

No. 681,678.

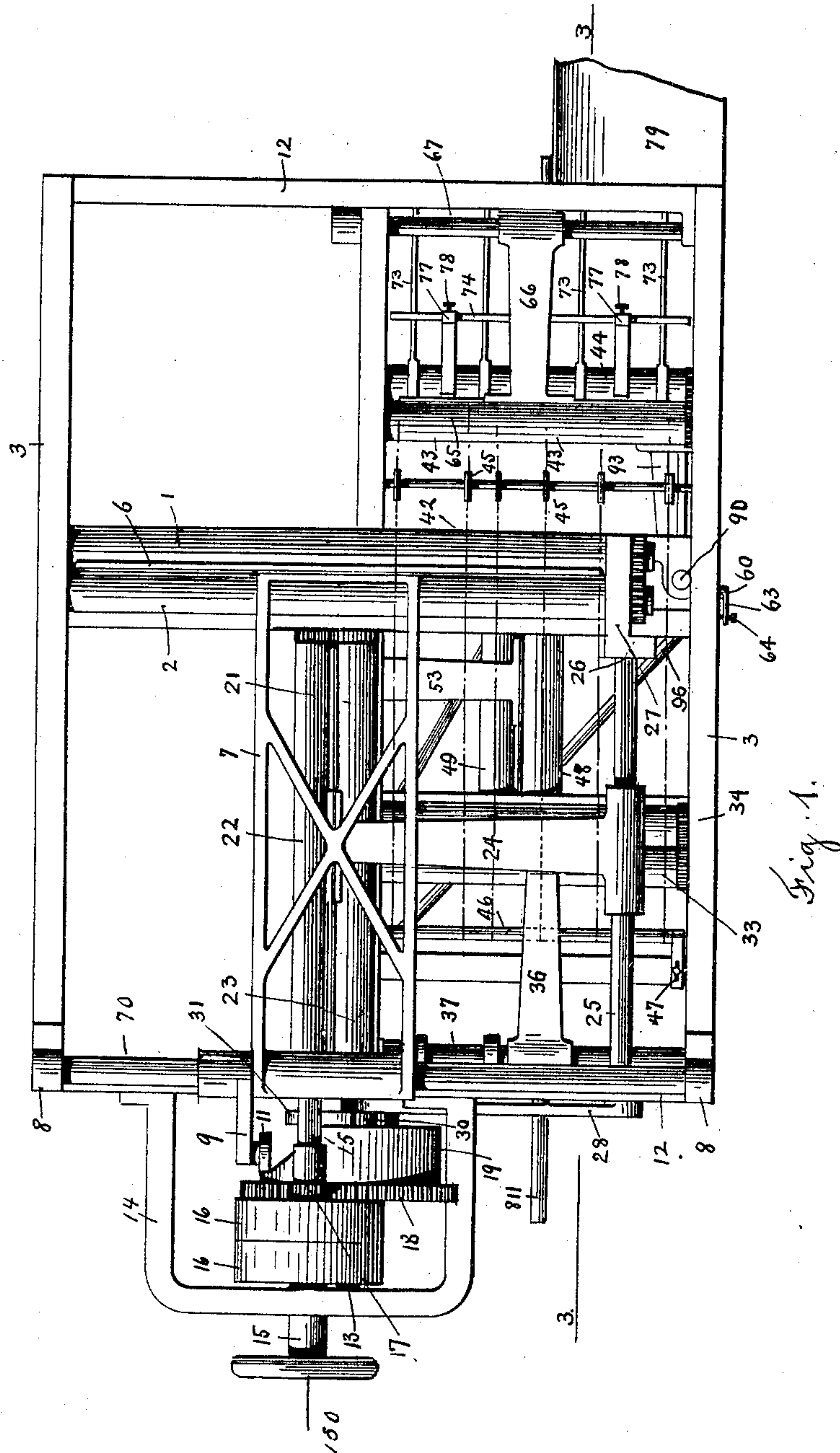
Patented Sept. 3, 1901.

