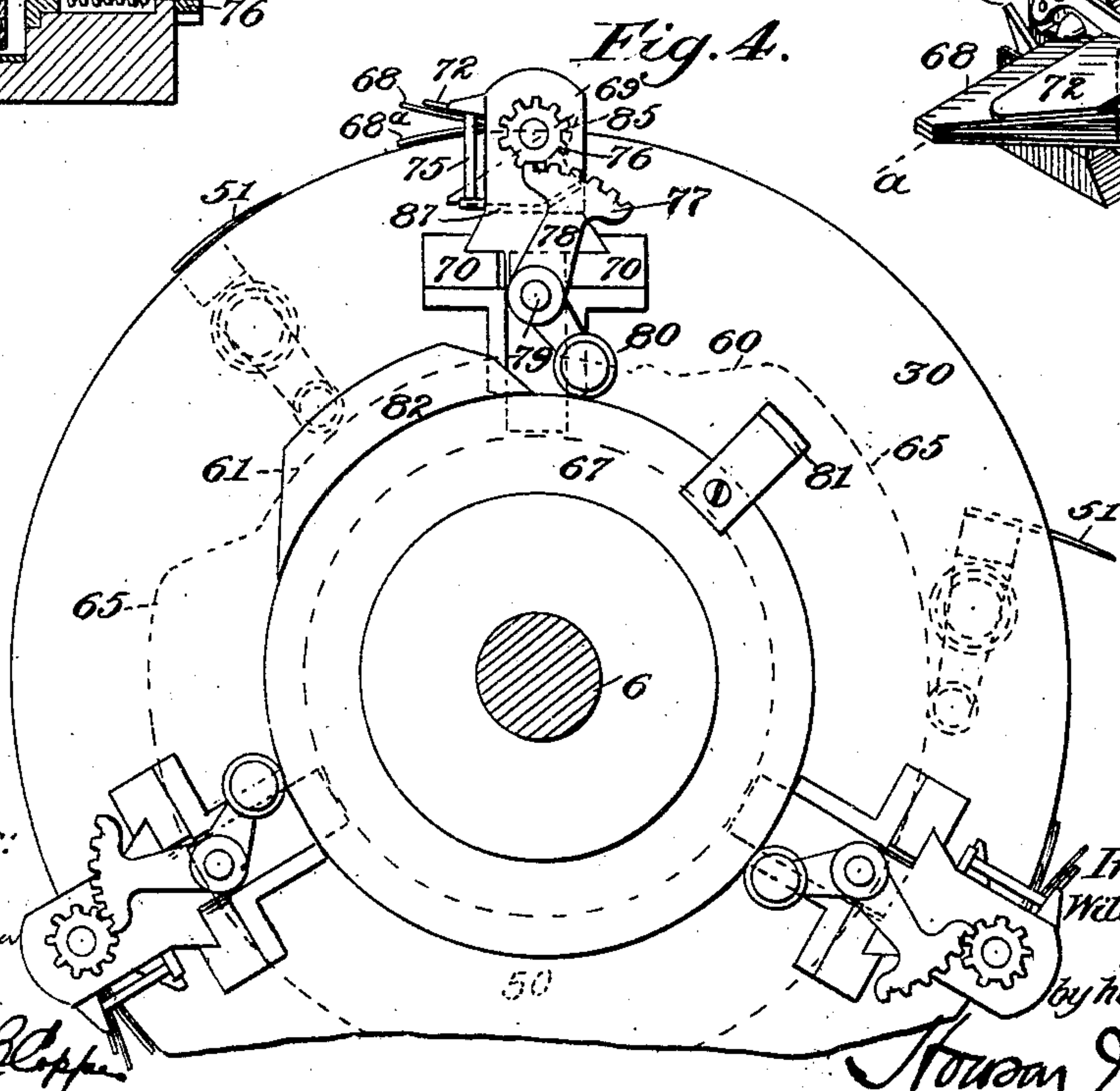
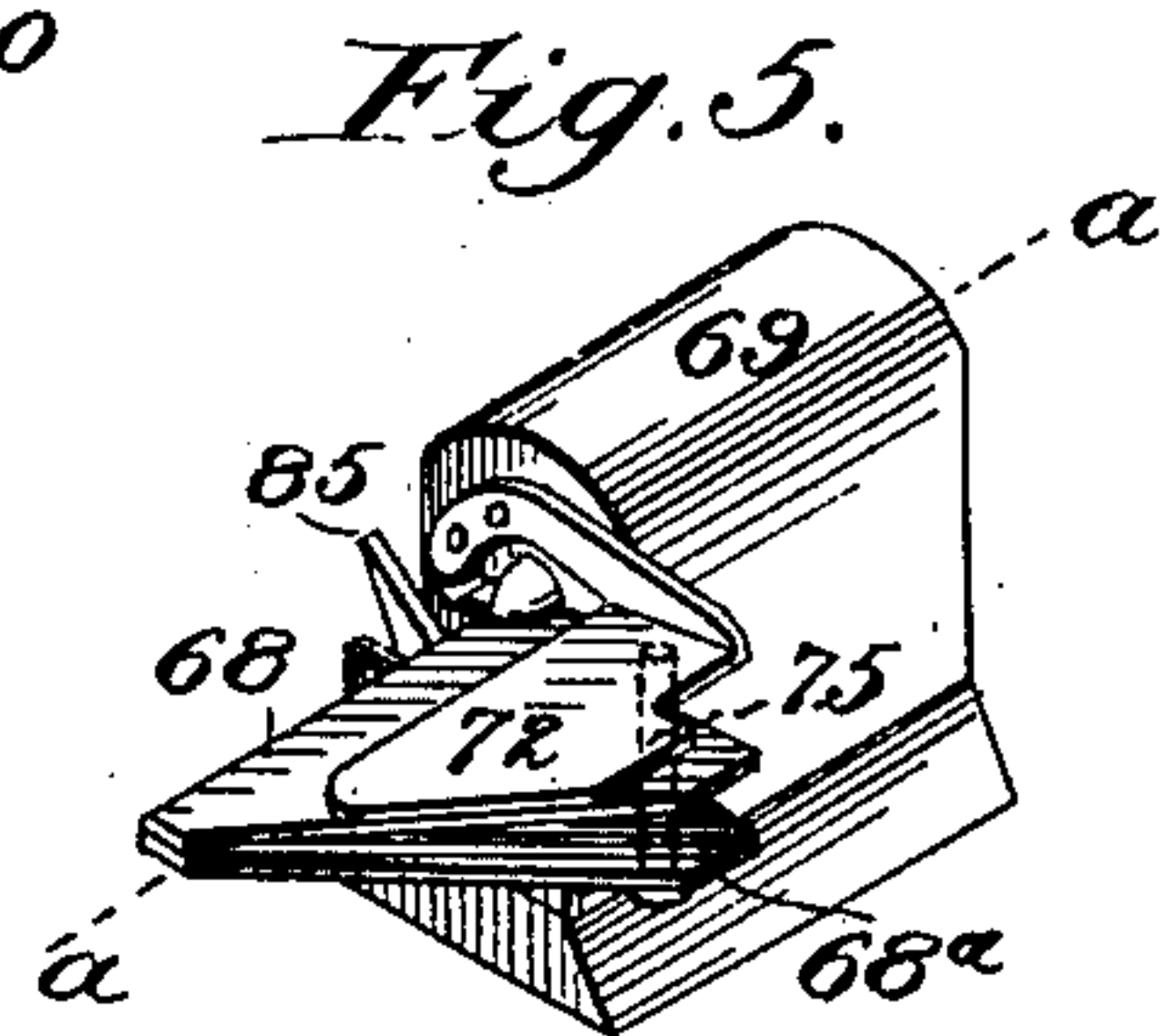
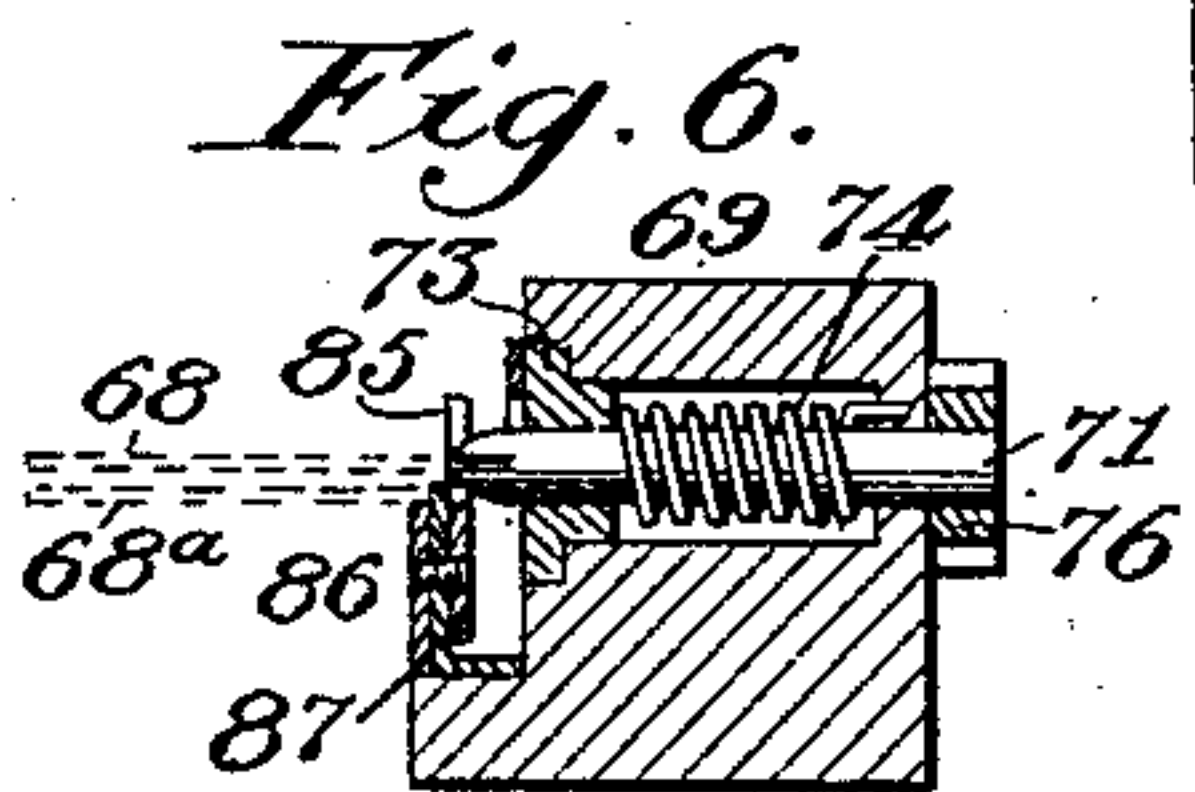
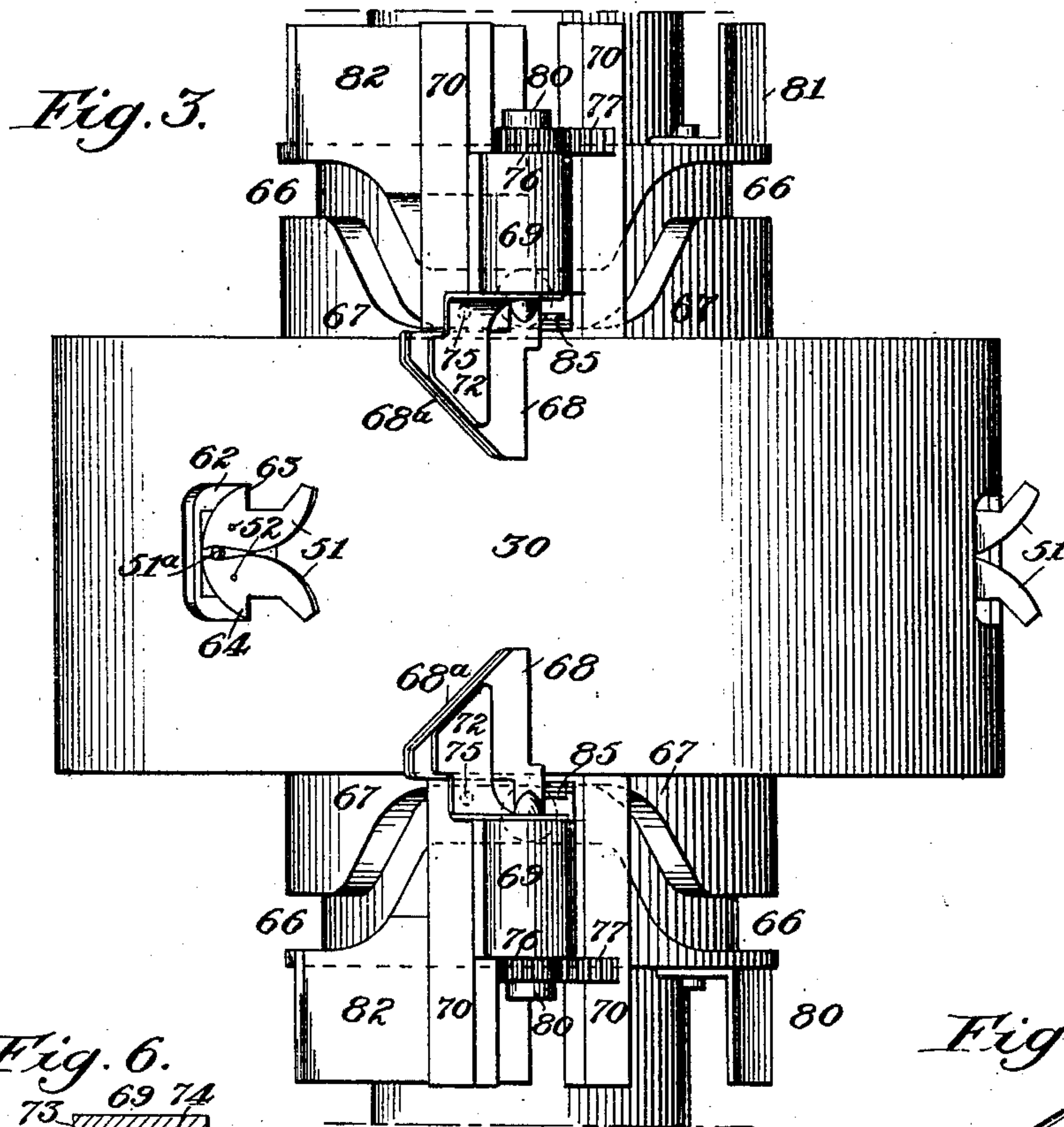
Inventor:
William C. Fuller.
by his Attorneys.
Howan & Howan

