

W. A. LORENZ.  
PAPER BAG MACHINE.  
APPLICATION FILED MAR. 25, 1903.

NO MODEL.

5 SHEETS—SHEET 1.

Fig. 1

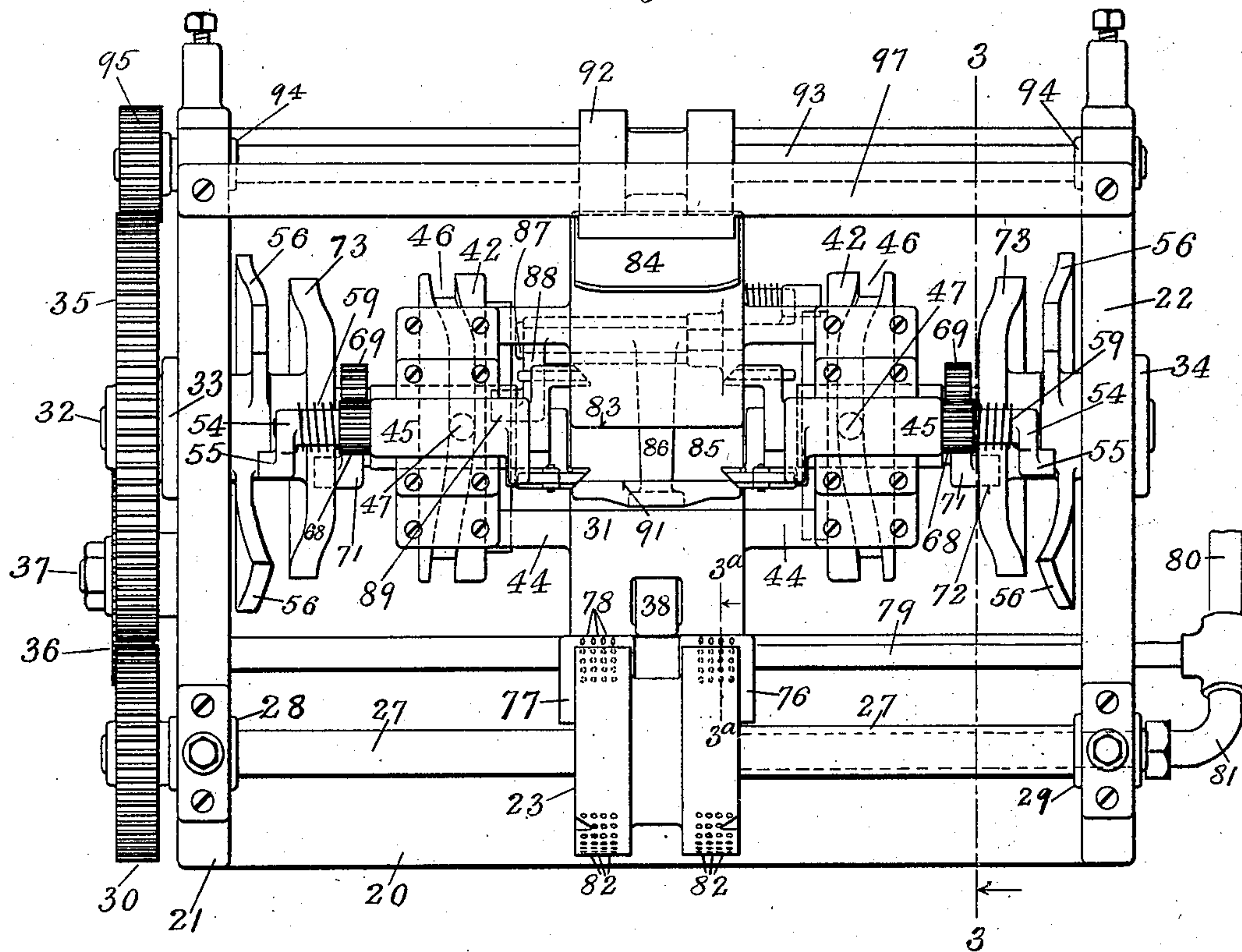
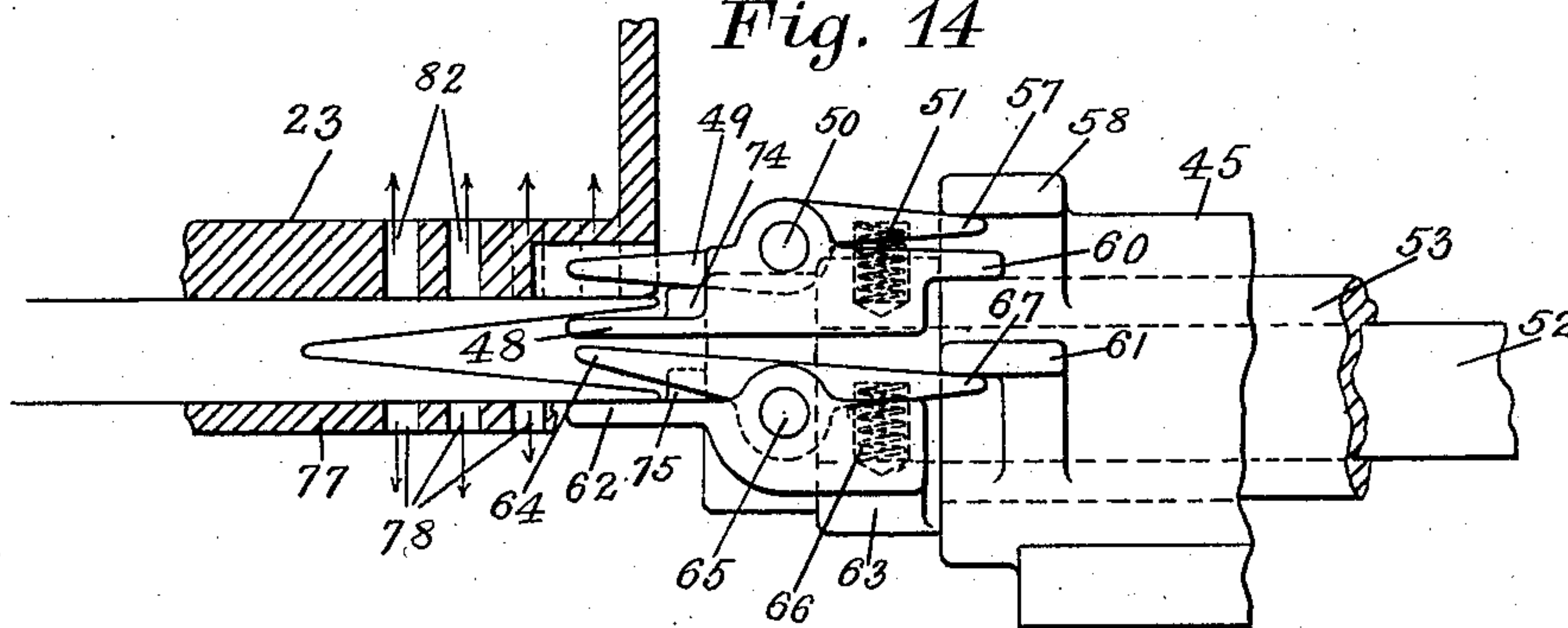


Fig. 14



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William A. Lorenz

By W. H. Honiss, Atty.

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5 SHEETS—SHEET 2.