W. G. BENNETT.
FOLDING MACHINE.

(Application filed Oct. 9, 1893. Renewed Feb. 5, 1901.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses
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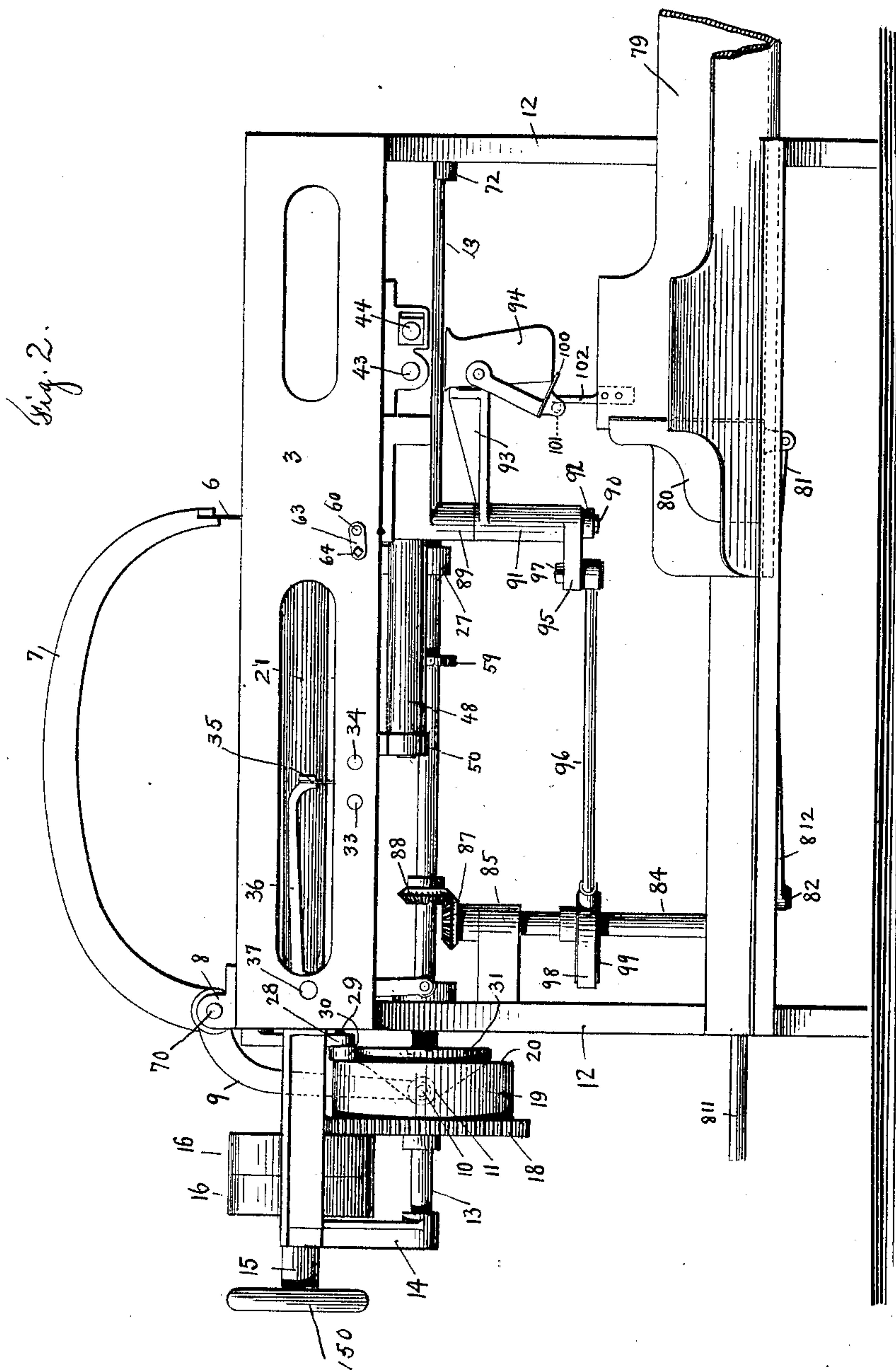
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FOLDING MACHINE.

(Application filed Oct. 9, 1893. Renewed Feb. 5, 1901.)

(No Model.)

4 Sheets—Sheet 2.



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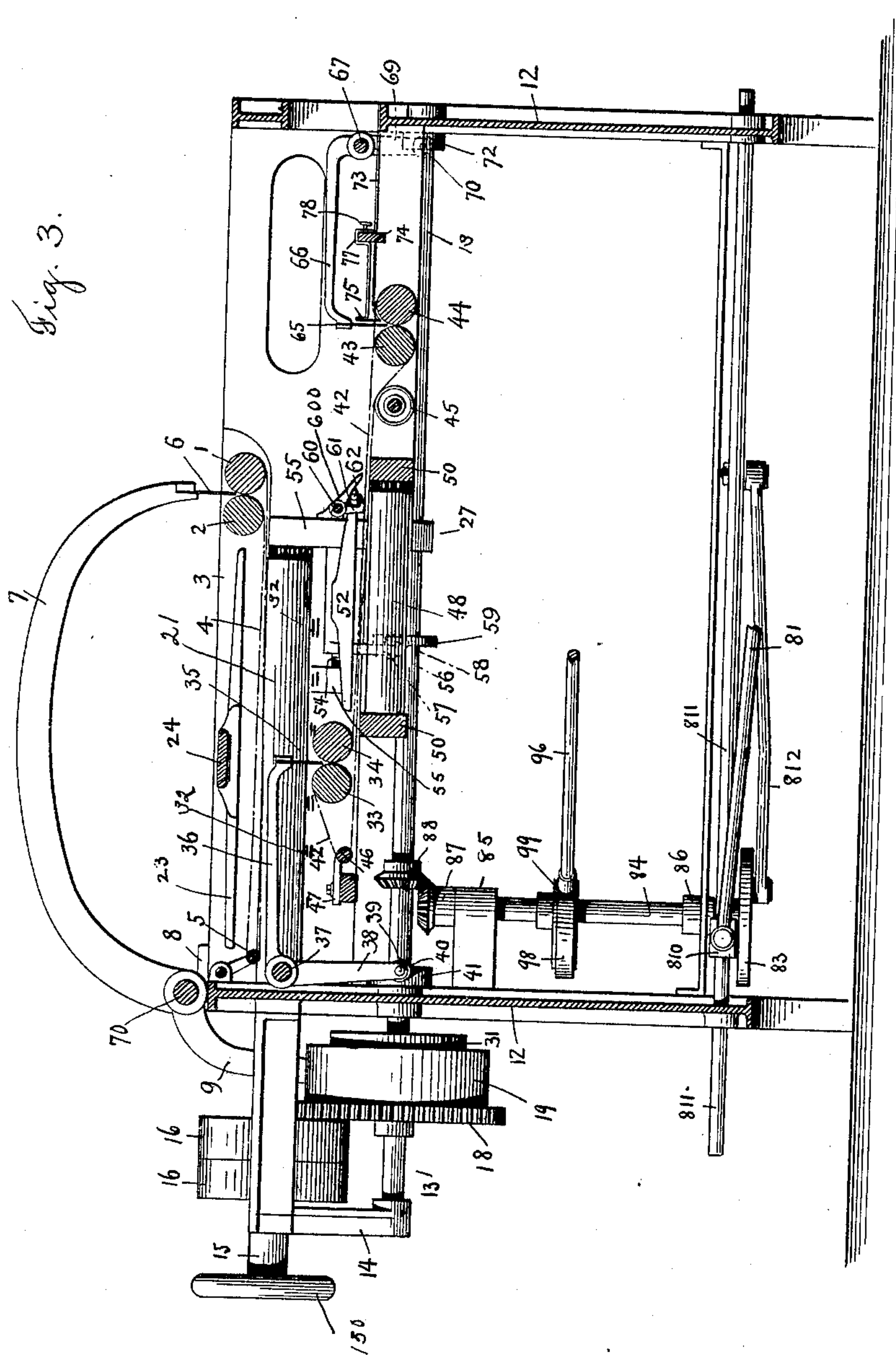
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(Application filed Oct. 9, 1893. Renewed Feb. 5, 1901.)