943,534.

W. C. FULLER.
PAPER BAG MACHINE.
APPLICATION FILED JAN. 23, 1908.

Patented Dec. 14, 1909.

5 SHEETS—SHEET 2.



Witnesses:

Albert A. Luedinger

Augustus B. Poppe

Inventor:

William C. Fuller

by his Attorneys.

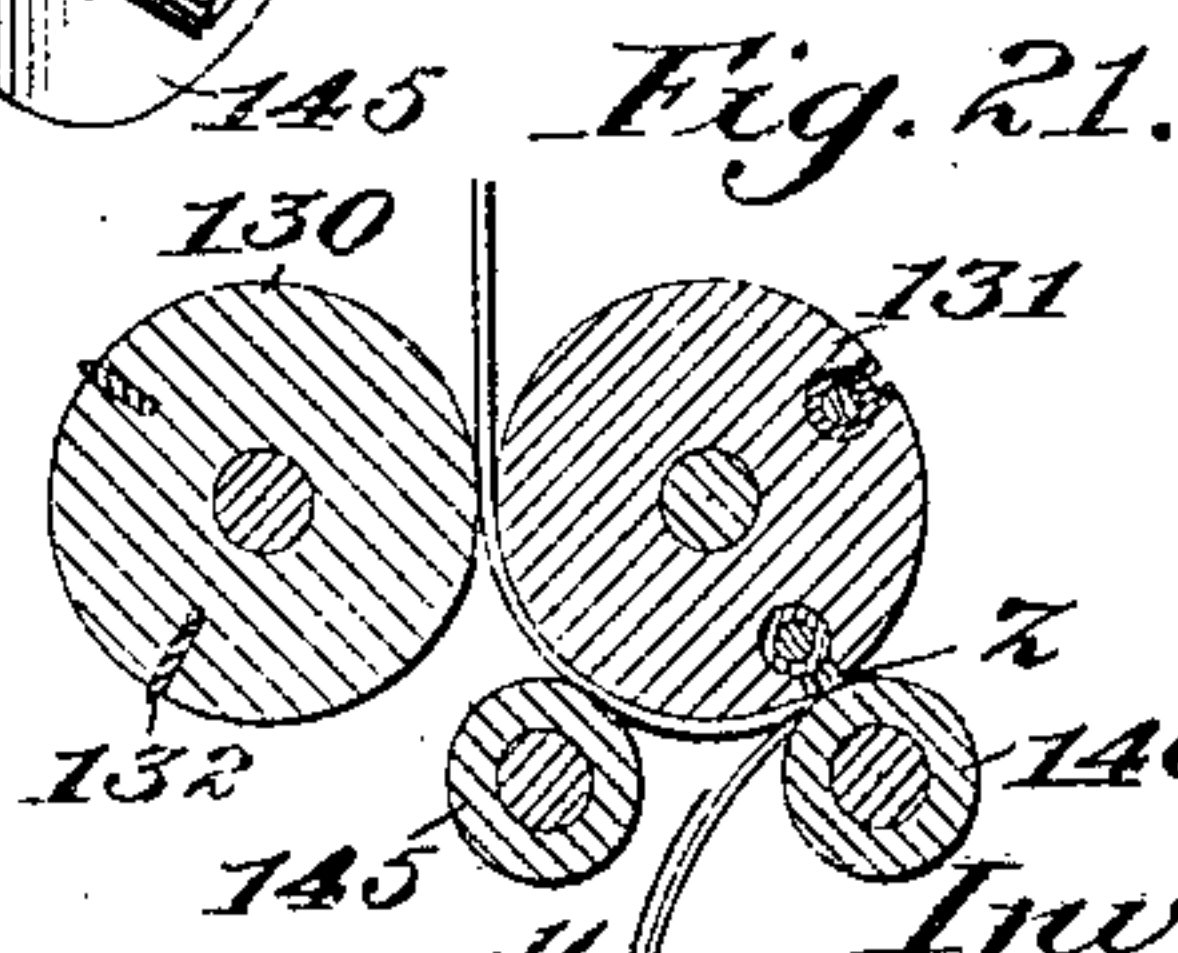
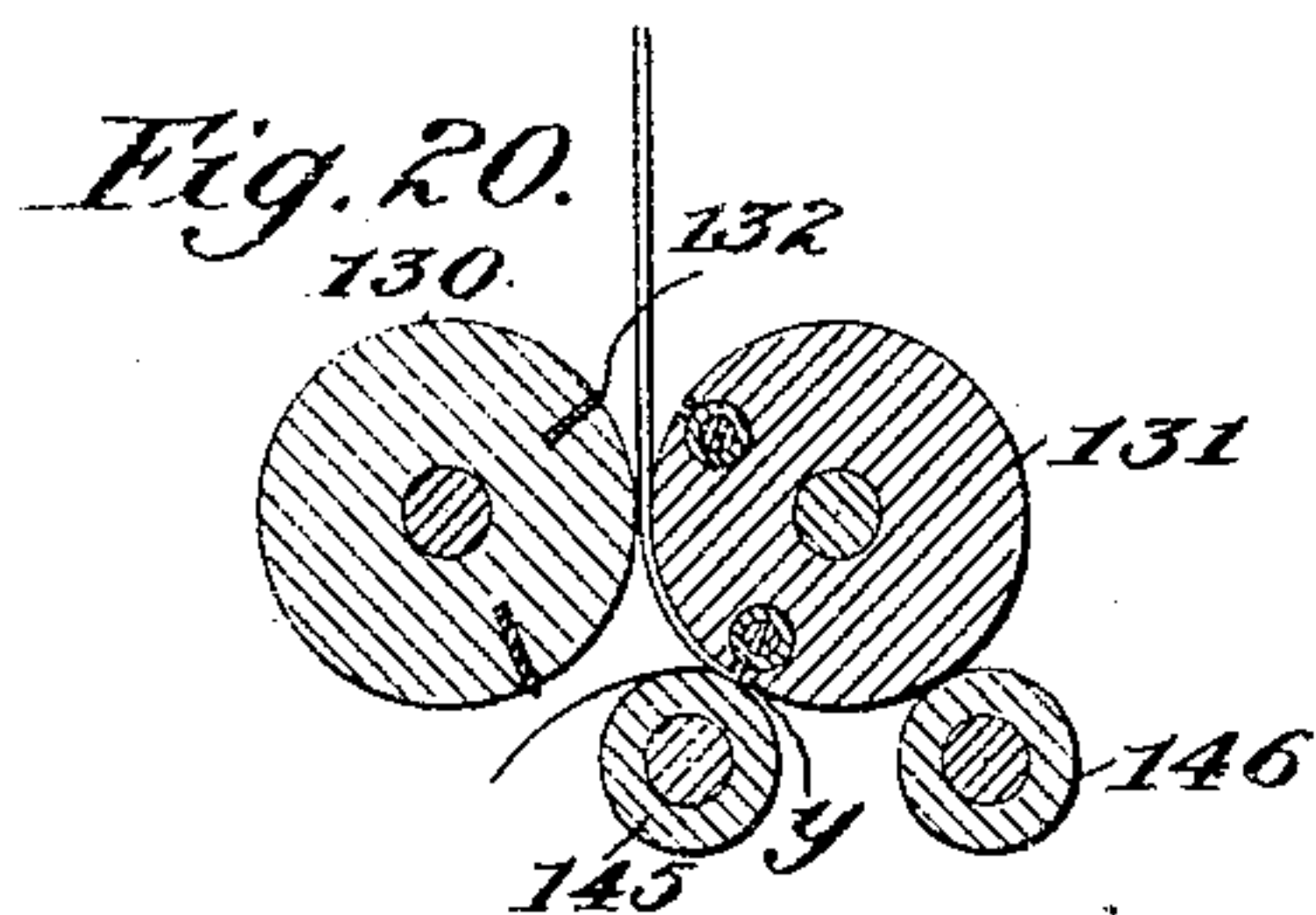
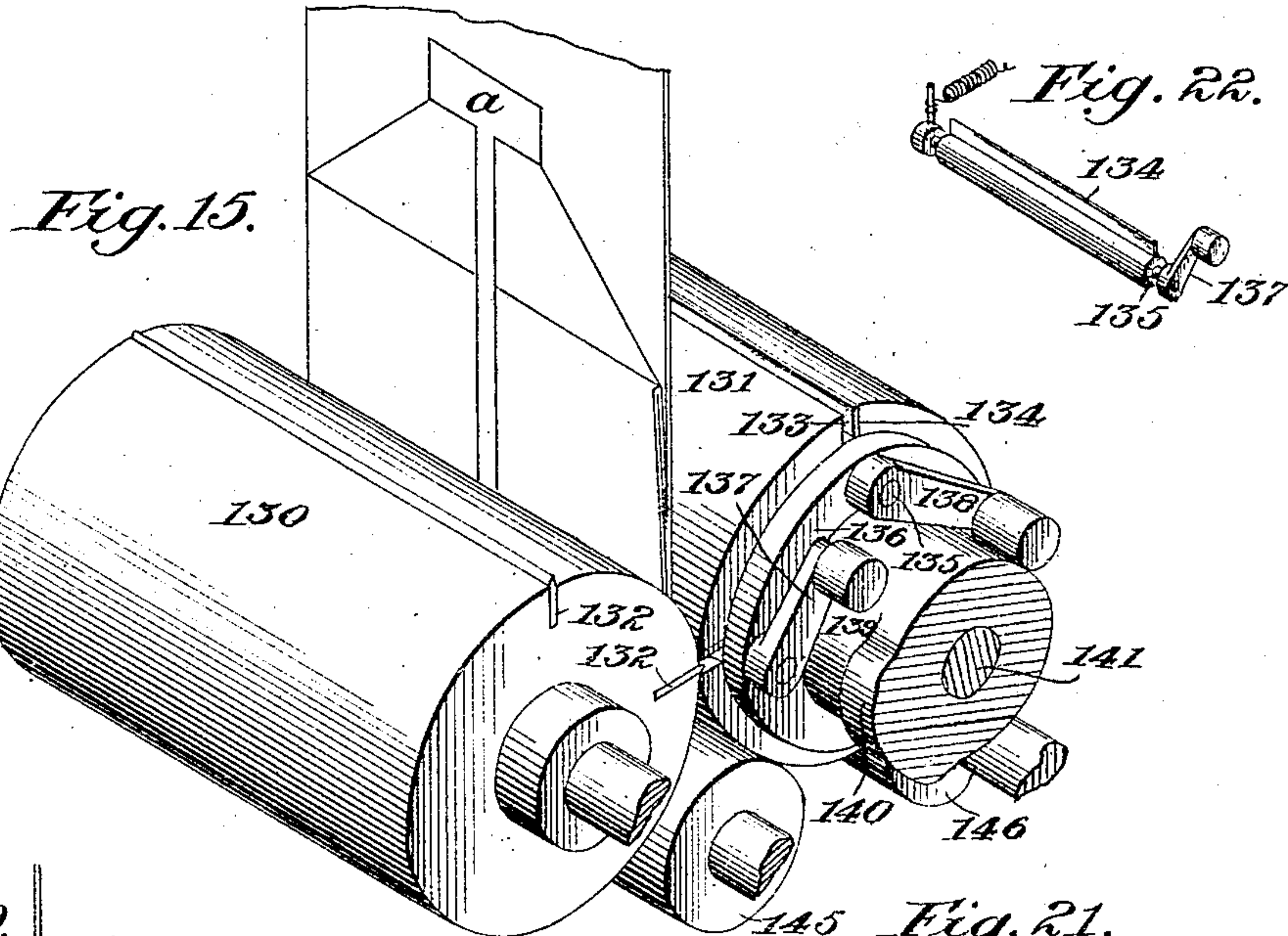
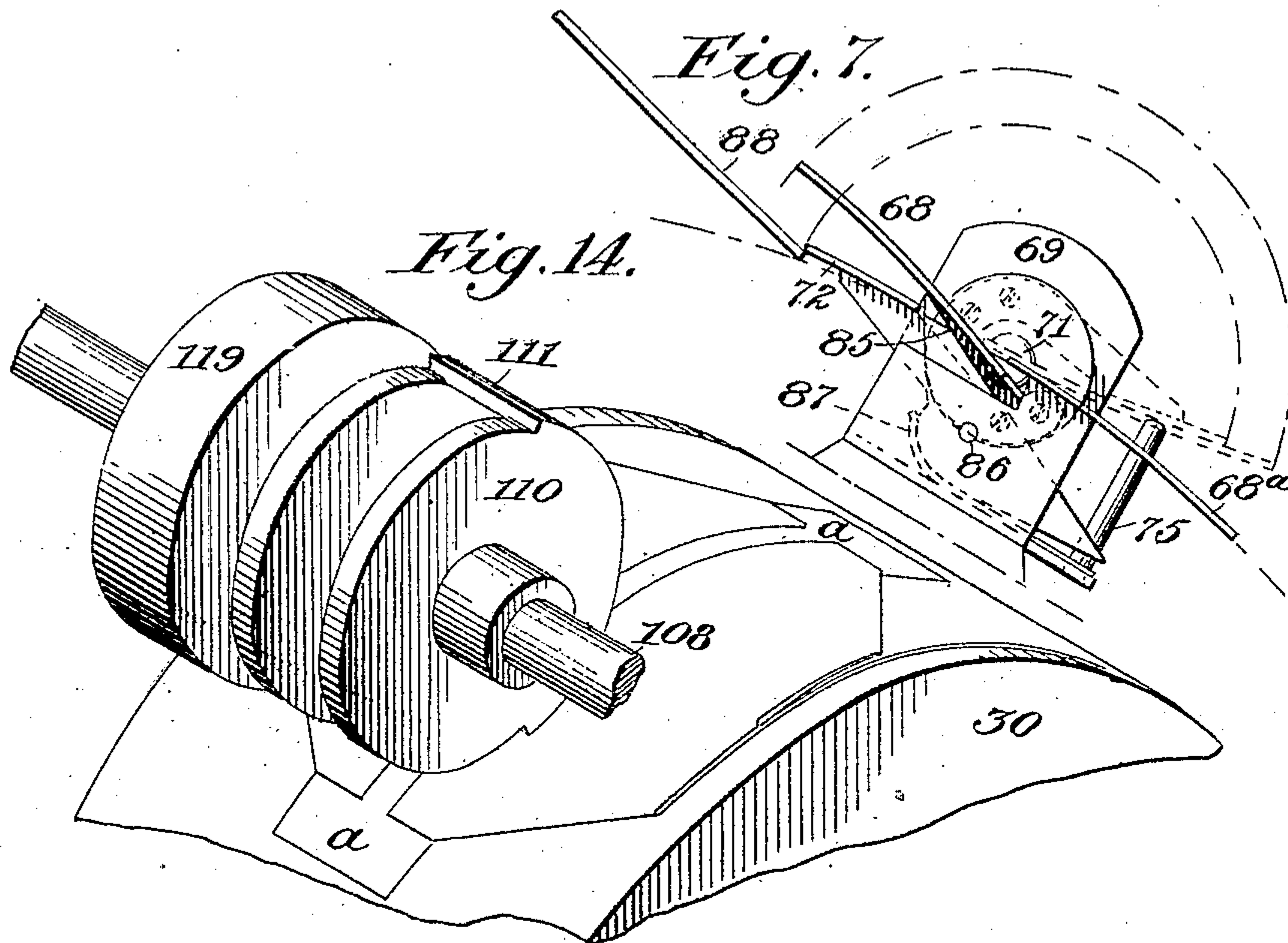
Howard J. Howard