Fig. 2

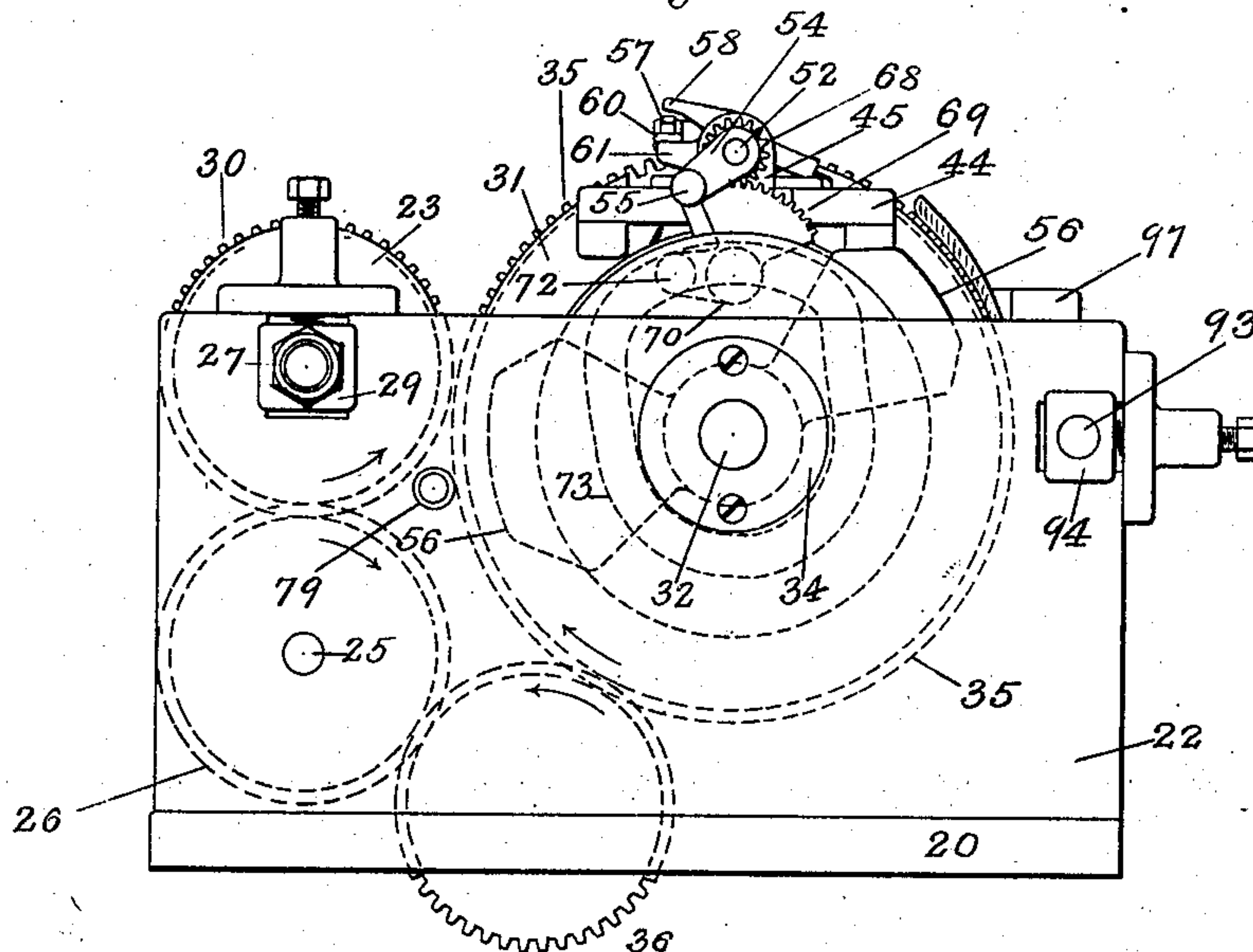
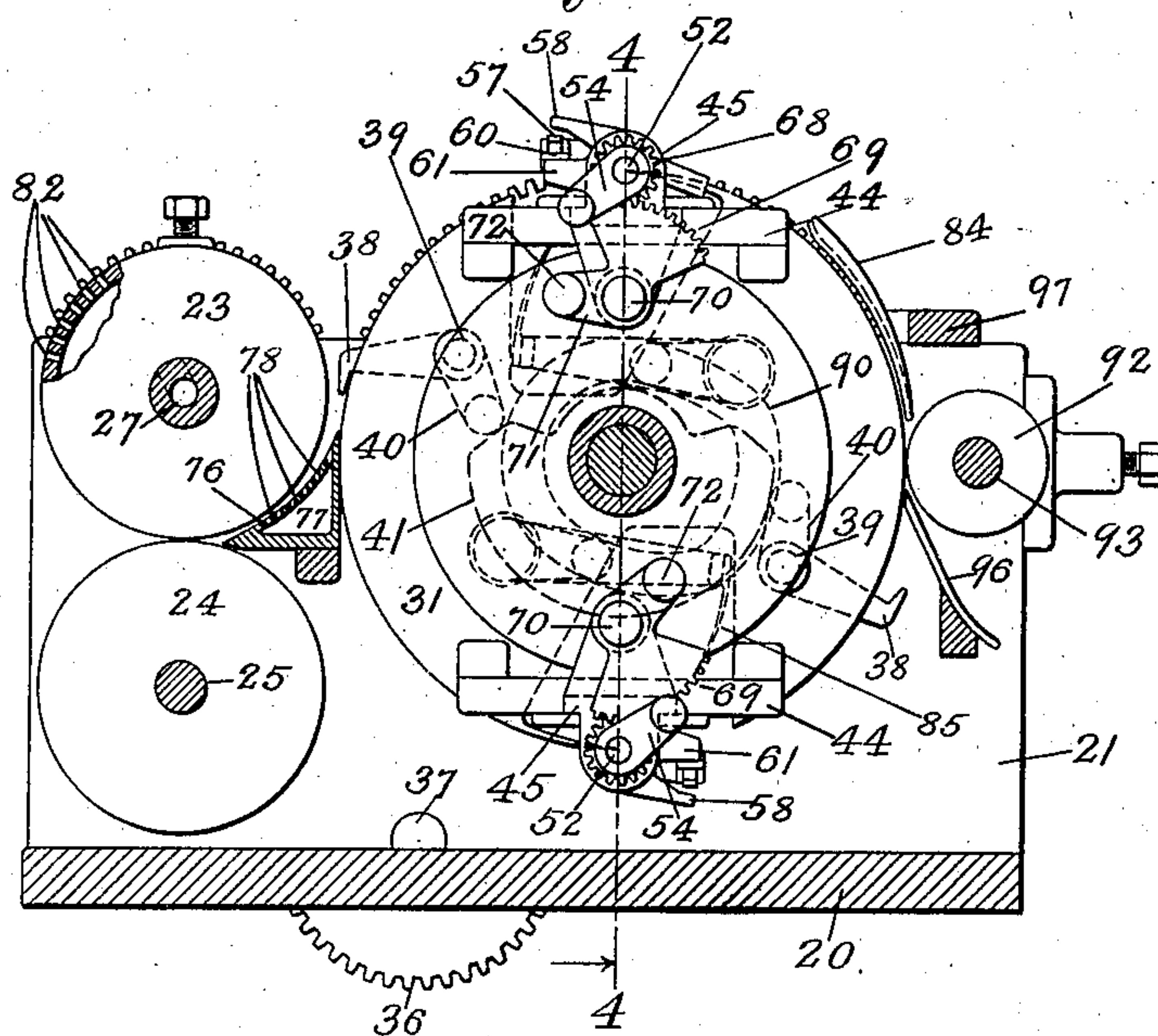


Fig. 3



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No. 742,205.

PATENTED OCT. 27, 1903.

W. A. LORENZ.  
PAPER BAG MACHINE.  
APPLICATION FILED MAR. 26, 1903.

NO MODEL.