(No Model.)

4 Sheets—Sheet 3.



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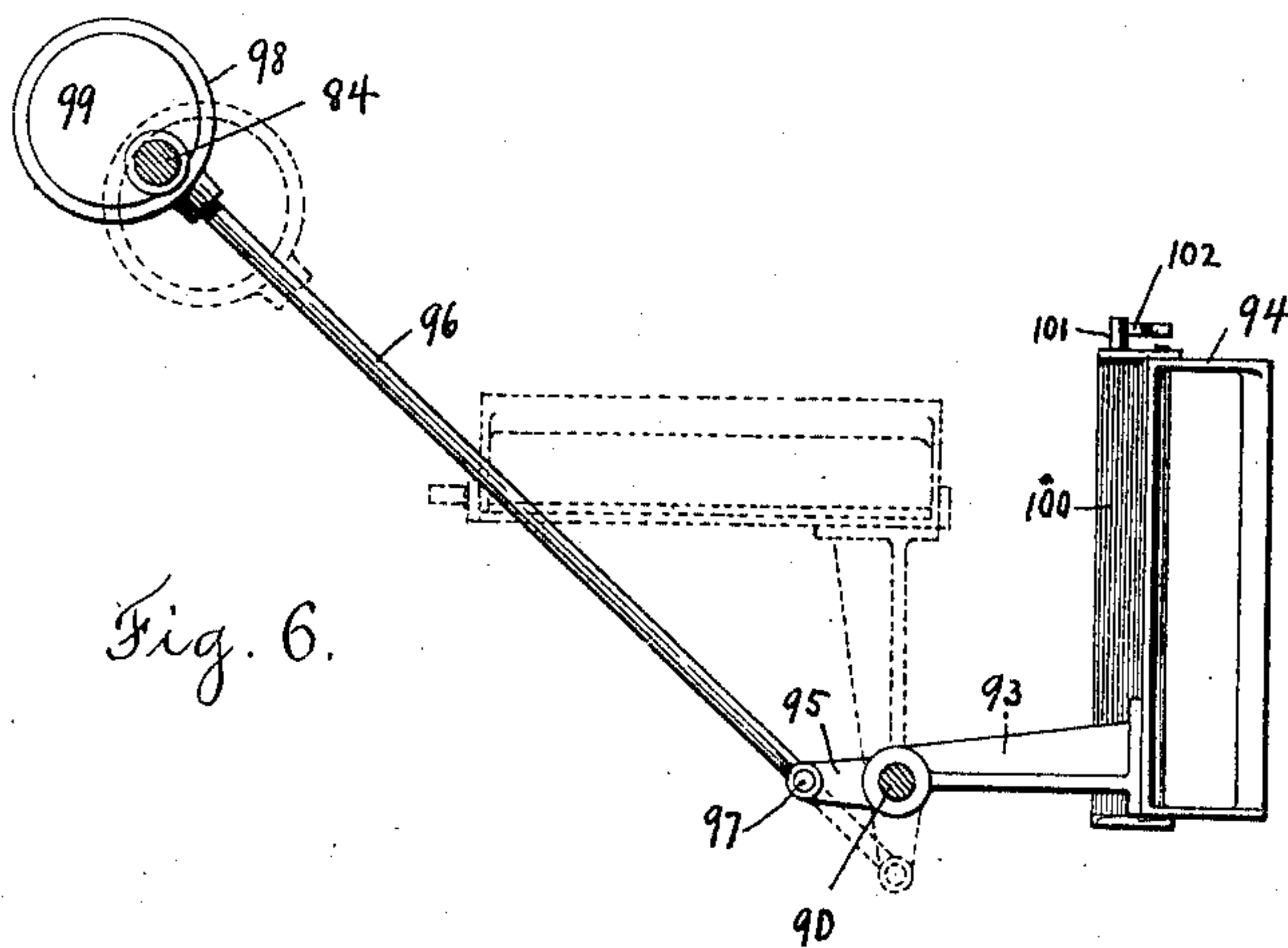