943,534.

W. C. FULLER.
PAPER BAG MACHINE.
APPLICATION FILED JAN. 23, 1908.

Patented Dec. 14, 1909.

5 SHEETS—SHEET 3.



Witnesses:
Walter D. Pullinger
Augustus B. Coppes

Inventor:
William C. Fuller,
by his Attorneys,
Howard & Howard

943,534.

W. C. FULLER.
PAPER BAG MACHINE.
APPLICATION FILED JAN. 23, 1908.

Patented Dec. 14, 1909.
5 SHEETS—SHEET 4.

Fig. 12.

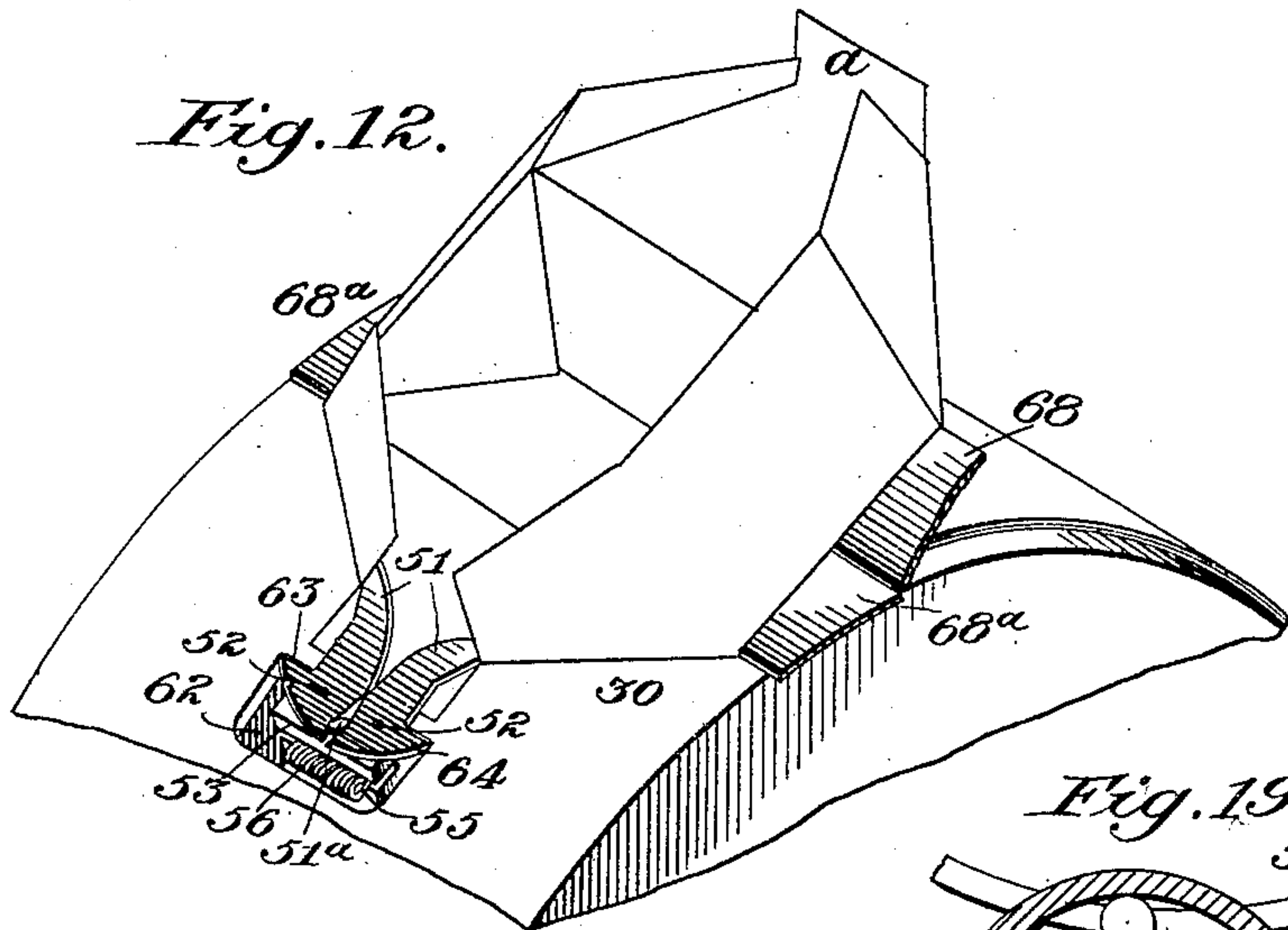


Fig. 19.

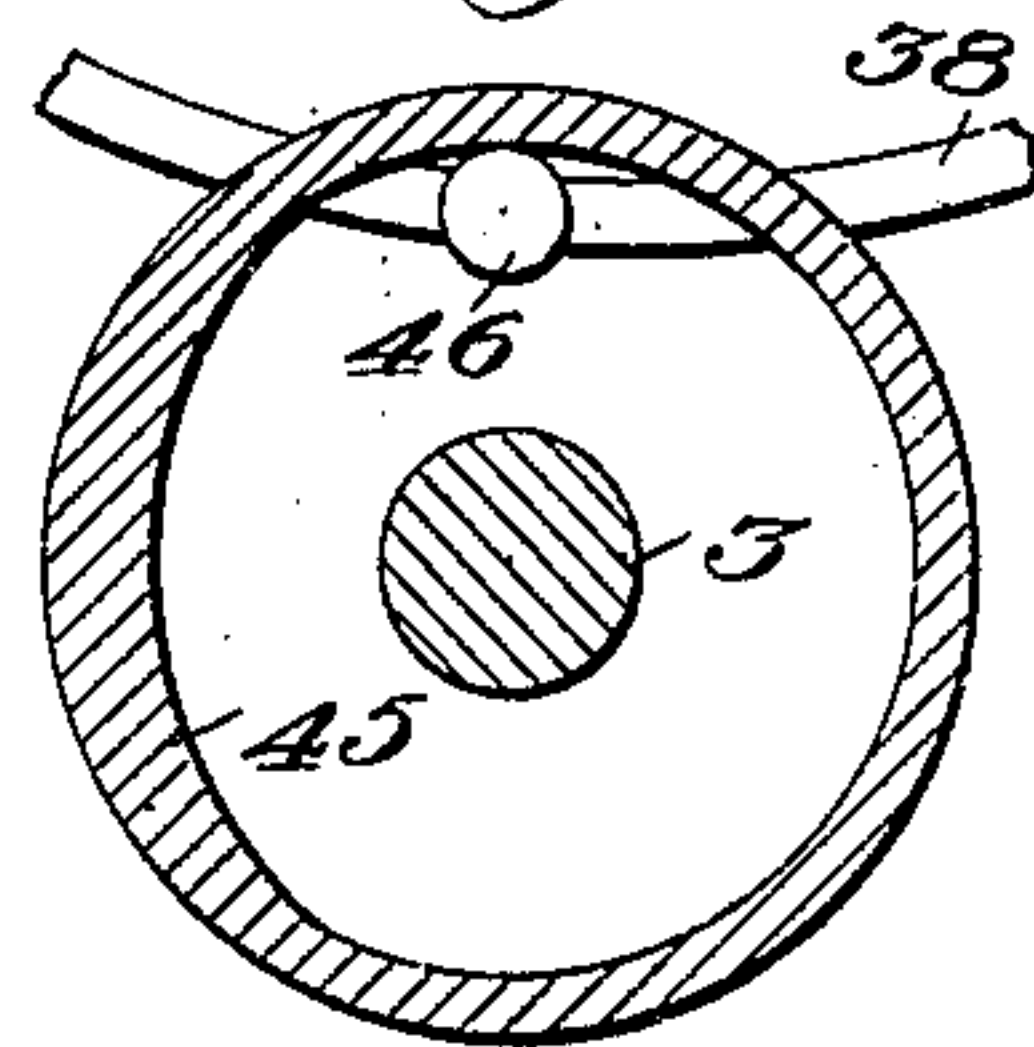


Fig. 13.