5 SHEETS—SHEET 3.

Fig. 4

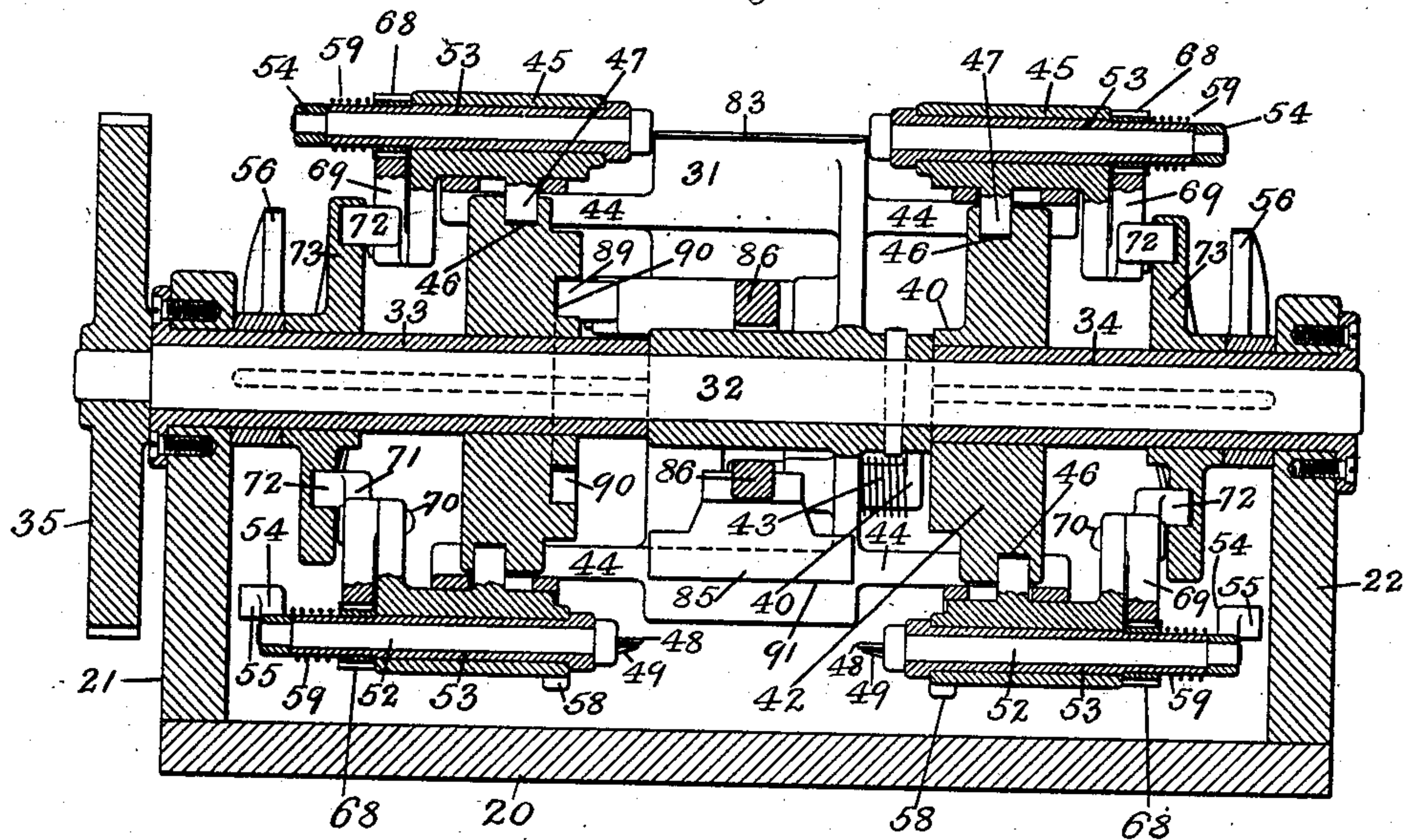


Fig. 15

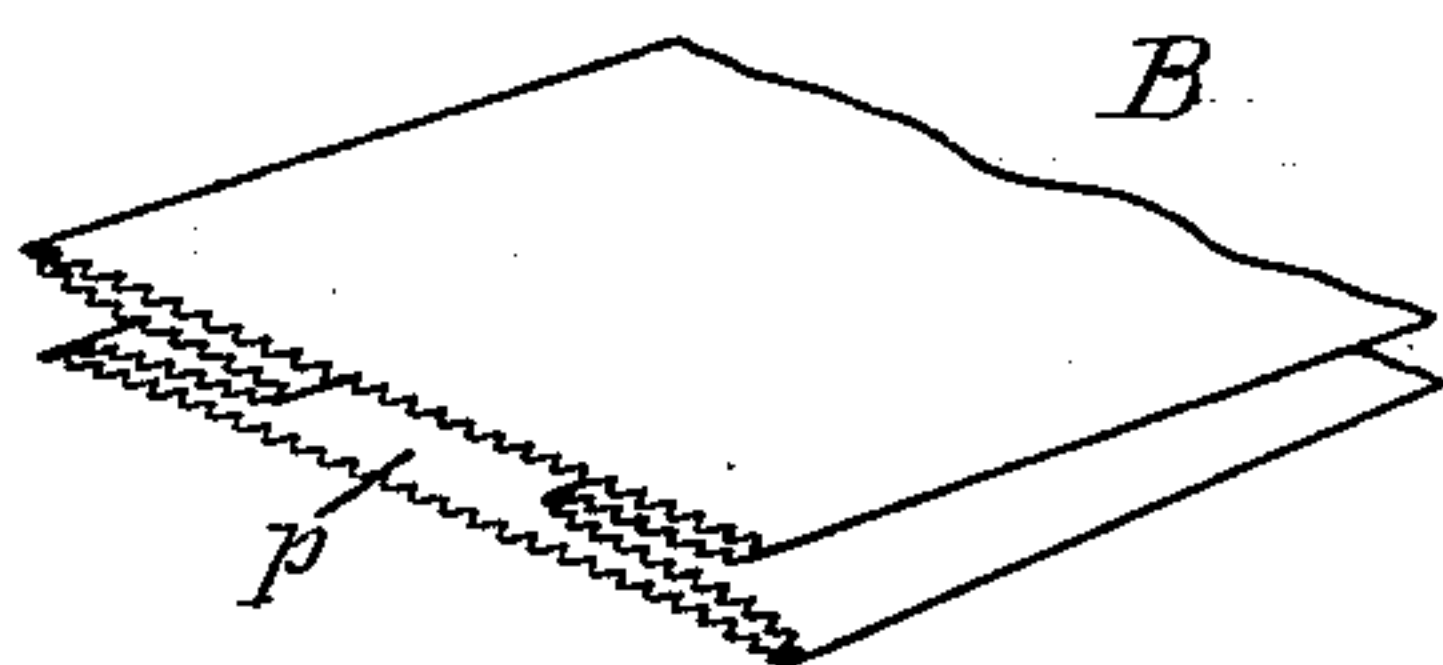


Fig. 16

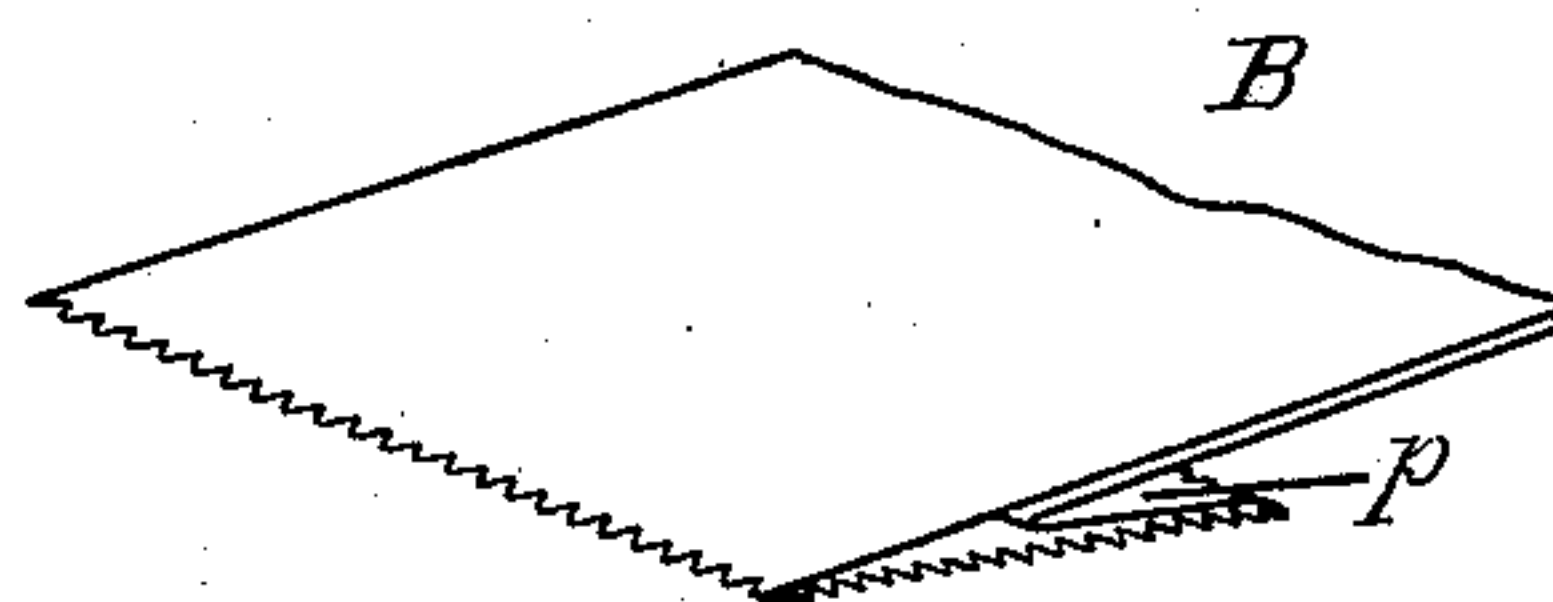
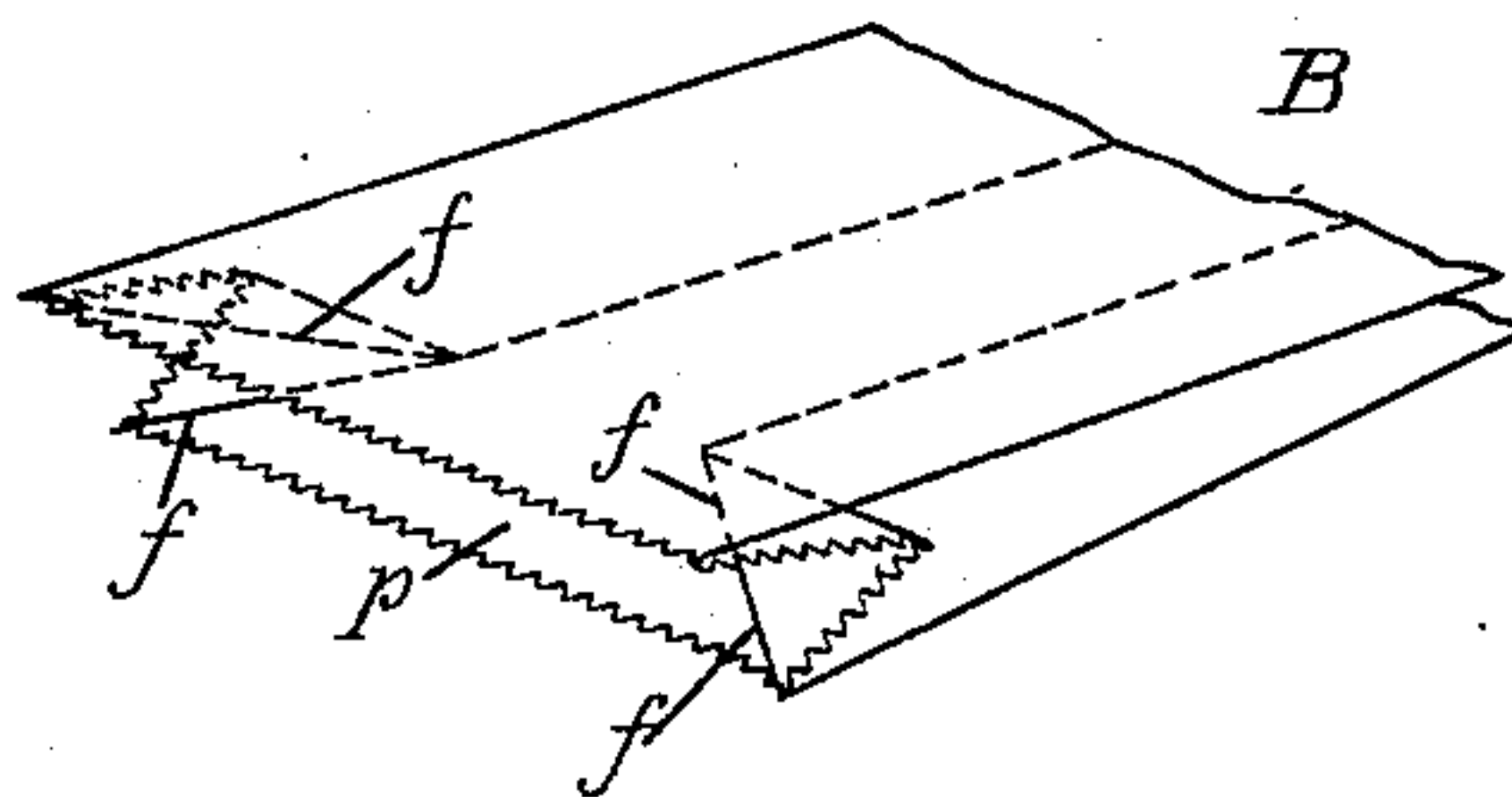


Fig. 17



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5 SHEETS—SHEET 4.