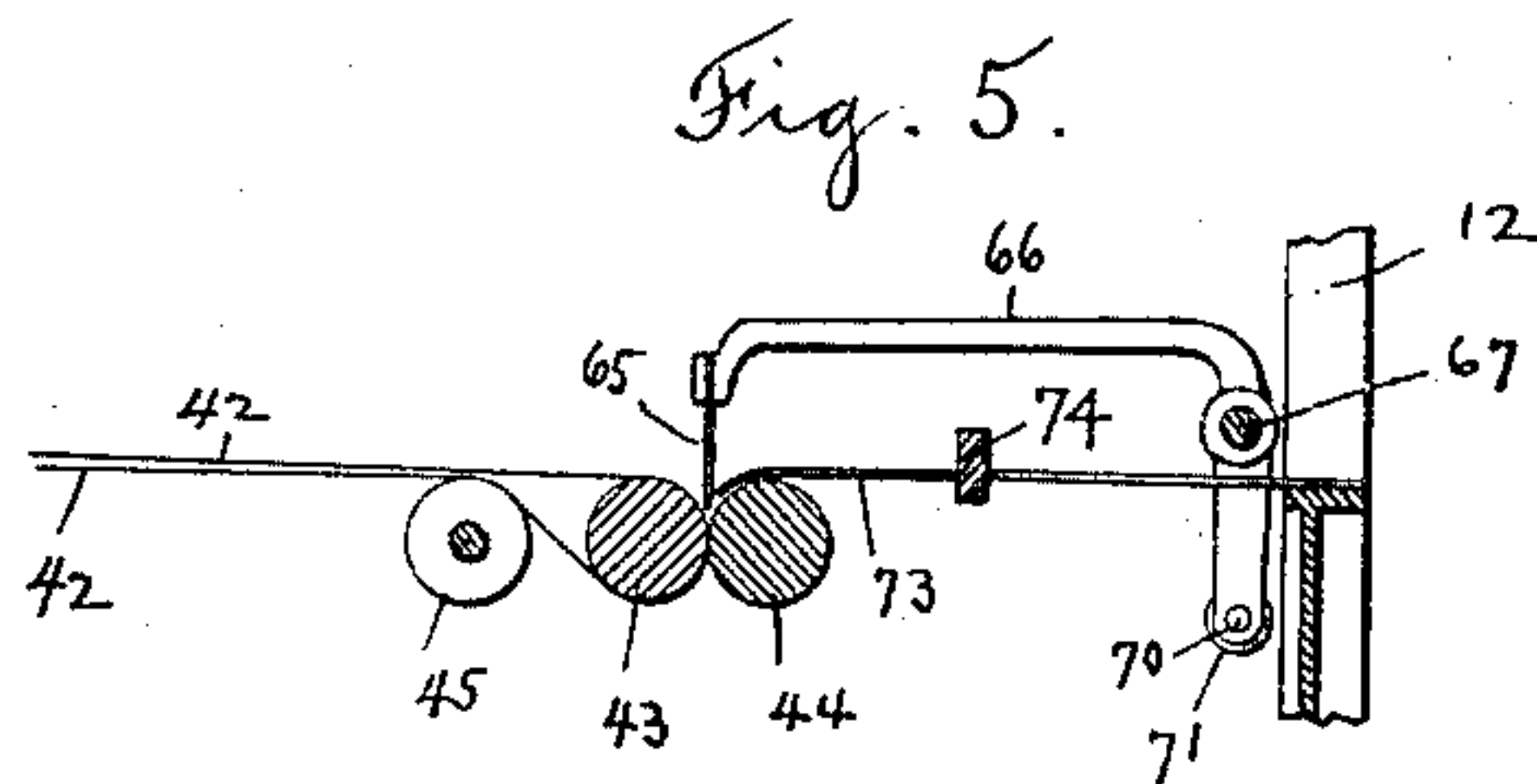
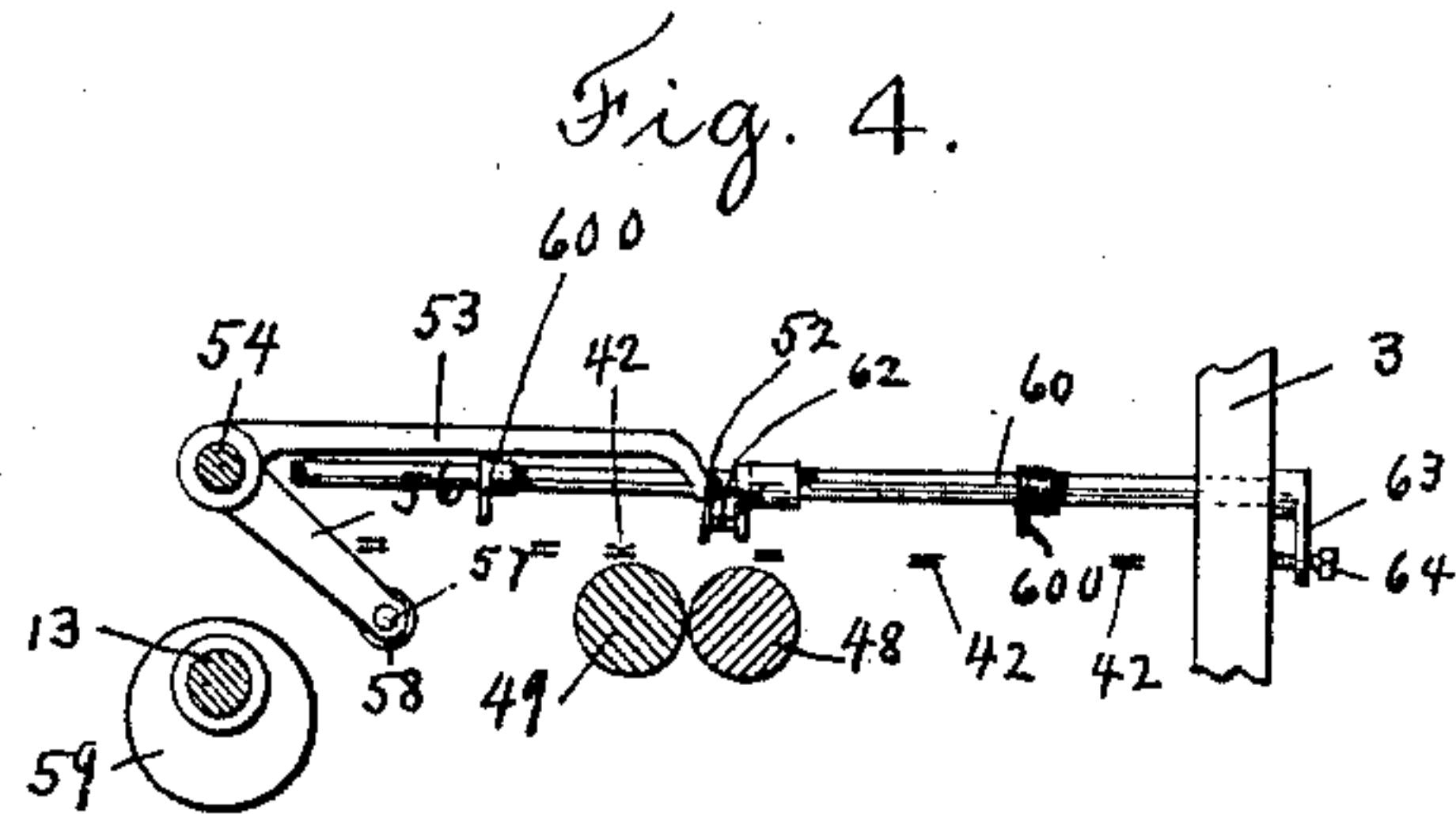
Patented Sept. 3, 1901.