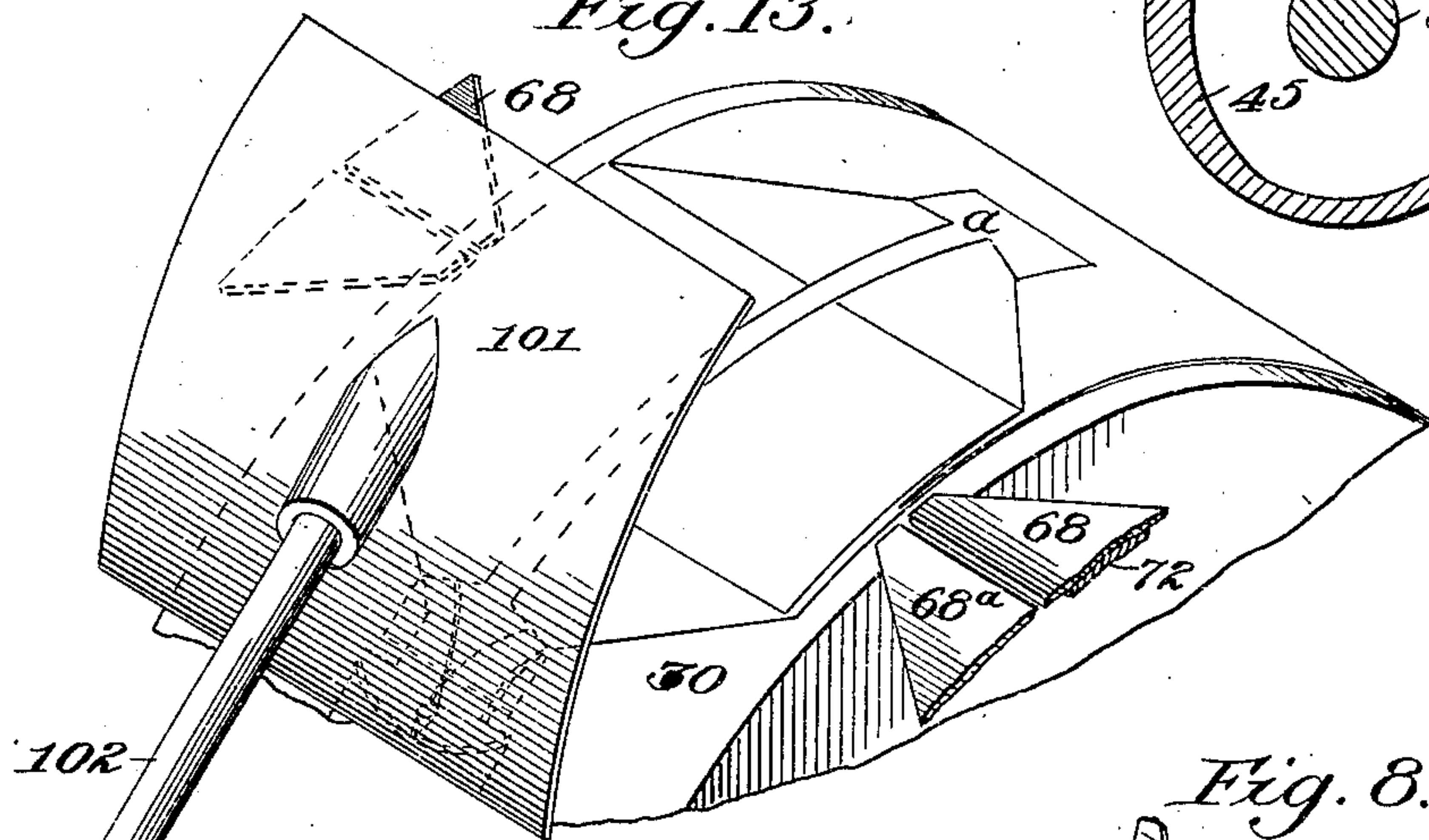


Fig. 8.

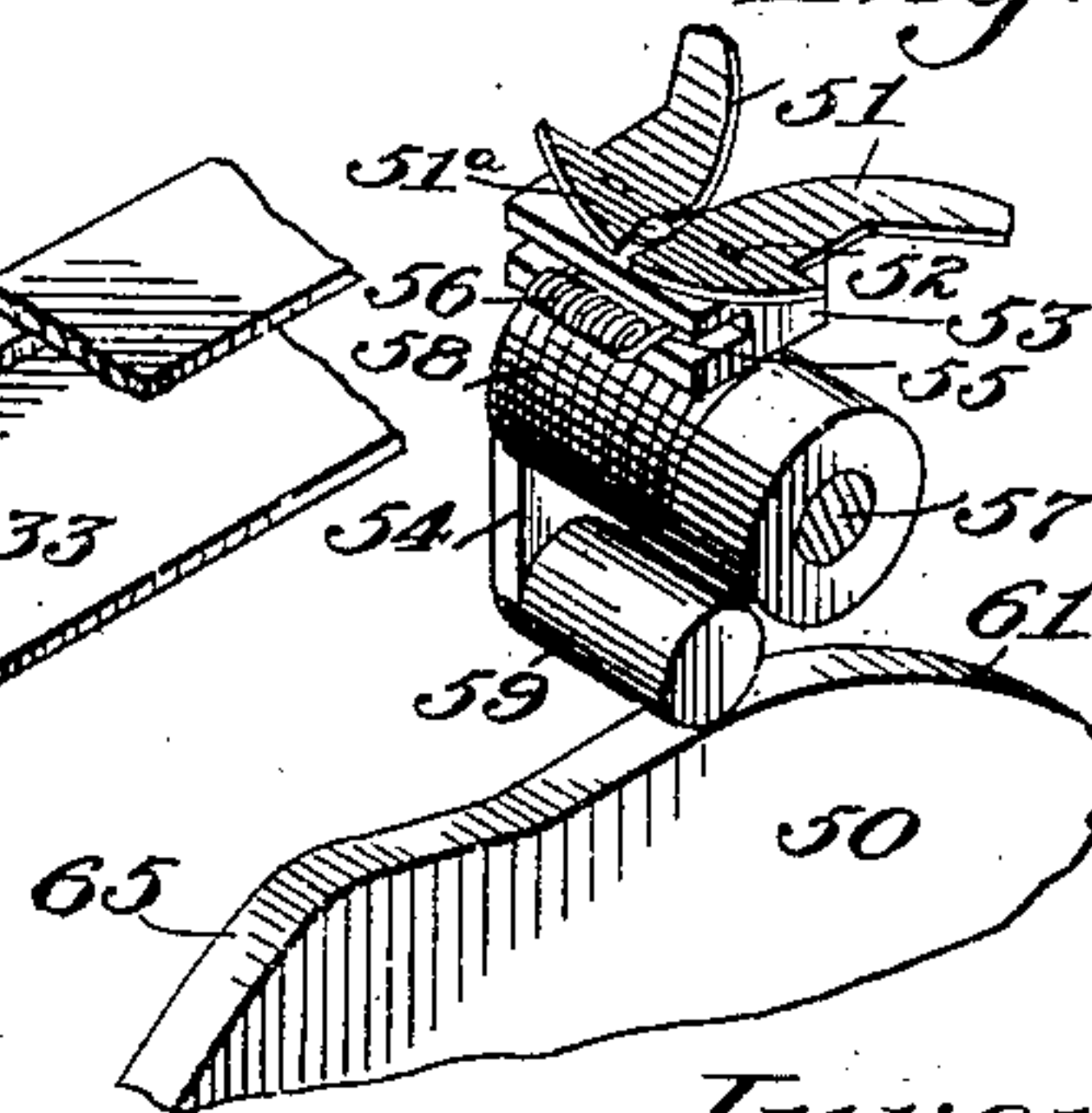
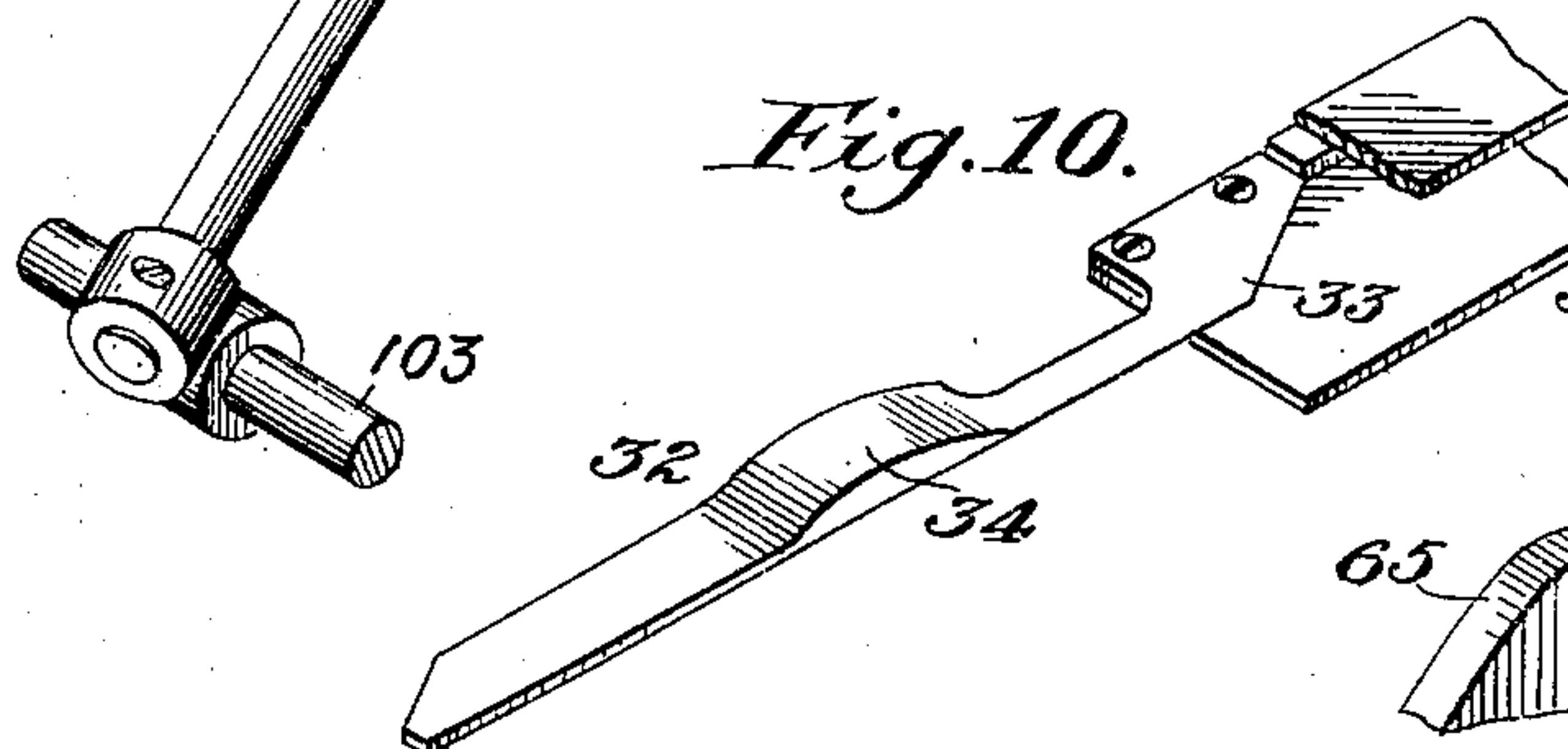