Fig. 5

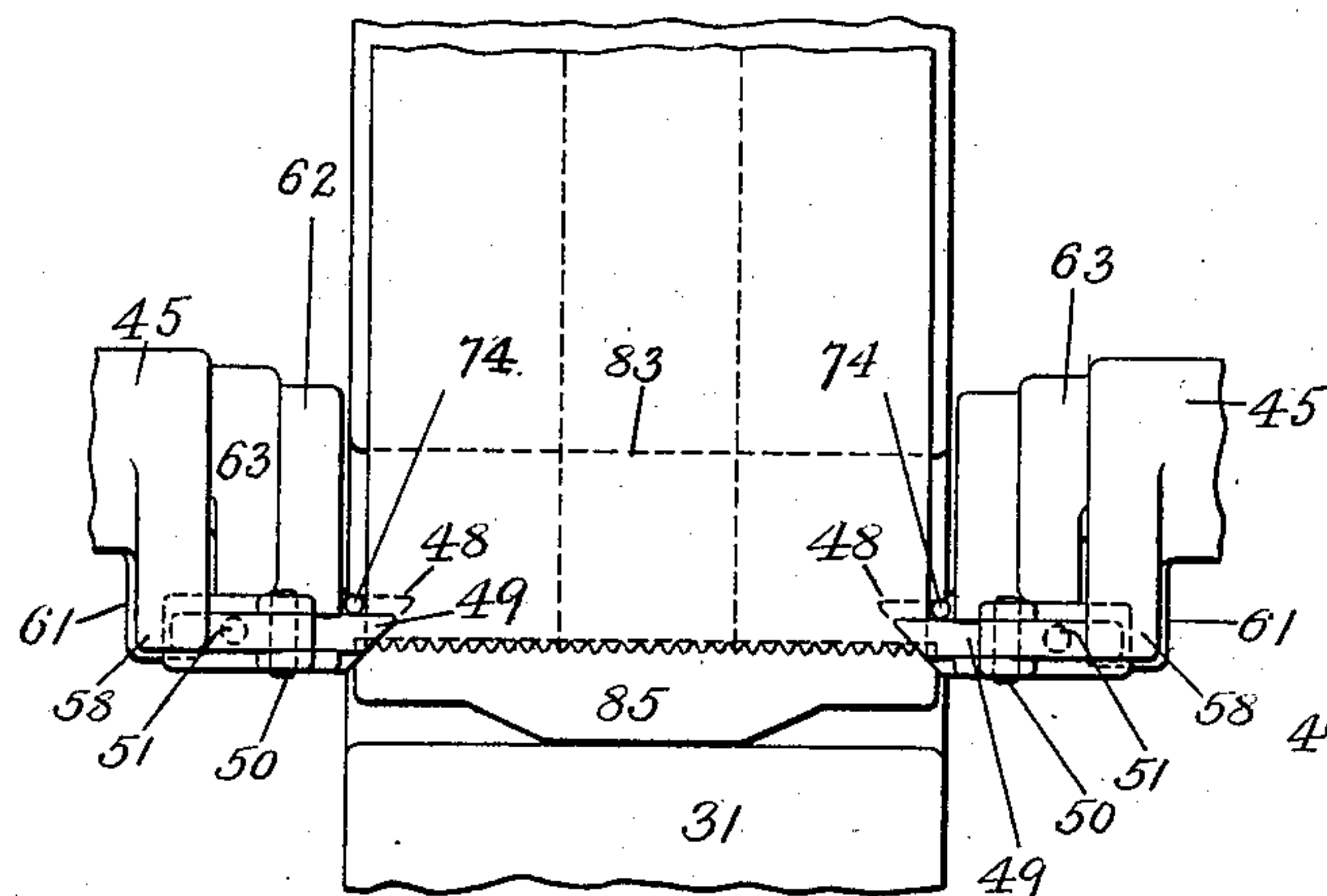


Fig. 6

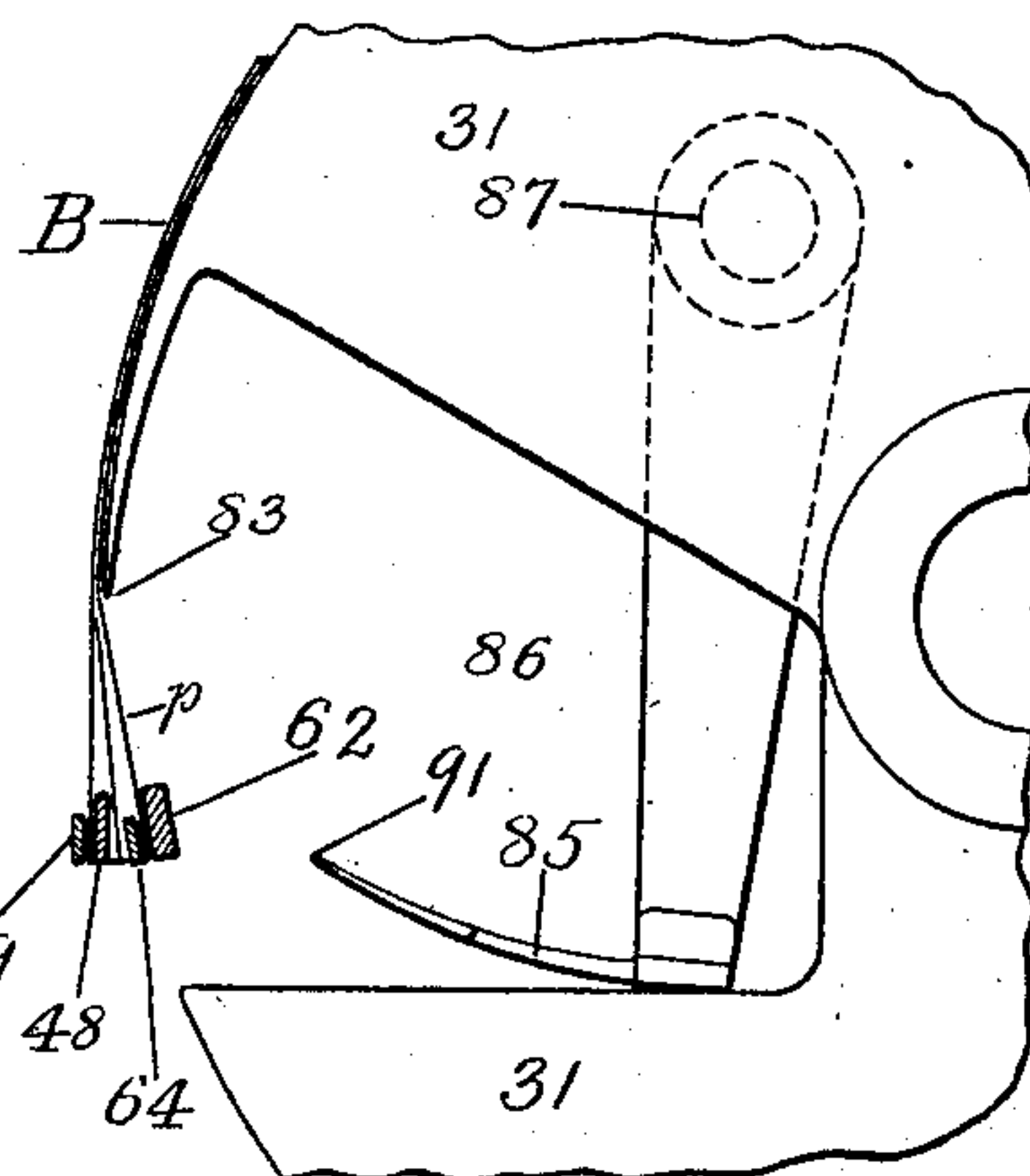


Fig. 7

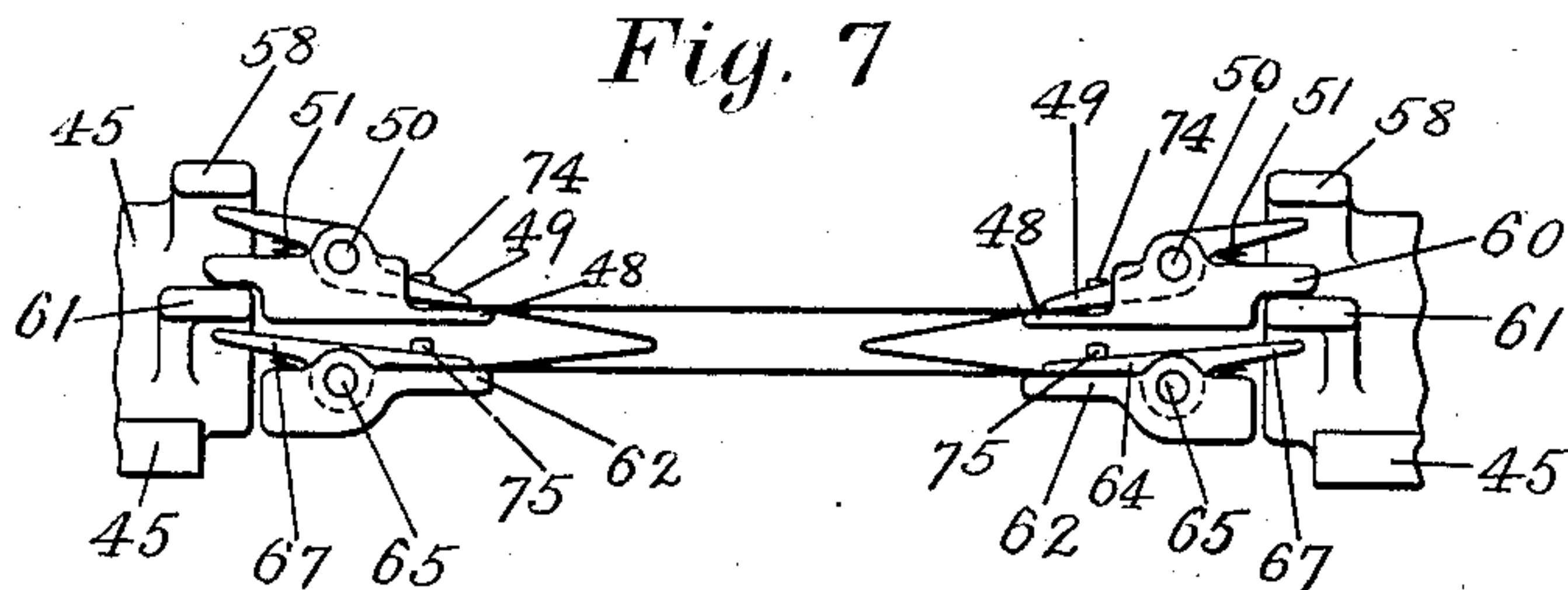


Fig. 8

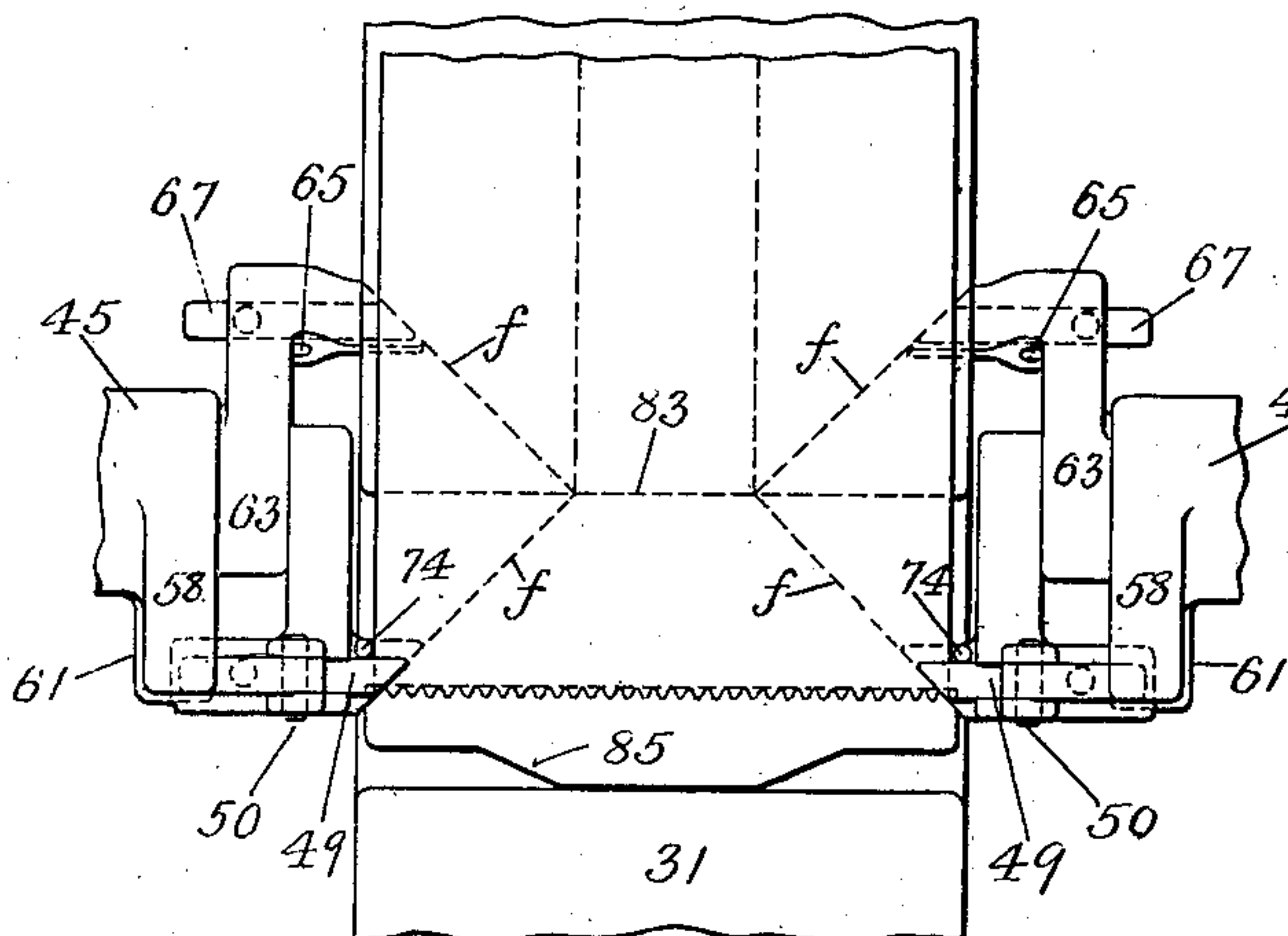
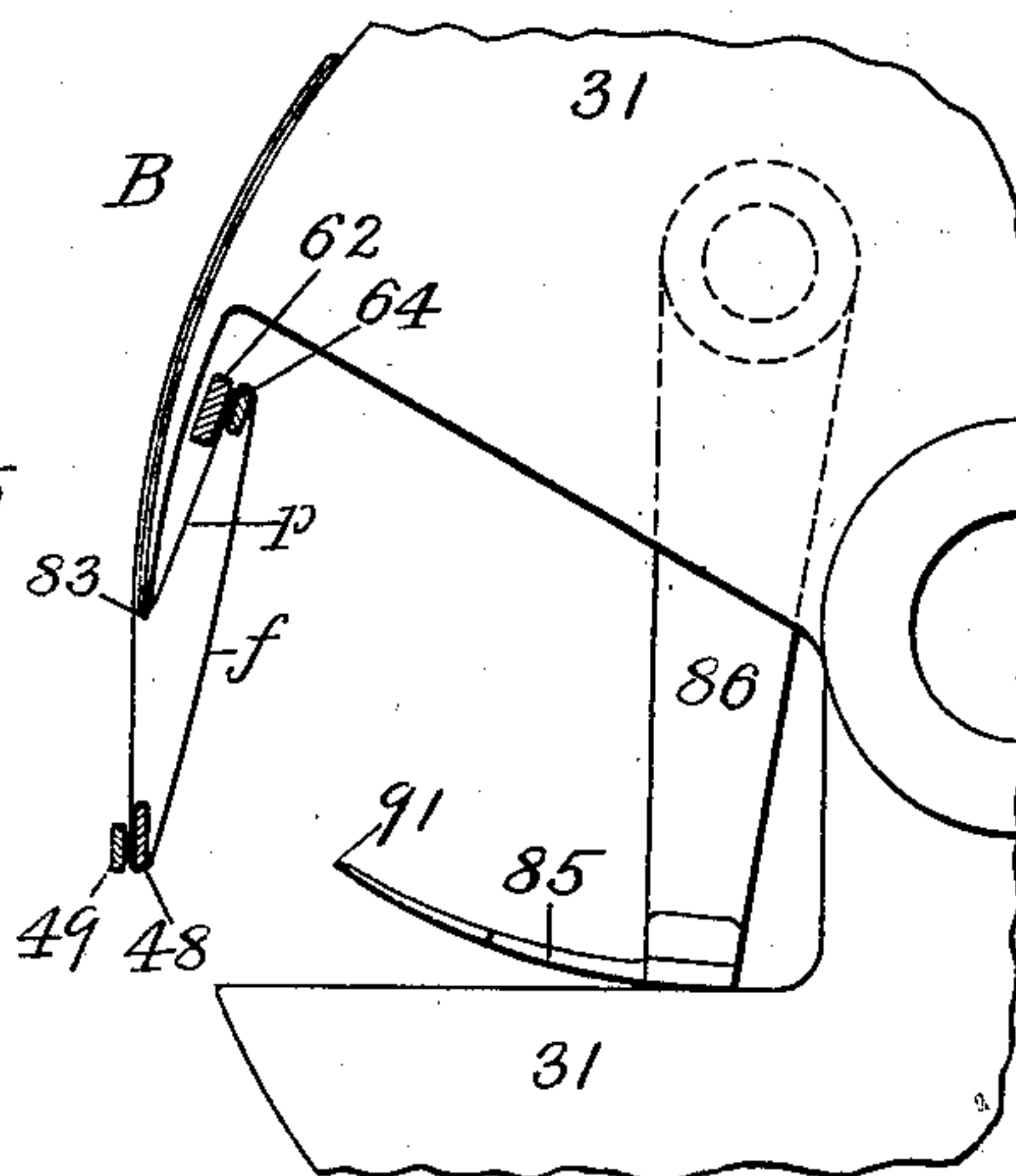