W. G. BENNETT.
FOLDING MACHINE.

(Application filed Oct. 9, 1898. Renewed Feb. 5, 1901.)

(No Model.)

4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

WALTER G. BENNETT, OF NEW YORK, N. Y., ASSIGNOR TO THE CAMPBELL
PRINTING PRESS & MANUFACTURING COMPANY, OF SAME PLACE.

FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 681,678, dated September 3, 1901.

Application filed October 9, 1893. Renewed February 5, 1901. Serial No. 46,156. (No model.)

To all whom it may concern:

Be it known that I, WALTER G. BENNETT, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Improvement in Folding-Machines, of which the following is a specification.

The aim of this invention is to improve the arrangement of parts in folding machines so that different products can be easily obtained so far as relates to the number and disposition of the various folds.

To this end the invention consists of the device described and claimed in this specification and illustrated in the accompanying four sheets of drawings, which show enough of the various mechanisms of a folding-machine to illustrate my invention.

In the drawings, Figure 1 is a plan view of the machine. Fig. 2 is a side elevation of the same. Fig. 3 is a sectional elevation on the line 3-3 of Fig. 1, and Figs. 4, 5, and 6 are detail views of various parts of the mechanism.

The special object of this invention is to provide a simple and efficient mechanism by which the sheets may be folded in different manners and delivered, preferably, by the same delivery mechanism no matter how they are folded or what the number of folds is.

Referring to the drawings and in detail, 3 3 represent side frames, which are secured to the end brackets 12 12 in the ordinary manner to constitute the framing of the machine. Journaled in the rear frame 3 and secured in a bracket 27, mounted on a cross tie or girth, are the first folding-rollers 1 and 2. These folding-rollers are geared to turn together and are driven from any suitable part of the machine by suitable gearing, (not necessary here to show or describe,) so that their upper surfaces or peripheries turn toward each other. Running around the folding-roller 1 and under the folding-roller 2 is a set of tapes 4, which pass also over the tightener pulleys or shafts 5, and by this means after the sheet has been folded by the rollers 1 and 2 the same will be carried out over the second set of folding-rollers. The sheets are fed by any suitable means, as from a feed-board or other device, onto a table over the folding-rollers

1 and 2. The sheet is then tucked between the folding-rollers 1 and 2 by a tucker-blade or folding-knife 6, which is carried by arms 7, mounted or secured to a suitable shaft 70, which is journaled in suitable bearings 8, secured to the side frames 3 3. Also secured to the shaft 70 and projecting downward is an arm or lever 9, which carries, at the end thereof, a suitable stud 10, on which is journaled a roller 11.

13 represents the "main" shaft, so called, of the machine and from which shaft the various tucker-blades are operated, as hereinafter described. This shaft 13 extends the entire length of the machine and is journaled in the end frames 12 12, as shown, and in an extending bracket or framing 14.

15 represents a shaft which is journaled in the left-hand side frame 12 and in the bracket 14, and on this shaft 15 are mounted the usual tight and loose pulleys 16 16, by which power can be applied to the machine in the ordinary manner, and also, if so desired, on the end of this shaft 15 may be arranged a hand-wheel 150, by which the mechanism can be adjusted or turned by hand.

Mounted on the shaft 15 is a pinion 17, which meshes with and engages a large gear 18, secured to the shaft 13, and by this means the main shaft 13 will be powerfully driven when the machine is operated.

Mounted on the shaft 13 at the right of the gear 18 is a face-cam 19, against which the roller 11, before referred to, bears. By this means the tucker blade or knife 6 will be properly operated to tuck the sheet into the first folding-rollers 1 and 2.

