

No. 640,248.

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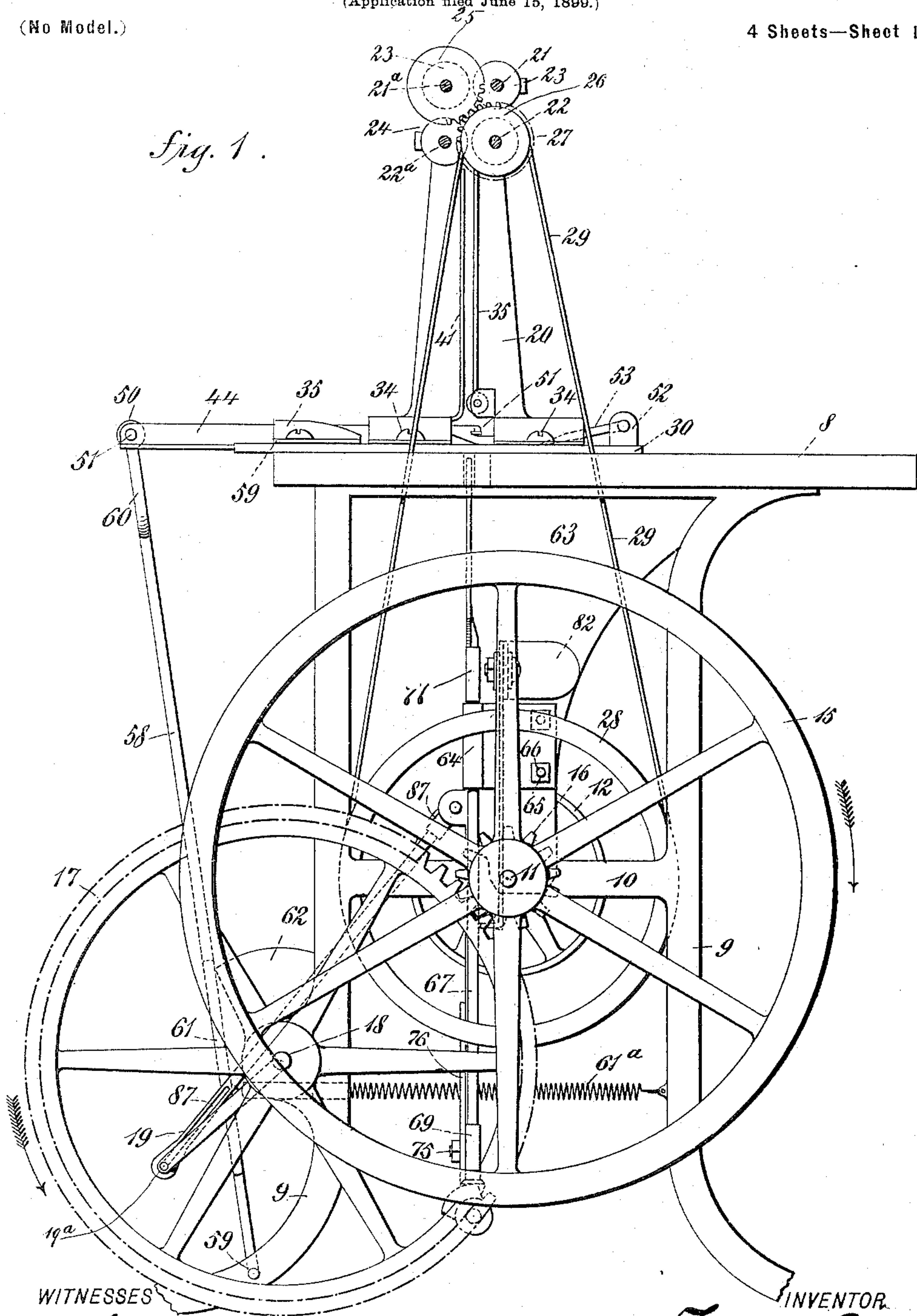
F. WULFF.  
PAPER FOLDING MACHINE.

(Application filed June 15, 1899.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.