Fig. 9



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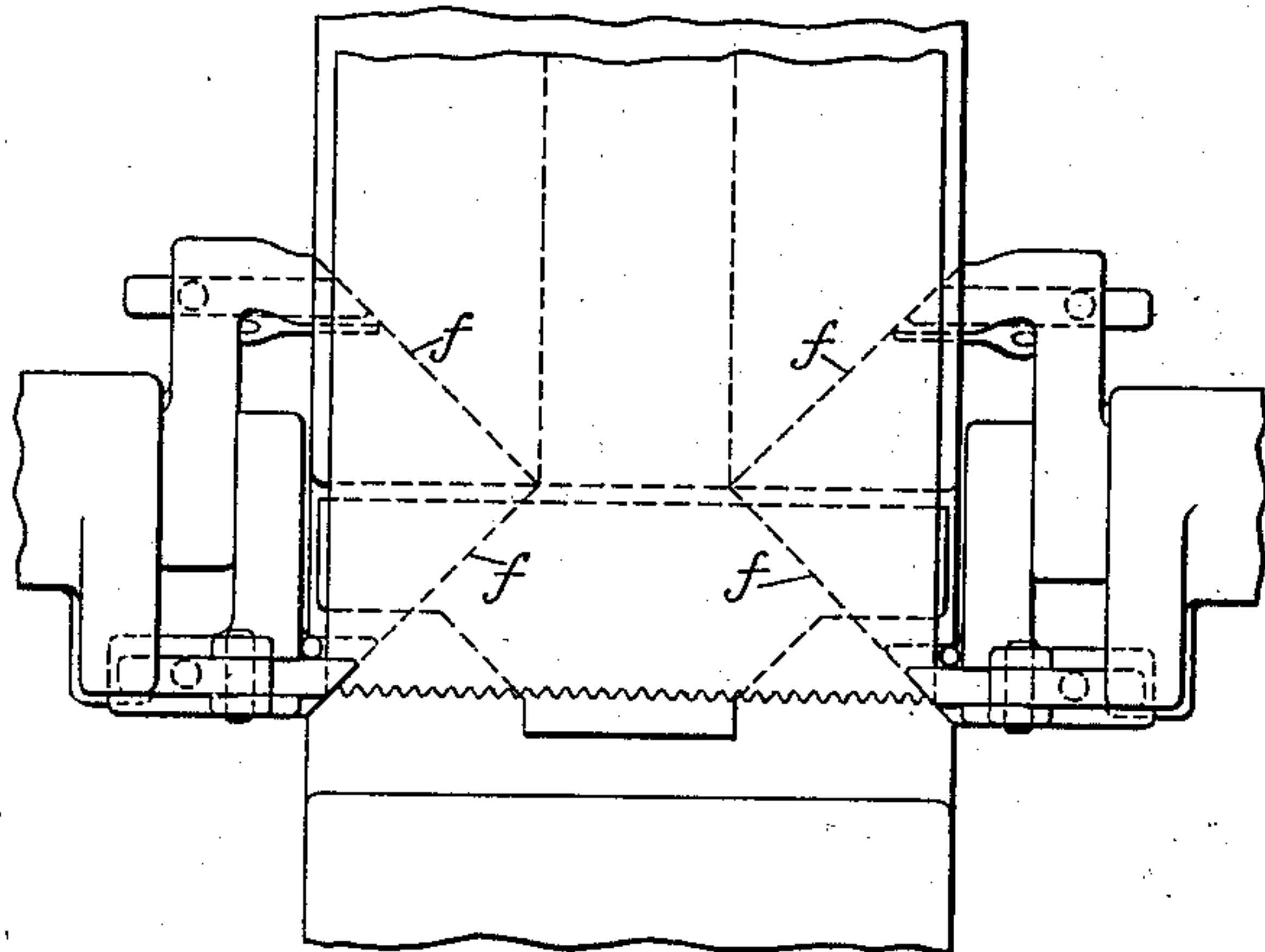
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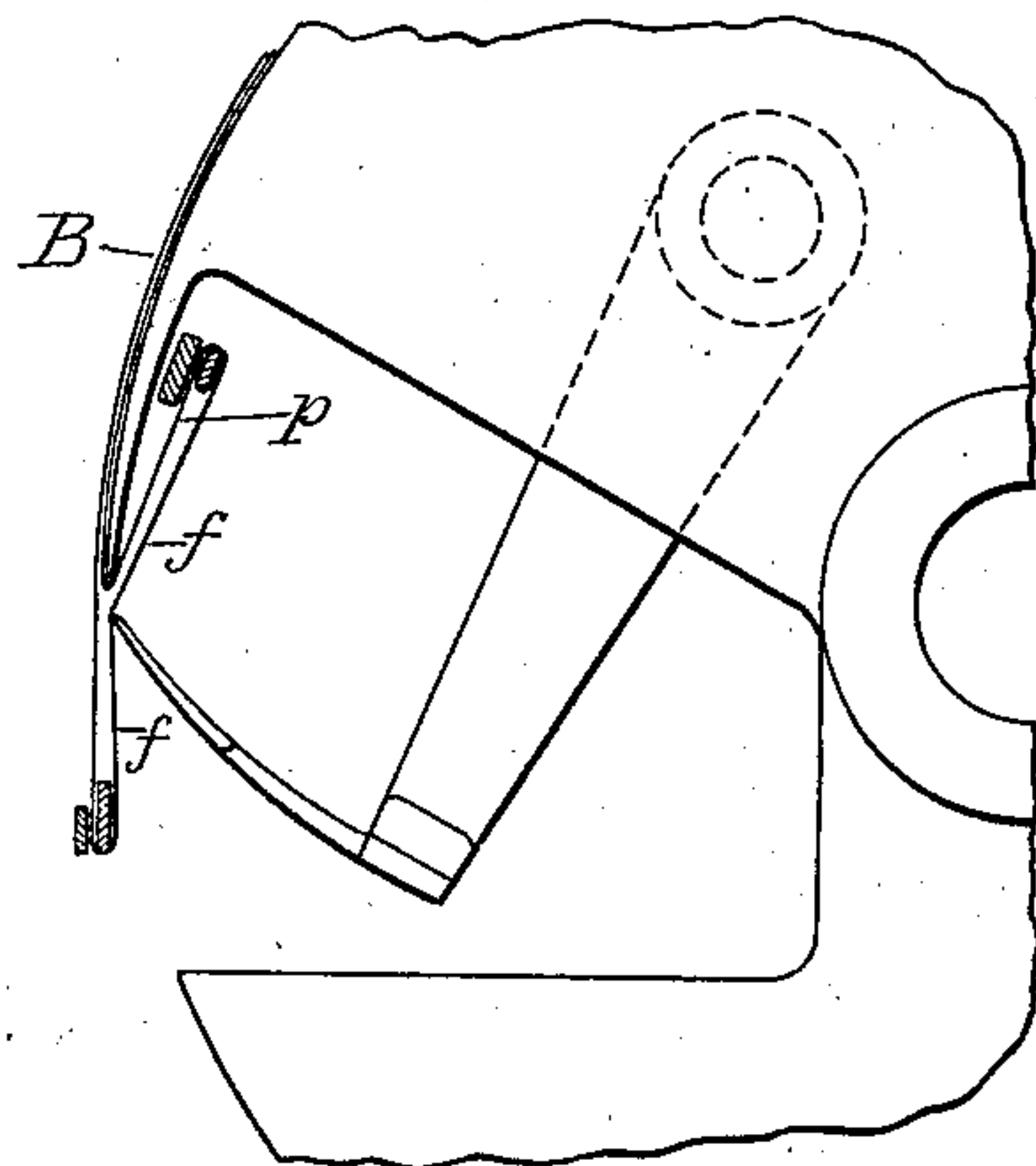
NO MODEL.