Fig. 10.



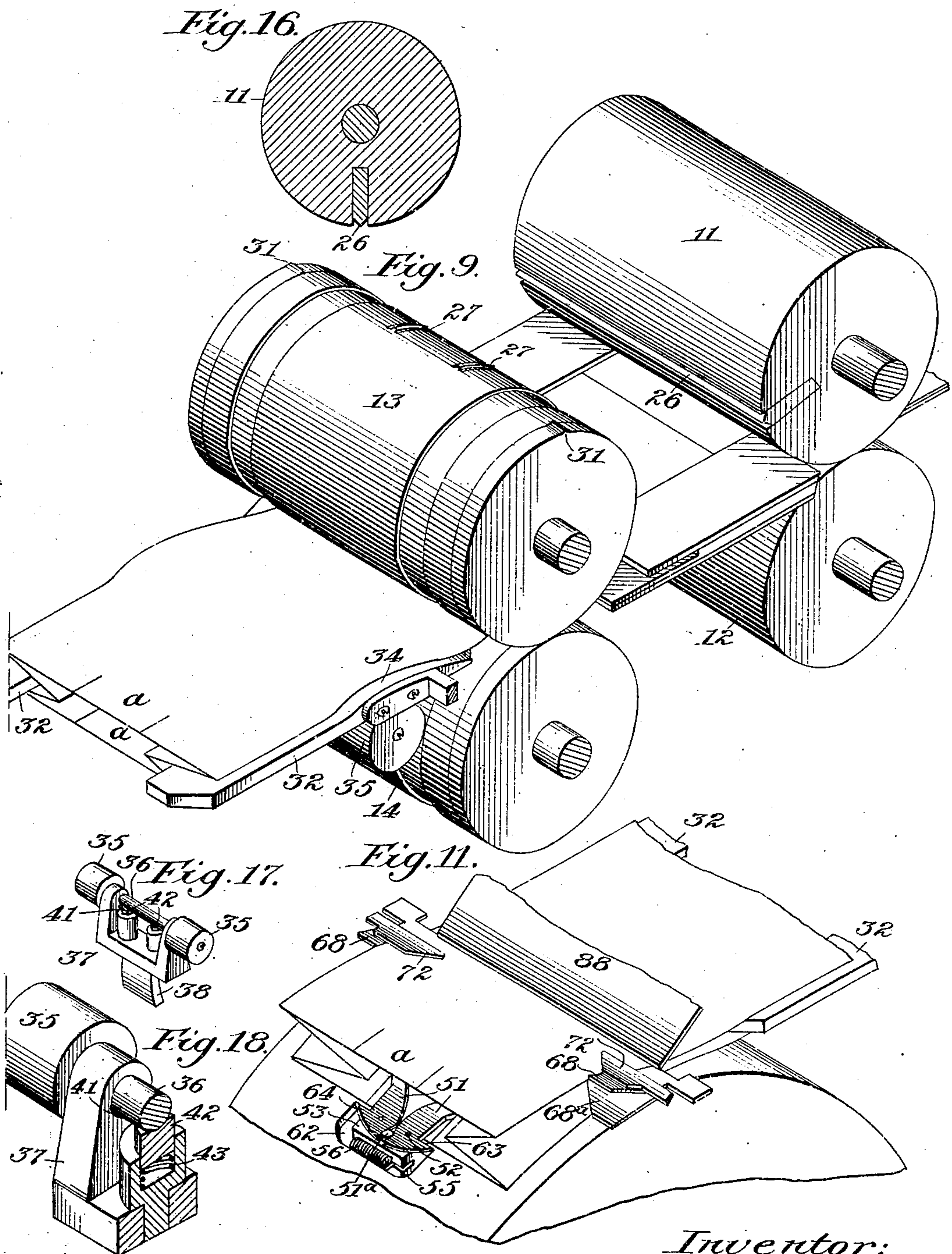
Witnesses:
Walter H. Pullinger,
Augustus B. Coppes

Inventor:
William C. Fuller,
by his Attorneys,
Howson & Howson

943,534.

W. C. FULLER.
PAPER BAG MACHINE.
APPLICATION FILED JAN. 23, 1908.

Patented Dec. 14, 1909.
5 SHEETS—SHEET 5.



Witnesses:
Valter J. Pullinger
Augustus B. Clapper

Inventor:
William C. Fuller,
by his Attorneys,
Hudson & Hudson

UNITED STATES PATENT OFFICE.

WILLIAM C. FULLER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO UNION PAPER BAG MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

PAPER-BAG MACHINE.

943,534.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed January 23, 1908. Serial No. 412,315.

To all whom it may concern:

Be it known that I, WILLIAM C. FULLER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Paper-Bag Machines, of which the following is a specification.

My invention relates to machines for forming paper bags, and consists of certain improvements in that class of machines known as "rotary cylinder machines"; my present improvements relating to the bottom forming and pasting mechanism whereby bags are made from a previously folded paper tube.

The bottom forming and pasting mechanism comprising the subject of my invention is arranged to be connected directly with tube forming mechanism, or, if desired, tubes made in any way and of proper size and shape may be fed to my improved bottom folding and pasting mechanism.

My invention is fully shown in the accompanying drawings, in which:

Figure 1, is a side elevation of the bottom forming and pasting mechanism forming the subject of my invention; Fig. 2, is a plan view of the same; Fig. 3, is an enlarged plan view of the cylinder carrying the bottom forming mechanism; Fig. 4, is an end elevation of said cylinder; Fig. 5, is a perspective view of one set of the folding wings; Fig. 6, is a sectional view of the same on the line *a-a*, Fig. 5; Fig. 7, is an elevation of the folding wings on an enlarged scale, showing the movable wings in the position they assume when thrown over to fold the bottom of the blank; Fig. 8, is a perspective view of one set of the gripping fingers; Fig. 9, is a perspective view of the blank cutting and slitting rolls; showing the means for guiding and opening the side folds of the bag blank; Fig. 10, is a perspective view of the opening guide for the side folds of the bag blank; Figs. 11, 12, 13, 14 and 15, are perspective views illustrating the successive stages of forming the bottoms of the bag; Fig. 16, is a sectional view of the blank cutting roll; Figs. 17 and 18, are perspective views, the latter in section, of the tension rolls for holding and guiding the blanks as they leave the slitting rolls; Fig. 19, is a sectional view of a detail of my invention; Figs. 20 and 21, are sectional views of the

rolls employed to crease and fold over the bottom of the bag and cause it to be held together by the paste, and Fig. 22, is a perspective view of one of the bottom creasing blades.

The object of my invention is to simplify the mechanism for forming what are familiarly known as "satchel bottom bags", that is to say, bags made from tubular blanks having bellows-folded sides, the ends of which blanks are afterward folded and creased in diamond form and then pasted down to form the bottom.

The mechanism forming the subject of my invention is mounted on a suitable supporting frame 1 in which is journaled the main driving shaft 2, to which motion may be imparted by any suitable means (not shown). A counter shaft 3 is driven from the shaft 2, by means of the gears 4 and 5, and a second counter shaft 6, is driven from the shaft 3 by means of the gears 7 and 8. A set of feed rolls 9 and 10; cutting rolls 11 and 12, and slitting rolls 13 and 14, which latter rolls serve also to feed the blanks, are driven from the counter shaft 3, by means of the train of meshing gears 15 and 16; 17 and 18; 19 and 20, and the intermediate gears 21 and 22, motion being imparted to such train by the gear wheel 23 mounted on the shaft 3.