WITNESSES

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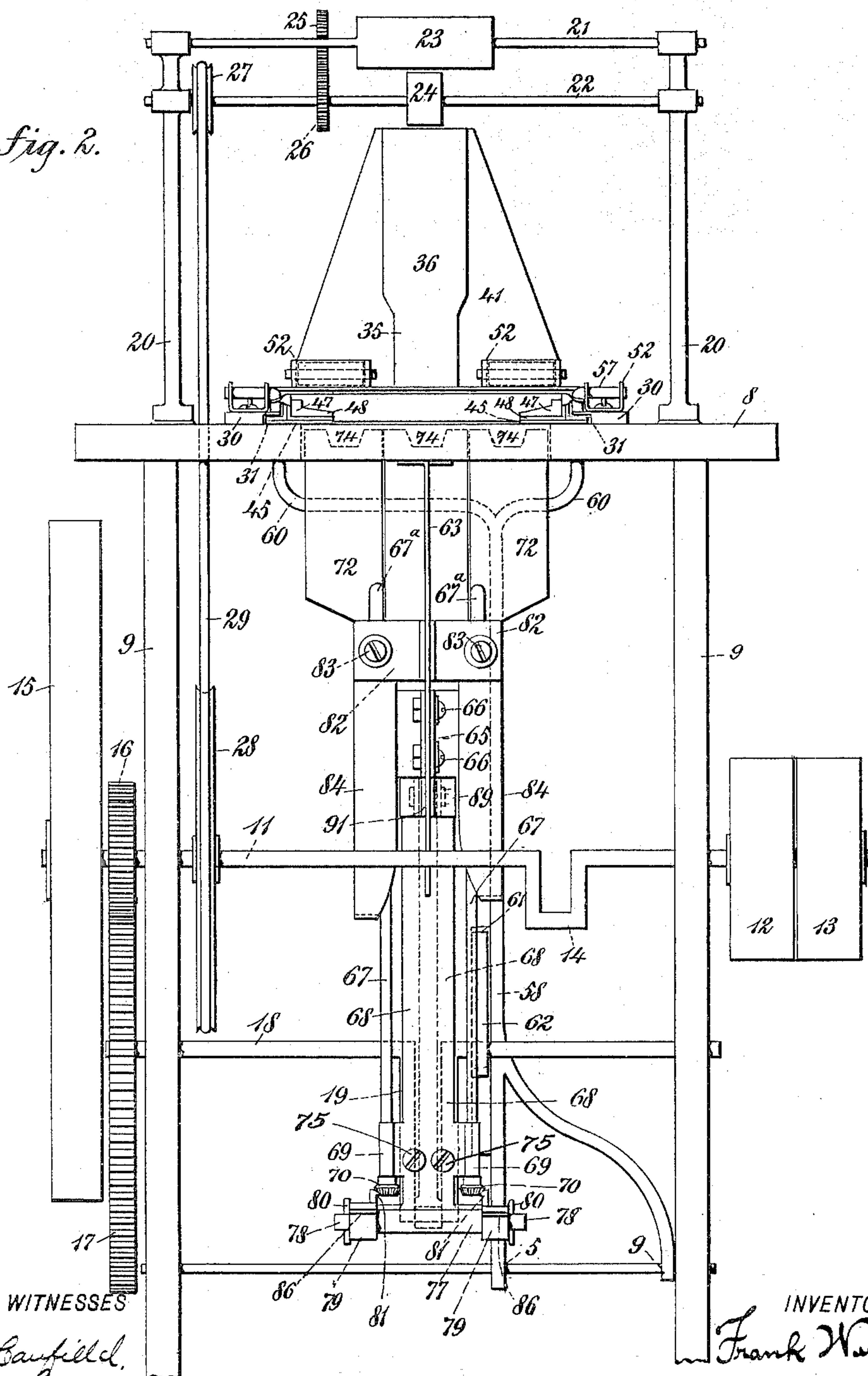
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(No Model.)