5 SHEETS—SHEET 5.

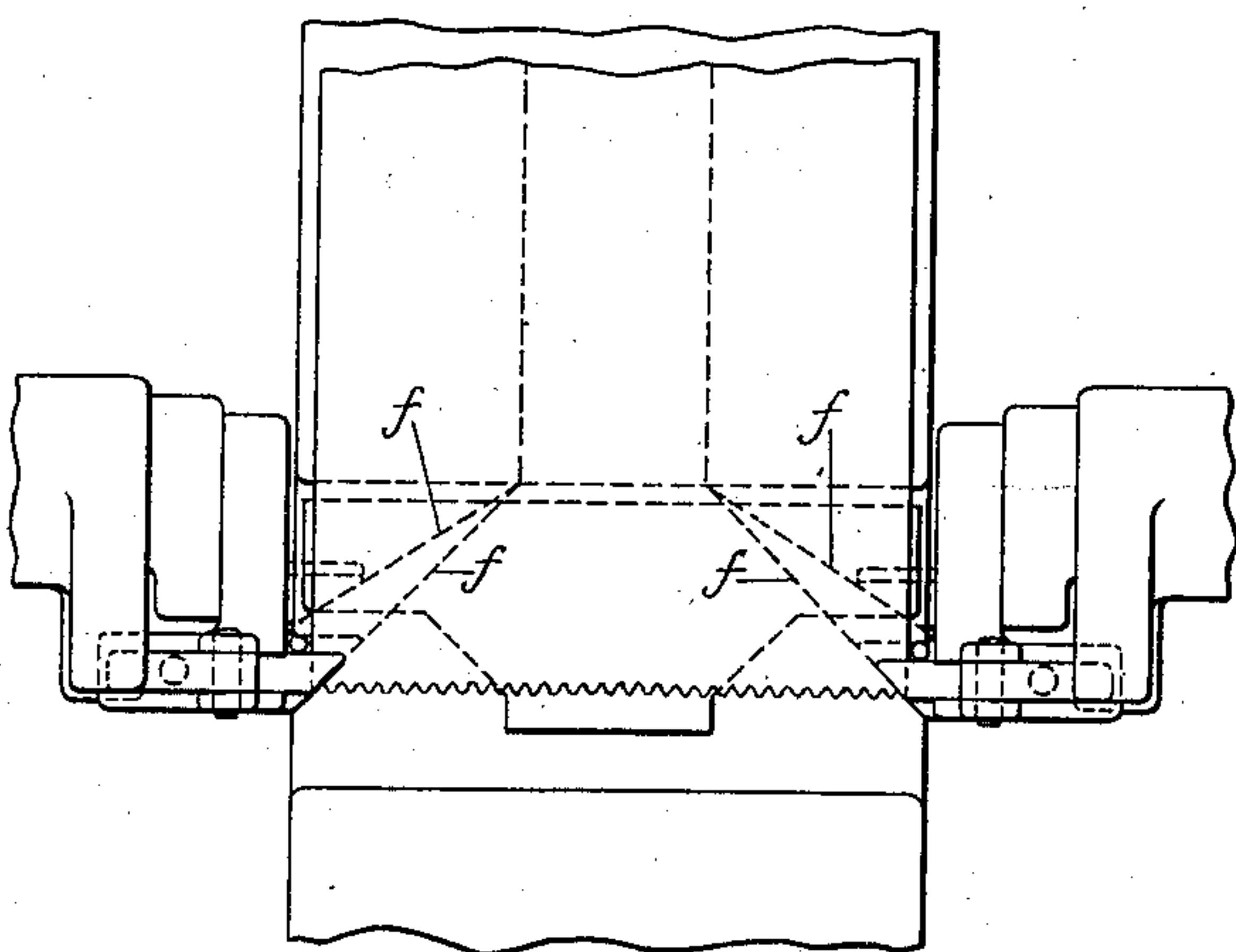
*Fig. 10*



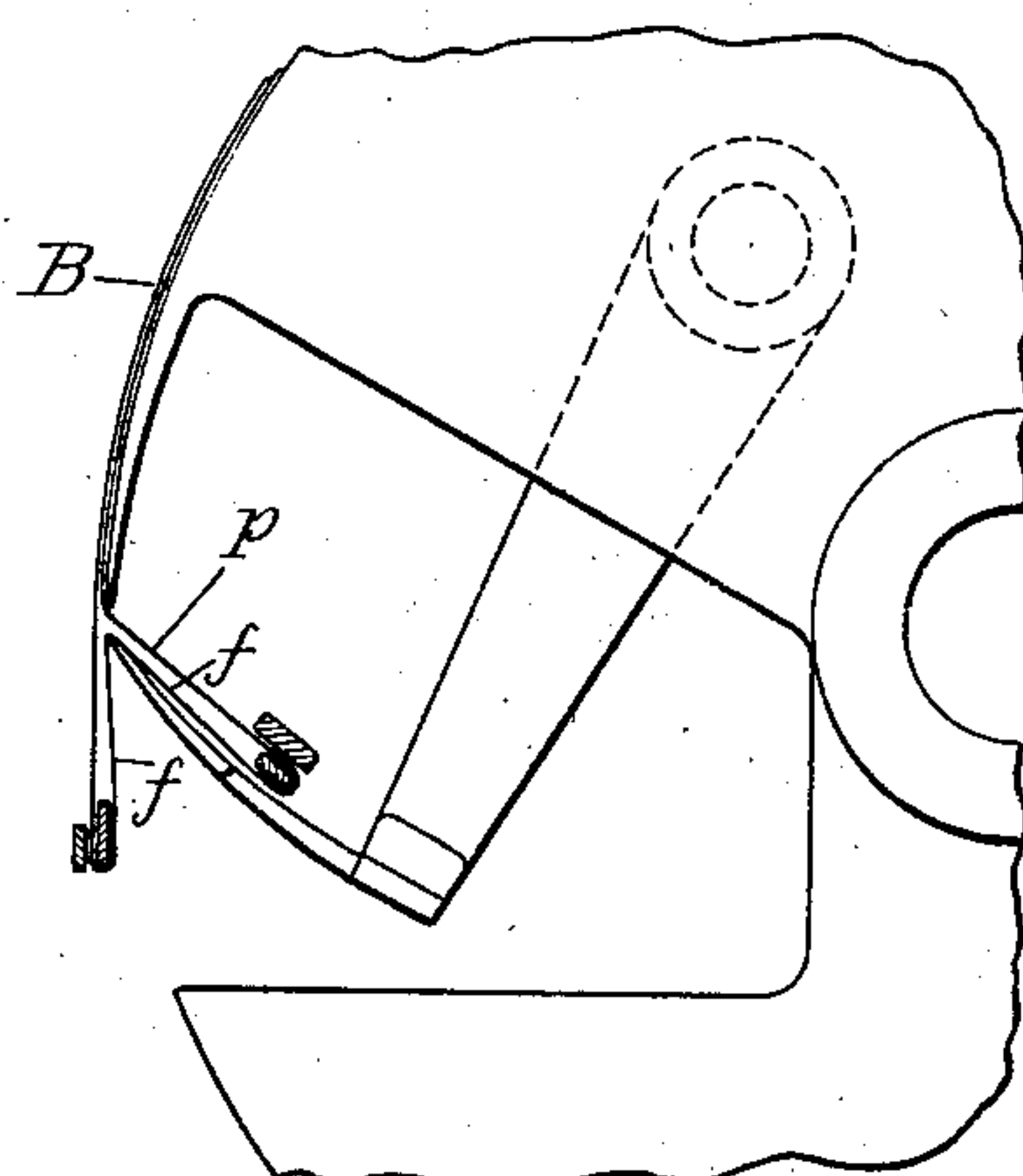
*Fig. 11*



*Fig. 12*



*Fig. 13*



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# UNITED STATES PATENT OFFICE.