A flattened tube of bellows-folded paper is entered first between the feed rolls 9 and 10, disposed at the right-hand side of the mechanism shown in Fig. 1, passes thence to the cutting rolls 11 and 12, where a knife blade 26 carried by the roll 11 severs it into blanks which are passed to the other pair of feed rolls 13 and 14; the roll 13 being provided with slitting blades 27 for a purpose to be described hereinafter, and from these rolls it passes to a drum or cylinder 30, provided with a series of mechanisms to grip the forward end of the blanks, and hold the same for operation by the several mechanisms designed to fold the end forming the bottom of the bag. The circumference of the cutting rolls equals the distance between the center of said rolls and the center of the feed rolls 13 and 14, so that the sections of tube will have been caught by said latter rolls ready to be passed forward to the gripping mechanism carried by the cylinder 30 simultaneously with the severing of said

sections. The cylinder 30 is driven at a greater speed than the feed rolls 13 and 14 in order that the blanks may be quickly drawn from said feed rolls, and to permit this action means are provided for separating these feed rolls just prior to withdrawing the blank. These means comprise cams 31 carried by said rolls at the edges of the same, and which are so arranged as to release the blank as soon as it is engaged by the gripping mechanism carried by the cylinder 30. As the blank passes between the cutting rolls 11 and 12, guides 32 having thin-bladed forward ends 33 enter the side folds of the blank, and these guides insure the feeding of the same in the proper line to said gripping mechanism. As the blank emerges from between the feed rolls 13 and 14, its folded sides are spread by the enlarged portion 34 of said guides 32 in order that the folding wings may freely enter said sides with the folds disposed in the proper manner with relation to such wings. During the movement of the blank in contact with the opening guides, it is held in proper alinement by tension rolls 35, mounted on the ends of a spindle 36, which is journaled in the end 37 of a bracket arm 38 pivotally mounted at 39 and supported by a spring 40. The spindle is capable of vertical movement in the end of the bracket, the latter being slotted at 41 for the purpose, and pillow blocks 42 in contact with the spindle and supported by springs 43 are provided to insure a yielding tension to said rolls 35. These rolls hold the blank in contact with the guides 32 while the folding mechanism, in combination with the gripping mechanism carried by the cylinder 30, effect the folds and creases necessary to form the bottom of the bag, after which said rolls are released from engagement with the blank as the folding mechanism is withdrawn; said gripping mechanism carrying the blank forward until released at the proper point. To effect this result, I provide a cam 44 mounted on the main driving shaft 3, said cam having a flange 45 in engagement with a stud 46 on the bracket arm 38 which serves to lower the same at proper intervals to permit the release of the rolls 35.

The cylinder 30 carries a series of mechanisms, in the present instance three, for creasing and folding the end of the blank and preparing the same to be finally pasted down to form the satchel bottom of the bag. It will be unnecessary to describe more than one of these mechanisms, however, as the others are duplicates of the same.

On the shaft 6 carrying the drum or cylinder 30, is a cam 50 internally disposed with respect to said cylinder. Carried by this drum or cylinder are sets of gripping fingers 51 arranged in pairs, there being three sets. These fingers are mounted upon

pins 52 journaled in side extensions 53 carried by arms 54, and such pins carry projections 55 connected by a spring 56 whereby the fingers may be held in the outwardly extended position. The arms 54 are journaled on spindles 57 and are capable of movement thereon to move the fingers 51 toward or away from the surface of the cylinder 30. These fingers are held in engagement with the cylinder by means of a torsion spring 58, having one end connected to the arm 54 and the other end connected to the spindle 57, and their outward movement is accomplished by the cam 50 which engages studs 59 carried by the arms 54. The fingers 51 are held in position slightly above the surface of the cylinder by the surface 60 of said cam until the forward edge of the underply of the blank is passed under the same when the stud 59 passes onto the low surface 61 of said cam and the spring 58 acts to clamp said fingers to said cylinder to engage and hold said blank. The cylinder is cut out at 62 to accommodate the gripping fingers; the cut out portion providing shoulders 63. When said gripping fingers are clamped to the cylinder, these shoulders 63 are engaged by side projections 64 of said fingers, locking the latter while they are holding the blanks. The low surface 61 of said cam permits the spring 58 to maintain the gripping fingers in the closed position in contact with the blank for a period of time sufficient to turn in the sides of said blank and form the necessary creases or folds which are afterward pasted down and form the bottom of the bag. This cam is also provided with a high side 65, which engages the studs 59 to throw said clamping fingers into the position shown at *x*, Fig. 4, when the blank is to be released from the cylinder. The cylinder 30 is so geared to the driving mechanism, as to have, as before described, a speed slightly greater than the feed rolls 13 and 14, so as to quickly draw away each blank presented by said rolls, thereby providing sufficient space between the several blanks for the proper manipulation of the bottom forming mechanisms.

Disposed on opposite sides of the cylinder 30 and carried into and out of the operative position by cam guides 66 formed in a cylinder 67 fixed in position over the shaft 6, are the folding wings 68 and 68^a, of which there are three sets, (only one of which will be described), carried by supporting members 69 which are adapted to slide in ways 70 mounted on the cylinder 30. The wing 68^a is fixed to the member 69 while the wing 68 is movable with relation thereto; said wing being carried by a stud 71 journaled in the member 69, around which it is swung in the arc of a circle when actuated by suitable mechanism provided for the purpose. In addition, an auxiliary wing 72 is provided, carried

ried by a sleeve or bushing 73 mounted on the stud 71, said wing overlying and movable with the wing 68. The auxiliary wing 72 is held in contact with the wing 68 by means of a torsion spring 74 surrounding the bushing 73; being connected at one end to the member 69 and at the opposite end to said bushing, such spring having a constant tendency to keep the wings 68 and 72 in the forward position, or that shown in Figs. 3, 4 and 5. Preparatory to their engagement with the side folds of the blanks as the latter are passed onto the cylinder 30, it is necessary to separate the wing 68 from the auxiliary wing 72, and for this purpose I provide a pin 75, carried by the member 69 back of the wing 68 and underlying the wing 72. The stud 71 carrying said wing 68 is suitably journaled in the member 69, and has a pinion 76 at its outer end engaged by a gear-segment 77, carried by a bell-crank lever 78, pivoted at 79 to the member 69; the opposite end of said bell-crank carrying a roller 80. To effect the separation of the wings, I provide a cam 81 mounted on the end of the cylinder 67 in such position as to engage said roller 80, causing it to pass under said cam and effect a movement of the segment 77 in the direction of the arrow Fig. 4; rocking the wing 68 away from the wing 72 while the latter is supported by the pin 75. As soon as the cam 81 releases the roller 80, the wings 68 and 72 close on the upper side fold of the blank, and as the cylinder continues its movement, said roller 80 is engaged by another cam 82 mounted on the periphery of the cylinder 67, which cam imparts movement to the segment 77 in the opposite direction. This movement amounts to a half-revolution of the pinion 76, and is sufficient to throw the folding wings 68 and 72 from the forward position, backward, carrying the portion of the bellows-folded side of the blank which they have gripped and forming the diamond-shaped creases or folds which are afterward pasted down and form the bottom of the bag. As this latter movement takes place, the auxiliary wing 72 is separated from its engagement with the wing 68, by means of a projection 85 pivoted at 86 to the member 69 and held in the engaging position by a spring 87 which serves to restore said projection to its normal position. As the wings are turned back against the blank by the engagement of the toothed segment 77 with the pinion 76, the wing 68 presses against the projection 85 and forces the latter against the edge of the wing 72 which is thereby moved by said projection, as indicated in Fig. 7, to the extreme position against a defining plate 88 held to the blank in a manner to be described hereinafter, and such wings having been separated by means of said projection in the manner indicated, they may be readily withdrawn from the

folds of the blank by the cam guides 66 as the cylinder 30 revolves.

The cam guides for operating the folding wings are disposed in fixed relation to the rotating cylinder 30, on both sides of the same, and said wings are gradually moved into position as the cylinder rotates. As the section of the bag leaves the point where the fold has been made, the folding wings follow with it, lying between the folds of the bag side until withdrawn by the cams in the manner noted above; the bag blank being carried forward by the gripping fingers 51 until passed to the other mechanisms. The folding wings in turning over to fold a portion of the end of the blank to form the bottom of the bag, press the latter against the edge of the defining plate 88, which thereby limits and controls one dimension of the bottom of the bag. This plate, which is secured to a sleeve 89 mounted on a rod 90 carried by arms 91 journaled on the shaft 6, is so held by means of a torsion spring 92 within the sleeve and surrounding said rod, as to have a constant tendency to engage the surface of the cylinder 30. It is held away from the cylinder until such time as it is needed to coact with the folding wings, by means of an arm 93 carried by said sleeve and having a projection 94 to engage a fixed cam 95 carried by the housing for the bearings of the rollers 13 and 14. The defining plate rests over the blanks, and as the latter are carried forward on the face of the cylinder 30, it is bodily moved until said front edge coincides with a line passing vertically through the center of the shaft 6, when it engages the blanks and moves with them during the folding of the bottom. This movement is accomplished by a cam 96 mounted on the shaft of the feed-roll 13, one of the arms 91 being pivotally connected at 97 to a yoke-piece 98 embracing said shaft and carrying a pin 99 fitting the groove of said cam. The continued movement of the cam 96 returns the arms 91 and the defining plate is retracted for engagement with a fresh blank. As the plate is moved forward preparatory to the folding of the blank to form the bottom of the bag, it passes gradually into engagement with the same; the projection 94 carried by the arm 93 riding up the edge of the cam 95 before the plate is in actual contact with the bag, and when the plate is moved back, said projection rides down the surface of the cam and gradually raises the forward edge of the plate. By this means, when the plate reaches the limit of its rearward movement, it has been lifted high enough to clear the cylinder 30 and permit the latter to receive the next blank. As the blanks are carried forward by the cylinder, being held thereto by the gripping fingers 51, a flattening plate 101 carried by an arm 102 adjustably se-

cured to a rod 103 mounted in the end of arms 104 which are journaled on spindles 105 and moved by torsion springs 106, engages the folded bottom portion of the blank, flattening down the folds or creases which have been put into the same, and said blank is then presented to the pasting device. The fingers 51 while gripping a portion of the bag bottom underlie also the angular side folds of the bottom and when said fingers are withdrawn after being pushed away from the face of the cylinder by the high side 65 of the cam 50, the tendency to tear the bottom is prevented as said fingers may move inwardly on their pivots, rocking on the pin 51^a, a sufficient distance to leave the fold without tearing, the spring 56 serving to hold said fingers in the outward position imparting but very slight tension thereto. The flattening plate 101 is carried into contact with the bag blank by means of the torsion springs 106 as explained above, and a cam 107 is employed to retract or lift said plate, said cam being carried by a shaft 108 and engaging a pin 109 on one of the arms 102.