The second set of folding-rollers is preferably arranged at right angles to the first set of folding-rollers 1 and 2, and this second set of folding-rollers is designated by 21 and 22. These folding-rollers are geared together and may be driven from any suitable part of the machine by suitable gearing so that their peripheries will turn toward each other. Co-operating with these folding-rollers is a tucking or folding blade 23, which is carried by an arm 24, which is securely fastened on a shaft 25, journaled in the left-hand end frame 12 and the cross-stay or bracket 27. Secured on the outside end of the shaft 25 is a lever

28, which carries at its end the usual stud and roller 29 and 30. The roller 30 bears on a rim-cam 31, secured on the shaft 13, and by this means the tucker-blade or folding-knife 5 will be properly operated to tuck the sheet between the second set of folding-rollers 21 and 22 to give the same its second fold.

33 and 34 represent the third set of folding-rollers, and these rollers preferably are arranged at right angles to the second set of folding-rollers 21 and 22 and parallel with the first set of folding-rollers 1 and 2. Coöperating with this third set of folding-rollers is the tucker blade or knife 35, which is carried by an arm 36, which arm 36 is mounted on a shaft 37, journaled in bearings secured to the framing of the machine, as shown. Also secured on this shaft 37 is a lever or arm 38, which has at its free end the usual stud and roll 39 and 40. The roller 40 bears against a cam 41, secured on the shaft 13, and by this means the knife 35 will be properly operated.

The twice-folded sheet is carried from the second set of folding-rollers 21 and 22 by means of the usual tapes 32, which pass around the folding-roller 22 and under the folding-roller 21 in the usual manner.

Running around the folding-roller 33 and under the folding-roller 34 is a set of tapes 42. This set of tapes also passes around the folding-roller 43 of the fifth set of folding-rollers 43 and 44, back over suitable idler-pulleys 45, around a suitable tightener, as the shaft 46, which is mounted in the adjustable brackets 47. Beneath the plane of these tapes 42 is arranged a fourth set of folding-rollers 48 and 49, and this fourth set are preferably arranged at right angles to the third and fifth sets, as shown, and this fourth set may be arranged in cross-girths 50 50. This fourth set of folding-rollers 48 and 49 may be geared together and driven from any suitable part of the machine, from any suitable gearing, so that their peripheries will turn toward each other. Arranged above and co-operating with these folding-rollers 48 and 49 is a folding knife or tucker 52, which is carried by an arm 53, which may be mounted on a suitable shaft 54, journaled in suitable bearings on the cross-girths 55, and secured on the shaft 54 is an arm 56, which carries at the end thereof the usual stud 57 and roller 58, which bears on a cam 59, mounted on the shaft 13, as shown more especially in Fig. 4. Journaled in one of the interior cross-girths and one of the side frames 3 is a shaft 60, which carries suitable paper-stops 600, which are adapted to be turned down between the tapes 42, so as to stop the sheet in proper position over the rollers 48 and 49, so that, if desired, the thrice-folded sheet may be tucked between the rollers 48 and 49 and again folded in at right angles to its third fold.

Secured to the tucker-blade 52 is a pin 62, and mounted on the shaft 60 is an arm 61, which has a projecting finger, which is adapted to catch under the pin 62 to hold the

tucker-blade in its raised position when the stops 600 are turned up, so as not to stop the sheet. The tucker-blade 52 descends only by gravity and is raised by the cam 59, and hence when the finger 61 is turned to engage the pin 62 the knife 52 will not operate, and hence a free passage will be allowed over the folding-rollers 48 and 49; but when the stops are turned down to stop the sheet the pin 62 will not be held by the arm 61 and the tucker will be free to act.

On the end of the shaft 60 outside of the frame 3 is mounted an arm 63, which has a suitable set-screw 64, by means of which the stops 600 can be securely held in either their raised or lowered positions. By this means it will be seen that when the stops are raised the tucker-blade will not act to tuck the sheet into the folding-rollers 48 and 49 and that the sheets can pass freely over the fourth set of folding-rollers to the fifth set; but it will also be seen that when the stops 600 are turned down between the tapes to stop the sheet the tucker-blade will then be free to act and that when the parts are arranged in this manner the sheet will be stopped and tucked between and folded by the fourth set of folding-rollers.

Coöperating with the fifth set of folding-rollers is the tucker or folding blade 65, which is mounted in an arm 66, which arm is secured on the shaft 67, which is mounted in a suitable bearing and the front side frame 3. Projecting from this shaft 67 is an arm 69, which carries the usual stud 70 and roller 71, and this roller engages a cam 72 on the shaft 13. By this means the tucker-blade 65 will be properly actuated.

It will be seen that all the tucking-blades of the five sets of folding devices are operated from the same shaft, whereby by adjusting the cams they will all properly act to fold the sheet at the proper time.

Partially covering the upper side of the fifth set of folding-rollers 43 and 44 are rods 73, which are secured to the frame 12. These rods 73 support the forward end of the sheet as it is pushed forward by the tapes 42. A stop 74 is secured on the rods 73 and arrests the incoming sheet, so that the knife 65 may tuck it properly between the rollers 43 and 44, as shown in Fig. 5. By this means the sheet can be folded by the rollers 43 and 44.