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*Fig. 2.*



WITNESSES

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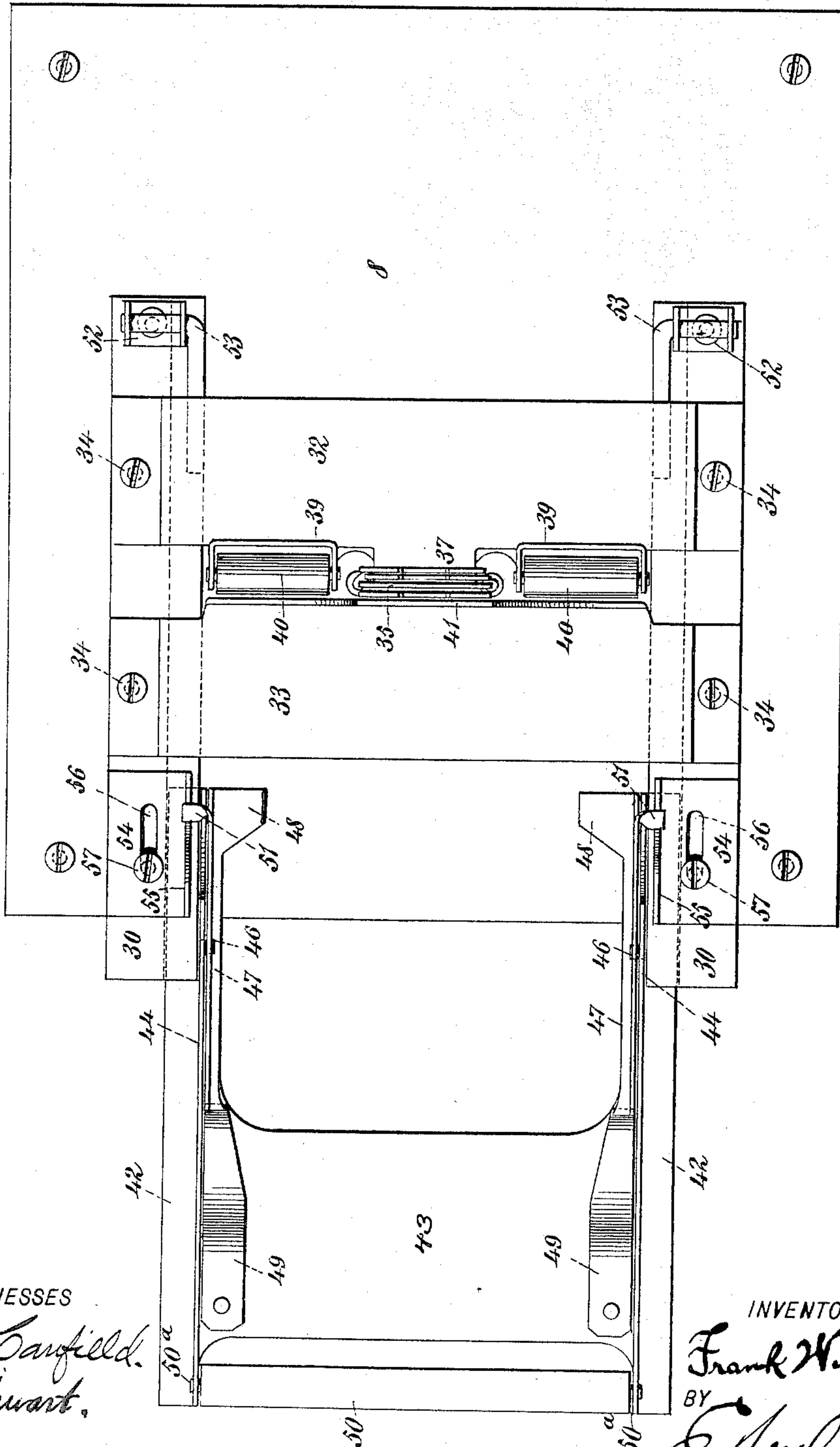
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Fig. 3.