The pasting device comprises a roll 110 having a horseshoe-shaped engaging surface 111, said roll being mounted on the shaft 108 which receives motion from the gear wheel 7 by means of the pinion 114. The surface 111 receives paste from a roll 115 mounted on a shaft 116 receiving motion from the shaft 108 by means of the pinion 117 and rotating in a paste receptacle 118. In addition, the shaft 108 carries feed disks 119 mounted on both sides of said pasting device, so that during the pasting operation the bag will be positively fed forward in proper alinement and confined against displacement. When the folded end of the bag reaches a point substantially opposite the horizontal center of the cylinder, the gripping fingers 51 are released, such action being accomplished by the high side 65 of the cam 50 which engages the stud 59 and rocks the arm 54 supporting said fingers, on its pivot, causing the fingers to be thrown inward quickly to the position shown at *x*, Fig. 4, thereby releasing the end of the bag and permitting its forward end to enter and pass between the guide plates 120 ready to have its end creased in parallel folds, so that the portions of the diamond to form the satchel bottoms can be folded over and pasted down.

In order that the pasting device may readily engage the bottom of the bag and distribute the paste in a proper manner over the several portions of the bag bottom whether such portion is of two or more plies, I mount the pasting mechanism on a platform or shelf 125 which is pivoted to the frame 1 at the points 126 and normally held so that the pasting roll may engage the

bottom of the bag, by means of springs 127, connected at one end to the housings of the bearings of such pasting mechanism and at the opposite end to the supports for the shaft 6. This arrangement permits the pasting roll to yield when the double plies of the bag bottom are engaged and insures an even distribution of the paste upon the parts desired.

In completing the formation of the bottom and the securing of the pasted portions, the bag bottoms are folded over upon themselves and for this purpose they must be creased. Various means for accomplishing this result may be employed, not shown herein, one form of such creasing means comprising two rolls 130 and 131; the roll 130 having a pair of creasing blades 132, and the roll 131 having a pair of recesses 133 in each of which a gripping plate 134 is mounted. The plates 134 are journaled on shafts 135 carried by disk plates 136 secured to the ends of the roll 131, and have arms 137 and 138 engaged by cams 139 and 140 mounted on the spindle 141 of said roll 131 which serves to move said plates 134 into engagement with the portions of the bag which have been pushed into the recesses 133 by the blades 132. This mechanism serves to place the parallel folds or creases in the bag, the first one made being shown at *y* in the diagram views illustrating the bag and the folds of its bottom. On the continued movement of the bag between said rolls, this creased portion is released and caught between a small roll 145 and the face of the roll 131, and this action serves to fold over and hold down the first section of the bottom. Immediately following this operation, the second set of crimping means come into contact with the bag and serve to put in the second fold or crease in the bottom at the point *z*, and lap over the other half which is pressed down by another small roll 146 acting against the surface of the roll 131; the bag having its bottom turned over against the body, and the fold for the final pasting being what is known as a "blind" fold. The bag is now finished, and passes to any suitable means for conveying it away.

The slit made by the knives carried by the second set of feed rolls provides the projecting portions *a* clearly illustrated in the diagram views, which cover the central portion of the bottom and serve to finish the same.

All of the mechanism just described is carried by the frame 1 and supported by cross-bars mounted on such frame; such mechanism being disposed wholly within the sides of said frame.

The cutting means which I have shown are specifically claimed in an application for patent, filed August 17, 1905, Serial No. 130

274,607, and no particular mention of the same is necessary herein.

As will be readily noted, the machine forming the subject of my invention comprises but few parts and is simple in its construction, arrangement and mode of operation. For every revolution of the cylinder 30, three complete bags are formed.

I claim:

10 1. The combination, in bag forming mechanism, of two sets of feed rolls, cutting means disposed between said feed rolls, a rotating cylinder carrying the bag blanks, means carried by said cylinder for making
15 the diamond fold to form the bottom of the bag, means for moving such mechanism into and out of the operative position with relation to the cylinder, means for driving said cylinder at a higher rate of speed than the
20 last pair of feed rolls, and cams carried by said rolls for separating the portion engaging the blanks when the latter are to be released.

25 2. The combination, in bag forming mechanism, of two sets of feed rolls, cutting means disposed between said rolls, guides extending from such cutting means for the sides of the bellows-folded tube, means carried by the guides for opening said bellows-
30 folded sides, and means for keeping said tube in alinement during the opening operation.

3. The combination, in bag forming mechanism, of a cylinder carrying the bag blanks,
35 folding mechanism to form the bottom of the bag bodily movable toward and from the blanks, said mechanism comprising a fixed wing to hold a portion of the blank, a wing movably mounted to effect the fold-
40 ing of the bottom and an auxiliary wing actuated by the movable wing and between which and said movable wing one of the side folds of the blank is confined, a support or carrier for said wings, means for hold-
45 ing said auxiliary wing against the movable wing, means for actuating said movable wing, and a pivoted wedging member lying in the path of the wings when moved over to fold the bottom for separating the mov-
50 able wing and the auxiliary wing to permit their withdrawal from the side folds of the blank.

4. The combination, in bag forming mechanism, of a rotating cylinder for carrying
55 the blanks having apertures cut in its face, shoulders formed by said apertures, pivotally mounted gripping fingers carried by said cylinder and projecting through said apertures, means for holding said fingers
60 against the blanks, and projections carried by said fingers and disposed in engagement with the shoulders of the cylinder whereby said fingers are locked against movement while confining the blanks to the cylinder.

65 5. The combination, in bag forming mech-

anism, of a rotating cylinder, pivotally mounted gripping fingers carried thereby, means for feeding bag blanks to said cylinder, means for shifting said fingers to en-
70 gage the underply of the forward end of the blanks, means for forming the diamond-fold in the end of said blanks, said fingers serving to define the angular creases at one side of the bottom, means for carrying the blank forward, a pivoted frame carrying said
75 fingers, an arm carried by said frame, and an internal cam for engaging said arm to displace the gripping fingers and release the bag blank.

6. The combination, in bag forming mechanism, of a cylinder, means for feeding bag
80 blanks thereto, means carried by said cylinder for gripping said blanks, wings for engaging the side folds at one end of the blanks for placing the diamond-fold therein
85 to form the bottom, a fixed cam for moving said wings into the operative position with relation to the blank, one of said wings being rotatable, a pinion carried by said wing, a toothed segment for engagement with said
90 pinion to throw said wing over, means for operating said segment, an auxiliary wing normally in engagement with the rotatable wing and mounted so as to have rotative
95 movement with and independently of the main rotatable wing, and means engaged by the rotatable wing designed to contact with and force said auxiliary wing away from the said rotatable wing.

7. The combination, in bag forming mechanism, of feed rolls for the tube, guides ad-
100 jacent thereto arranged to enter the bellows-folded sides of the tubes, said guides having thickened portions forming opening means for said sides, and means disposed below
105 said guides for holding the underply of the tube against the same and keeping said tube in alinement during the opening operation.

8. The combination, in bag forming mechanism, of the feed rolls, cams carried there-
110 by for effecting their separation at regular intervals, opening guides for the side folds of the blanks, and tension rolls adapted to hold the lower ply of the sides against such opening guides to keep the tube properly
115 alined.

9. The combination, in bag forming mechanism, of the feed rolls, means carried there-
120 by for effecting their separation at regular intervals, opening guides for the side-folds of the blanks, tension rolls adapted to hold the lower ply of the tube side against such guides to keep the tube properly alined, and means for releasing said tension rolls.

10. The combination, in bag forming
125 mechanism, of a rotating cylinder, gripping fingers carried thereby, the cylinder being apertured for the passage of the same, means for feeding blanks to said fingers for en-
130 gagement by the same against said cylinder,

a carrier for said fingers, pivots for the fingers, means for rocking said fingers on their pivots, and means for rocking said carrier to release the fingers from the blanks.

- 5 11. The combination, in bag forming mechanism, of a cylinder, a pair of curved gripping fingers carried thereby, said fingers being pivotally mounted alongside of each other and the cylinder being apertured
10 for the passage of the same, and tension means for holding said fingers with their curved ends in an outwardly projecting po-

sition, said means permitting contraction of the projecting portions of said fingers as they are released from the overlying folded 15 portion of the bag blank.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM C. FULLER.

Witnesses:

MURRAY C. BOYER,
JOS. H. KLEIN.