Sometimes it is desired to deliver a sheet just as it leaves the third folding-rollers 33 and 34 without further folding. When this is desired, delivery-stops 75 may be secured to the stop 74. These delivery-stops 75 have suitable bridge-pieces 77, which fit over the stop 74 and which are held in place by means of set-screws 78. When these delivery-stops are put in place, as shown in Figs. 1 and 3, the forward end of the incoming sheet will be arrested substantially at the tangential line between the rollers 43 and 44, and then when the tucker-blade 65 descends the sheet will be simply directed down between the

rollers 43 and 44 without being folded. The tucker-blade 65 is preferably used to direct the leading end of the sheets from the stop 75 down between the rollers 43 and 44. This can
 5 be done without adjusting the machine, as the sheets coming to this point have been thrice folded, and hence there is considerable distance between the same. If this operation takes place, the tapes 42 will slide
 10 slightly under the thrice-folded sheet, as it is held by the stops 75 until the tucker-blade 65 descends. Another way this operation can be made to take place is by adjusting the cam 72 upon the shaft 13 so that the tucker-
 15 blade 65 will act to direct the leading end of the sheets into the bite of the rollers 43 and 44 at about the instant the folded sheet reaches this point. Other means may be employed to direct the thrice-folded sheets
 20 through these rollers 43 and 44 without being folded. If these delivery-stops are moved as shown in Fig. 5, the sheet will run up to the stop 74, and then when the knife 65 descends the sheet will be given a fold and delivered
 25 by the folding-rollers 43 and 44. Thus a sheet can be delivered between the rollers 43 and 44 from the third set of folding-rollers 33 and 34 either with an additional parallel fold or without.
 30 Beneath the folding-rollers 43 and 44 is arranged a proper receptacle or delivery device 79, which in this case consists of a V-shaped casting or trough. At the left-hand end of this receptacle is arranged a sliding frame 80,
 35 which as the sheets descend from above packs them toward the right-hand end of the trough 79, which, if desired, may have a suitable yielding stacker. The packing-frame 80 slides in the V of the trough 79 and is re-
 40 ciprocated by a connection or pitman 81, which connects to a sliding shaft 811, mounted in the end frames 12 12, and which shaft 811 is reciprocated by means of pitmen 812, se-
 45 cured to said shaft and to a revolving crank-disk 83. This crank-disk 83 is secured on the lower end of a shaft 84, which is mounted in suitable bearings 85 and 86, secured to one of the end frames, as shown. On the upper
 50 end of this shaft 84 is mounted a bevel-pin-
 55 ion 87, which meshes with and engages a bevel-pinion 88, fast on the shaft 13, by which means the shaft 84 will be revolved synchronously with the main shaft 13. Any other delivery mechanism—such as the well-known fly, rotary fly, &c.—may be substituted for the means herein shown without departing from the scope of my invention.

Cast or secured to the front side frame 3 is a bracket 89, which is bored out and in which
 60 is fitted a shaft 90, the shaft 90 being rigidly secured in the bracket 89. On the projecting part of this shaft 90 is journaled a suitable collar or bearing 91, which is held in place by a collar 92, secured upon the lower
 65 end of the shaft 90. From the upper part of this collar or journal 91 extends an arm 93, which carries at its free end a delivery-cage

94 or bottomless and tapered box. Said cage 94 is of sufficient length and width to receive a sheet folded by the rollers 48 and 49. Pro-
 70 jecting from the lower end of this journal 91 is an arm or lever 95, which carries a crank-pin 97, to which is secured a connection 96, which is connected at its end to an eccentric-strap 98, which strap 98 engages an eccentric
 75 99, secured upon the shaft 84. Thus it will be seen that as the shaft 84 revolves the cage 94 will swing about the shaft 90 as a center. The stroke of the eccentric 99 is such that the extreme left-hand limit of the movement
 80 of the cage 94 is to a position beneath the folding-rollers 48 and 49 and that the extreme right-hand movement is to a position immediately over the point of reception of the delivery device, the cage 94 describing in
 85 its traverse a quarter-circle.

Hinged at either end of the cage 94 is a swinging bottom 100. This bottom is so centered that it will of its own gravity swing to and form a cover for the bottom of the cage
 90 94. At one end of the bottom 100 is arranged a pin 101. This pin when the cage turns over the receptacle 79 strikes a yielding pin 102, set at right angles to it and secured upon a
 95 suitable part of the machine, and is thereby moved so as to open the cover 100, thereby permitting the sheet that may be in the cage 94 to escape into the delivery device 79. Thus when it is desired to use the folding-
 100 rollers 48 and 49 as the last folding device the cage 94 will be used, and it will be seen that this cage serves to take the folded sheet delivered from the fourth set of folding-rollers and deposit it into the receptacle 79, the sheet being turned at right angles, so as to
 105 properly come into the delivery receptacle. When it is desired to deliver from the rollers 43 and 44 without using the rollers 48 and 49, the stop 600, before referred to, is turned up, so as to provide a free pathway to the fold-
 110 ing-rollers 43 and 44 and so as to render the tucking-blade of the fourth set of folding-rollers inoperative, whereby the sheet can be delivered directly from the rollers 43 and 44 or can be folded thereby. When the deliv-
 115 ery takes place with the rollers 43 and 44, the bolt 97 may be withdrawn and the arm 96 disconnected and, if desired, the cage 94 swung to one side to be out of the way of the folding-rollers 43 and 44, or, if desired, the cage
 120 can be left in the position shown in Fig. 2, so as to form a guiding device for directing the sheets from the rollers 43 44 into the packing-box 79.