WILLIAM A. LORENZ, OF HARTFORD, CONNECTICUT, ASSIGNOR TO UNION PAPER BAG MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 742,205, dated October 27, 1903.

Application filed March 25, 1903. Serial No. 149,532. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM A. LORENZ, a citizen of the United States, and a resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a full, clear, and exact specification.

The principal object of this invention is to provide automatic mechanism for forming in the open or mouth end of the side tucks of bellows-sided paper bags or paper-bag blanks certain reversed folds, which are shown and described in Letters Patent of the United States to H. M. Farnsworth, No. 355,010, so that when the bag is opened for use these particular folds will turn outwardly instead of inwardly, and thus present a funnel-shaped mouth for the more ready reception of the contents of the bag. These folds also assist in maintaining the mouth of the bag in an open condition. For this purpose the upper or mouth ends of the inwardly-tucked bellows-plies of the blank are turned outwardly, the innermost bellows-fold lines being reversed and swung outwardly to positions approximately ninety degrees from their former positions.

Another object of this invention is to provide means for separating the bellows sides of the blank, near the mouth end thereof, to facilitate the proper engagement of the gripping devices with the upper and lower plies of the tucked-in bellows sides.

A further object of this invention is to provide means for positioning or centralizing the mouth end of the blank upon the blank-support to facilitate the symmetrical formation of the funnel folds on the blank.

This invention may be embodied in an independent machine by providing it with a suitable driving mechanism and by providing means for feeding the blanks or bags to it in proper sequence and register; but I prefer to embody the invention in a machine which operates in conjunction with mechanism for folding the bottoms of paper bags from bellows-sided blanks, thus embodying in a single organization an automatic machine for rapidly manufacturing bellows-sided paper bags hav-

ing these funnel folds. When thus employed in such an organization, the machine of my present invention may perform its operations before the bottom of the bag has been formed, or it may, as herein shown, receive the bags after the bottom-forming mechanism has completed the bottom folds, or both operations may be performed simultaneously. The machine of the present invention produces these funnel folds by first gripping the edges of each of the four plies of the tucked bellows sides of the blank and then folding one of the flat side walls of the blank over a transversely-disposed defining edge, thereby opening the mouth ends of the tucked bellows sides into flattened triangular folds. A blade, herein designated as the "reversing-blade," is then brought across the centers of the triangular folds into approximate coincidence with what were formerly the inner bellows-fold lines, upon which lines each of the triangular folds is then doubled upon itself by the turning back and straightening out of the folded-over side wall, the reversing-blade serving to reverse the said fold-line and prevent it from returning to its original position.

Figure 1 of the drawings is a plan view of a machine embodying my invention. Fig. 2 is an end view thereof looking from the right of Fig. 1. Fig. 3 is a side view in section taken partly on the line 3 3 and partly on the line 3<sup>a</sup> 3<sup>a</sup> of Fig. 1. Fig. 4 is an end view in section taken on line 4 4 of Fig. 3. Figs. 5 to 13, inclusive, are more detail views in larger scale, showing the fold-forming devices in different positions. Figs. 5, 6, and 7 show the relative positions of these parts when the grippers have been brought into engagement with the blank. Figs. 8 and 9 show the same parts in their positions after the grippers have been revolved nearly one hundred and eighty degrees from their position shown in Figs. 5 and 6 or far enough to open the tucked sides into substantially flat triangular folds. Figs. 10 and 11 show the reversing-blade in engagement with the flattened triangular folds, which are substantially doubled back upon themselves against the defining edge of the reversing-blade, as shown in Figs. 12 and 13, which represent the grippers a little more than mid-



way of their return movement. Fig. 14 shows in detail and on a further enlarged scale the grippers about to engage the blank after the bellows sides thereof have been partially distended and the grippers have been moved to their inner positions. Figs. 15, 16, and 17 are perspective views showing the mouth end of a bag or blank in different stages of the funnel-folding operation. Fig. 15 shows the bellows sides slightly distended to permit the grippers to enter. Fig. 16 shows the lower ply folded back to the position in which the flat triangular folds are formed; and Fig. 17 shows the funnel-mouth folds completed, but still slightly distended, in order to enable the character of the folds to be more clearly seen.

When employed in conjunction with a paper-bag machine, the mechanism shown in the drawings may be directly operated from the driving mechanism of the paper-bag machine, so that the feed-rolls of the present mechanism may be considered as equivalents of or substitutes for the delivery-rolls of such paper-bag machines.

To the base-plate 20 is secured a pair of uprights or side frames 21 22, in which the mechanism is journaled or otherwise supported. The blanks are fed into the machine by a pair of feed-rolls 23 and 24, the lower one 24 of which is mounted on a shaft 25, journaled in the side frames and carrying at one end thereof a gear 26, which is driven from any suitable gear of the paper-bag machine with which the present mechanism may be connected. The roll 23 is mounted upon a shaft 27, journaled in the spring-pressed boxes 28 and 29, supported in the side frames 21 22, respectively, and has fixed upon it the gear 30, meshing with the gear 26. The paper bag or blank B after passing through the feed-rolls 23 24 is delivered to a rotating blank-support 31, which is approximately cylindrical and is mounted on the shaft 32, journaled in bearings 33 34 and having a gear 35, driven from the gear 26 through the intermediate gear 36, turning upon a stud 37 appurtenant to the frame 21. The blank-support is herein shown of a size suitable for receiving two blanks during each rotation and is therefore provided with two sets of blank holding and folding devices which operate alternately on the succeeding blanks. These two sets of devices being similar in construction and operation, the following description of one set will answer for both: As the blank passes from the rolls 23 24 to the blank-support, its leading end is gripped to the latter by a clip 38 on the shaft 39, journaled on the blank-support and having an arm 40 engaging with the cam-face 41 of a stationary cam 42, which is preferably secured to the bearing 34, a spring 43 serving to close the clip upon the blank. As the blank is carried forward by the support 31, a set of grippers engage with the upper and lower plies of the blank, on opposite sides

thereof and toward the rearward or mouth end of the blank, one pair of grippers being employed for sustaining the upper plies, while the second pair of grippers seize the lower plies and fold them with the lower side wall of the blank around the projecting defining edge 83 of the blank-support, thereby forming a flat triangular fold in the end of each of the bellows sides of the blank. In order to enable the grippers to engage with and disengage from the blank, both sets of grippers are mounted for movement toward and away from each other laterally of the blank, the construction and operation of both sets being alike and as follows: Disposed at opposite sides of the blank-support 31 are the brackets 44, constituting ways for the gripper-slides 45, to which a reciprocating movement is imparted at suitable times by the cam-grooves 46 in the cams 42 engaging the projections or rollers 47 of the slides. Each of the upper grippers, Fig. 14, comprises a sustaining-jaw 48 and a pincer 49, which latter is pivoted to the sustaining-jaw at 50 and is actuated by a spring 51, the gripper in its entirety being secured to the swinging end of the shaft 52, journaled in a sleeve 53, which in turn is journaled in the slide 45. The axes of the shafts 52 are in approximate alinement with the defining edge 83 of the blank-support. The outer end of the shaft 52 carries an arm 54, having a projection 55 engaging with the stationary cam 56, the function of which is to open the upper gripper by turning the shaft 52, and thereby bringing the heel 57 of the pincer 49 against the under side of the stop 58 appurtenant to the slide 45. The spring 59 bears upon the arm 54 and serves to turn the shaft 52 until the projection 60 of the sustaining-jaw rests upon the upper surface of the lug 61, also appurtenant to the slide 45, thereby permitting the spring 51 to close the pincer 49 against the sustaining-jaw 48, thus gripping the upper ply of the blank between them, as in Fig. 7. The function of the lower pair of grippers, Fig. 14, is to cooperate with the upper pair of grippers in swinging the lower plies of the tucked sides and the adjacent side wall of the blank over and around the defining edge 83 to form flat triangular folds in the mouth ends of the tucked sides preparatory to doubling those folds upon themselves along the reversed transverse center line of those folds, which doubling is performed by the return swinging movement of the lower pair of grippers cooperating with the reversing-blade 85. The lower jaw 62 is formed on an arm 63 appurtenant to the sleeve 53, and the pincer 64 is pivoted at 65 on the jaw 62. A spring 66 acting against the heel 67 of the pincer serves to close the pincer toward the jaw to grip the edges of the lower ply between them, a pair of these lower grippers being employed for each edge of the blank, Fig. 7. Each of these grippers is opened



by turning the sleeve 53 upwardly and bringing the heel 67 of the pincer against the lug 61, as shown in Fig. 14.

Means are provided for oscillating the sleeve 53, so as to swing the lower or folding grippers away from the upper or supporting grippers, through an arc of nearly one hundred and eighty degrees, the said means consisting of a pinion 68, secured to the outer end of the sleeve 53, meshing with a sector 69, pivoted at 70 to the slide 45 and having an arm 71, the projection 72 of which engages with a stationary cam 73, mounted upon the bearing 34.

In order to enable the several grippers to seize the plies of the blank to the same extent on both sides, and thus enable symmetrical folds to be produced, means are provided for positioning the mouth end of the blank centrally of the blank-support. These means consist of the pushers 74 75, attached to the jaws 48 and 62, respectively. As these jaws approach the blank from their respective sides thereof, the pushers engage with one or the other of the edges of a misplaced or displaced blank, pushing it into a central position before the grippers close upon the blank.