Thus it will be seen that I have invented a
 125 device in which are placed three sets of folding apparatus, as the folding-rollers 33 34, 48 49, 43 44 and their coacting parts, in such relative position that work may be folded by
 130 two of the sets in parallel folds, as by rollers 33 34 and 43 44, or, second, may be folded by two sets of rollers in right-angled folds, as by the rollers 33 34 and 48 49, or, third, may be delivered without further folding from the

first set of rollers, as from the rollers 33 34. Also it will be seen that a single set of tapes, as 42, is used to convey the sheets to either a right-angled or parallel succeeding fold, as desired. Also it will be seen that by placing a removable stop, as 600, in the path of the folded sheet the sheet may be delivered to an intermediate folding apparatus at will. Also it will be seen that I have arranged this removable stop so that when the same is moved to allow the sheet a clear pathway the tucker-blade of the second set of folding-rollers coacting with this stop is rendered inoperative. Also it will be seen that I have provided a delivery-stop, as 75, which arrests the edge of the sheet sufficiently near the edge of the blade so that when the blade descends it will direct the sheet through the folding-rollers, as 44 45, without folding it. Also it will be seen that I have provided, in combination with two sets of folding apparatuses, a paper-receptacle so arranged with relation to the sets that the sheets delivered from either set of folding-rollers may be delivered and deposited into one delivery device or packing-trough without changing or adjusting the same horizontally.

The various and relative positions of the first three sets of folding-rollers may be varied as desired by a skilled mechanic without departing from the scope of my invention.

As before stated, the way that the sheets are fed to the first set of folding-rollers can be arranged as desired, and I have not thought necessary to show any particular mechanism for accomplishing this feeding, as many such are known and well understood. The set of rolls 33 34 may be the first, second, third, or any other set in a folding-machine, so far as the scope of some of my claims is concerned.

The arrangement of girths, gearing, and the various parts may be greatly varied by a skilled mechanic without departing from the scope of my invention as expressed by the claims.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a folding-machine of three sets of folding-rollers arranged substantially as described, with means whereby the folded sheets issuing from the first of said sets of folding-rollers can be delivered through the third set without further folding, or can be delivered from said first set through either of the other two sets and folded thereby without removing any of said rollers, substantially as described.

2. The combination in a folding-machine of two folding apparatuses arranged substantially parallel, an intermediate folding apparatus arranged at right angles to said two, and means whereby the sheet can be delivered from the first of said folding apparatuses through the third set without further folding, or can be delivered folded by either of the

other folding apparatuses, substantially as described.

3. The combination in a folding-machine of a pair of folding-rollers as 43, 44, a tucker co-acting therewith, and an adjustable stop, these parts being so arranged that, when the stop is in position, the tucker will force the leading end of the sheet into the bite of the folding-rollers, so that the same will pass through without folding, and so that, when not in position, the tucker-blade will crease and fold the sheet into the bite of the folding-rollers, so that the same will be folded thereby, the parts being further so arranged that these adjustments can be made without interfering with the action of the tucker, substantially as described.

4. The combination in a folding-machine of the three sets of positively-driven folding-rollers as 33 34, 48 49 and 43 44 arranged substantially as described, a set of tapes taking the sheets from the rollers 33 34, and means whereby the sheets can be folded by either of said sets of folding-rollers 48 49 or 43 44, or delivered through the rollers 43 44 without further folding and without altering or removing any of said folding-rollers, substantially as described.

5. The combination in a folding-machine of three sets of folding-rollers, as 33 34, 48 49 and 43 44, arranged substantially as described, means whereby the sheet after passing from the rollers 33 34 can be folded by either set of rollers 48 49 or 43 44, or delivered out through the rollers 43 44 without further folding, as desired, and means whereby the sheet issuing from either of the last two sets of folding-rollers will be deposited in the same delivery device, substantially as described.

6. The combination in a folding-machine of three sets of folding-rollers as 33 34, 48 49, and 43 44, arranged substantially as described, means whereby the sheet issuing from the rollers 33 34 will be carried first over the rollers 48 49, and then to the rollers 43 44, a stop which is adapted to be thrown into position to stop the sheet over the folding-rollers 48 49, if desired, or which can be so positioned that the sheets will pass to the folding-rollers 43 44, and means whereby the sheets may be either folded by the rollers 43 44, or carried thereto without folding, substantially as described.

7. The combination in a folding-machine of three sets of folding apparatus, a set of tapes carrying the sheet from one of said sets of folding apparatus first, over the next set, and then to the third, a stop adapted to be thrown into and out of position to stop the sheet over the intermediate set of folding-rollers, the tucker knife or blade coöperating with this intermediate set of folding-rollers, and means whereby the folding-blade will be rendered inoperative when the stop is moved so as to allow a free passage over the intermediate set of folding-rolls, and so that when the sheet is stopped over this intermediate set the tucker-

blade will be allowed to operate, substantially as described.

5 8. The combination in a folding-machine of a set of folding-rollers as 43 44, and a cooperating tucker-blade, a set of guiding-fingers as 73, a stop 74 arranged to stop the sheet so that the same will be folded, and a removable set of delivery-stops as 75, which, when in place will stop the head of the sheet so that
10 as the tucking-blade descends, the sheet will be caused to pass between the folding-rollers without being folded thereby, substantially as described.

15 9. The combination in a folding-machine of a set of folding-rollers as 48 49, a set of tapes as 42 for carrying the sheet over these folding-rollers, a tucker blade or knife 52 for tucking the sheets between these folding-roll-

ers, a stop adapted to arrest the sheet over these folding-rollers in proper position, said 20 stop also being adapted to assume a position which will allow the sheets to pass beyond the folding-rollers, and connections whereby when the stop is in its inoperative position, the folder or tucker blade will be rendered 25 inoperative, and when the stop is in its operative position, the tucker-blade will be allowed to act, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing 30 witnesses.

WALTER G. BENNETT.

Witnesses:

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JAMES J. McGRATH.