Means are provided for partially distending the plies of the blank to facilitate the entrance of the grippers into the tucked sides, as shown in Figs. 1 and 3. The guide-plate 76 for conducting the blank from the feed-rolls to the blank-support is shown as forming the upper wall of a suction-box 77, having perforations 78 communicating with the interior of the box. The upper feed-roll 23 is also preferably made hollow to serve as a suction-roll, and the roll and box 77 together constitute a suction device for drawing apart the mouth ends of the side walls of the blank, so as to separate the plies of the corresponding portions of the bellows sides. The shaft 27, upon which the roll 23 is mounted, is tubular and is connected with the main pipe 80 by means of a branch pipe 81. The air is exhausted simultaneously from the suction-box and the feed-roll, suitable means being provided for producing a vacuum in the main pipe—such means, for example, as is shown in my Letters Patent No. 591,175. In order to produce a symmetrical form of funnel-mouth, the flat triangular folds should be doubled upon themselves along their transverse center line, which was originally a part of the inner or bottom fold-line of the bellows sides of the blank, the particular portion of this fold-line which crosses the flat triangular folds being reversed and forming the line upon which the triangular folds are doubled upon themselves. In order to insure that the reversing and doubling of the triangular folds shall take place along this line, I prefer to employ a reversing-blade which is brought against the flat triangular folds across this transverse fold-line, as shown in Figs. 10 and 11, during the folding

operation, thereby cooperating with and rendering more certain the action of the swinging grippers. The reversing-blade 85 is secured upon an arm 86, which is pivotally supported upon a stud 87 of the blank-support 31, and is provided with a lever 88, having a projection 89 in engagement with a cam-groove 90, the blade 85 having an arc of swing toward and away from the defining edge 83 of the blank-support, its movement being timed to cooperate with the swinging grippers 62 in doubling the flat triangular folds upon themselves to complete the funnel folds.

Means are preferably provided for pressing the funnel folds together to define them more completely after they are formed. The flattening-plate 84 is secured to the cross-bar 97 adjacent to the blank-support, and the funnel folds are drawn under this plate, either while still held by the grippers or after the grippers have been released, as may be preferred. The roll 92 is secured upon a shaft 93, journaled in the spring-pressed bearings 94, supported in the side frames 21 22, the shaft being provided with a gear 95, meshing with the gear 35. The roll 92 is pressed against the blank-support 31 and carries the blank forward over the stripper-plate 96, which guides the blank from the carrier.

The operation of this machine as a whole is as follows: The blank B passes between the feed-rolls 23 24, which push it over the guide-plate 76 toward the blank-support 31, and its leading end is then gripped to the cylinder by the clip 38. When the mouth end of the blank is over the perforations 78 of the suction-box 77, a vacuum is established in the box and in the upper feed-roll 23, which latter moves substantially in unison with the blank and retains its hold upon the upper ply, while the lower ply adheres to the plate 76, thus distending the bellows sides. The grippers are now in their outward open position, and the slides 45 then move toward each other, thus carrying the grippers into engaging relation with their respective plies of the blank to the position shown in Fig. 14. The shafts 52 and sleeves 53 are now rotated sufficiently to permit the pincers 49 and 64 to be closed by their respective springs upon the plies, at which time the parts are in the position illustrated in Figs. 5, 6, and 7. The upper grippers 48 and 49 remain in those positions while the lower pair of grippers are swung around to the position shown in Figs. 8 and 9, thereby folding the lower ply *p* around the defining edge 83 and transforming the mouth ends of the bellows side into the flat triangular folds shown in Figs. 8 and 16, whereupon the reversing-blade 85 advances, bringing its edge 91 adjacent to the defining edge 83, as shown in Figs. 10 and 11. The lower grippers are then swung back toward their original positions, thereby doubling the triangular folds *f* along their transverse centers as defined by the reversing-blade, which



remains in position until the triangular folds are doubled far enough to insure the reversal of the original fold-lines. The reversing-blade is then withdrawn to permit the continued swinging movement of the lower grippers from the position shown in Fig. 13 until the grippers return to the position of Fig. 6, thereby straightening out the lower ply *p*, as shown in Fig. 17. At this time the funnel folds are drawn beneath the flattening-plate 84, which partially flattens those folds, preferably while they are still held by the grippers. All grippers are now released from the blank, and the slides 45 are moved out, thus withdrawing the grippers from the completed blank, after which the latter passes beneath the presser-rolls 92, by which the funnel folds are more sharply defined and flattened. The blank is then guided from the blank-support by the stripper-blade 96 in completed form to suitable carrying-belts, (not shown,) with its mouth end presenting substantially the appearance shown in Fig. 17.

The terms "upper," "lower," "right," "left," and similar terms denoting relative position are herein used in their relative and not their absolute sense, inasmuch as many of the parts may be reversed, inverted, or transposed in many ways that will be obvious to the mechanic or designer.

The mechanism herein shown and described may be modified as to dimensions, amplitude of movement, and in many other obvious ways to suit different sizes of bags or to suit various conditions of service.

I claim as my invention—

1. Means for forming the described funnel folds in the mouth end of a bellows-sided bag-blank, comprising a blank-support, a suction device movable with the blank for distending the mouth end of the bellows sides of the blank, means for sustaining one of the side walls of the blank, means for gripping the other side wall thereof and folding it over to open the bellows sides into flat triangular folds, and then unfolding the said side wall back to its first position, and a cooperating reversing-blade for doubling the said triangular folds upon themselves.

2. Means for forming the described funnel folds in the mouth end of a bellows-sided bag-blank, comprising a blank-support having a defining edge, means for gripping the mouth ends of the two side walls of the blank, means for moving the gripping means of one of the side walls to fold that wall around the defining edge to form flat triangular folds in the bellows sides, and for unfolding the side wall to its first position, and a reversing-blade for cooperating in doubling said triangular folds.

3. Means for forming the described funnel folds in the mouth end of a bellows-sided bag-blank, comprising a traveling blank-support having a defining edge, means for gripping the upper side wall of the blank, gripping devices for the lower side wall mounted to swing upon axes substantially in alinement

with the said defining edge, means for carrying said gripping devices into and out of engagement with the edges of the blank, and means for oscillating the swinging grippers upon the said axes to fold back their respective plies and then unfolding them again.

4. Means for forming the described funnel folds in the mouth end of a bellows-sided bag-blank comprising a traveling blank-support having a defining edge, a pair of gripping devices for gripping the upper plies of the blank, a pair of gripping devices for the lower plies thereof, mounted for swinging movement upon the axes substantially in alinement with said defining edge, means for moving the said gripping devices laterally into and out of engaging relation with the blank, and means for oscillating the swinging pair of gripping devices upon the said axes to fold over their respective plies, and then to unfold them again for the purpose specified.

5. Means for forming the described funnel folds in the mouth end of a bellows-sided bag-blank comprising a traveling blank-support having a defining edge, a pair of oppositely-disposed grippers for gripping the upper bellows-plies of the blank, a pair of oppositely-disposed gripping devices for the lower bellows-plies thereof, mounted for swinging movement upon axes substantially in alinement with said defining edge, means for moving the said gripping devices laterally into and out of engaging relation to the blank, means for oscillating the swinging grippers upon their axes to fold and then unfold their respective plies, and a reversing-blade for cooperating in doubling the flat triangular folds formed by the swinging movement of the grippers.

6. The combination of a blank-support having a defining edge, and a plurality of gripping devices for the plies of the blank, mounted for independent swinging movement upon axes substantially coincident with said defining edge.

7. The combination of a blank-support having a defining edge, a plurality of gripping devices for the plies of the blank, mounted for swinging movement independently of each other upon axes substantially in alinement with the said defining edge, and independent means for swinging each of the said gripping devices.

8. The combination of a traveling blank-support having a defining edge, and gripping devices for the respective plies of the blank, mounted upon the traveling support, the said grippers for the respective plies being mounted for independent swinging movement upon axes substantially in alinement with said defining edge.

9. The combination with a blank-support, of a gripper for the upper ply, and a gripper for the lower ply of the blank each mounted for independent swinging movement, and each gripper comprising a jaw and a cooperating pincer therefor, abutments for the re-



spective pincers, and means for swinging the grippers to carry their respective pincers against and away from their respective abutments to open and close the grippers.

5 10. The combination of a blank-support, a gripper for the upper ply and a gripper for the lower ply, each mounted for independent swinging movement upon an axis common to both, each gripper comprising a jaw and a cooperating pincer, abutments for the pincers, and means for swinging the said grippers upon their common axis to carry the pincers against and away from their respective abutments to open and close the grippers.

15 11. The combination of a blank-support, a gripper for the upper ply, and a gripper for the lower ply of the blank, mounted for independent swinging movement upon a common axis, and mounted for axial movement toward and from the blank, means for moving the grippers in the said axial direction, and means for independently swinging the grippers upon their common axis.

25 12. The combination of a traveling blank-support having a defining edge, a gripper for the upper ply and a gripper for the lower ply of the blank, each mounted upon the blank-support for independent swinging movement upon a common axis substantially in alinement with the said defining edge, and mounted also for movement in an axial direction toward and from the blank, means for moving the said grippers in the said axial direction, and means for independently swinging said grippers upon their axes at suitable times in the travel of the blank-support.

35 13. The combination of a rotating blank-support having a defining edge, a gripper for the upper ply, and a gripper for the lower ply of the blank, mounted to revolve with the blank-support, and mounted for independent swinging movement upon a common axis substantially in alinement with the said defining edge, and mounted also for movement in an axial direction toward and from the blank, and cams disposed in a concentric relation to

the axis of rotation of the blank-support for moving the said grippers in the said axial direction and for swinging them independently upon their common axis at proper times 50 in the rotation of the blank-support.

14. The combination with a blank-support, of a gripper for the upper ply and a gripper for the lower ply of the blank, the shaft 52 and the sleeve 53 appurtenant to the said 55 grippers respectively, mounted for oscillatory movement upon a common axis, and means for oscillating the said shaft and sleeve.

15. The combination with a blank-support, of a gripper for the upper ply and a gripper 60 for the lower ply of the blank, movable pincers appurtenant to the said grippers, abutments adjacent to the respective pincers, a shaft 52 and a sleeve 53, appurtenant to the said grippers and mounted for oscillatory 65 movement upon a common axis, and means for independently swinging the shaft and the sleeve to move the pincers against and away from their respective abutments to open and close the grippers. 70

16. The combination with a blank-support, and with means for moving the leading end of the blank thereon, of gripping devices movable toward each other to engage the opposite bellows sides of the blank, and pushers 75 movable with said devices laterally of the carrier for centering the blank thereon.

17. The combination with a blank-support having a defining edge, and means for holding the leading end of the blank on said 80 support, of grippers mounted for revolution around an axis substantially in alinement with said defining edge, and mounted to move transversely of the carriage, and pushers movable with said grippers for centering the blank 85 upon the carrier.

Signed at Hartford, Connecticut, this 21st day of March, 1903.

WILLIAM A. LORENZ.

Witnesses:

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WM. H. HONISS.