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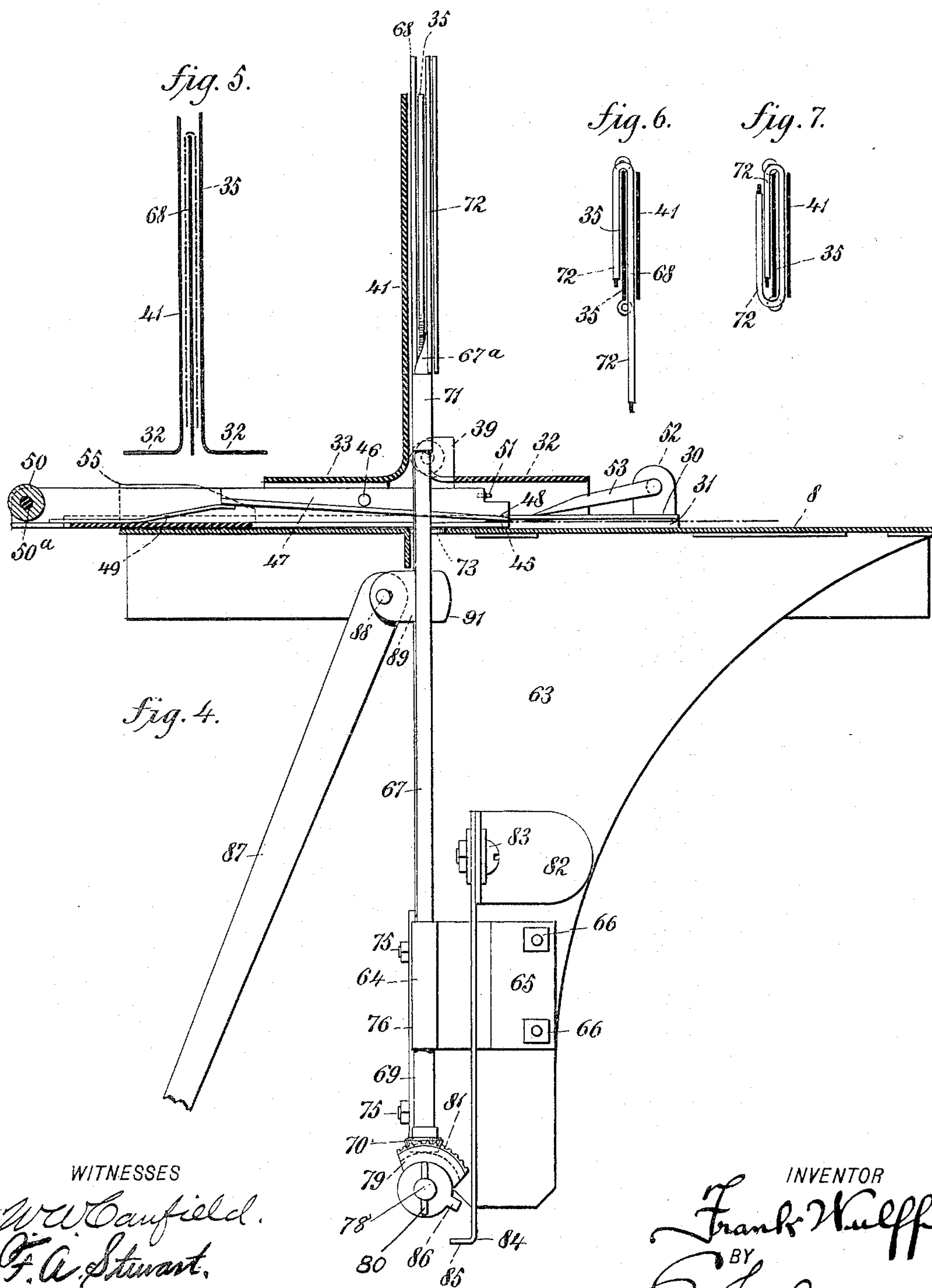
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4 Sheets—Sheet 4.



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# UNITED STATES PATENT OFFICE.

FRANK WULFF, OF COLUSA, CALIFORNIA.

## PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 640,248, dated January 2, 1900.

Application filed June 15, 1899. Serial No. 720,609. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK WULFF, a citizen of the United States, residing at Colusa, in the county of Colusa and State of California, have invented certain new and useful Improvements in Paper-Folding Machines, of which the following is a full and complete specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to paper-folding machines, and has for its object to provide a simple, efficient, and practically operative machine of this class by means of which sheets or strips of paper may be picked up, folded, and passed into a basket or other receptacle.

The invention consists in the novel construction, combination, and arrangement of parts hereinafter fully described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which like reference characters denote like parts in the several views, and in which—

Figure 1 is a side elevation, partly cut away, of a machine constructed according to my invention; Fig. 2, a front elevation thereof; Fig. 3, an enlarged plan view thereof, the discharge and presser rollers and their supports being omitted; Fig. 4, an enlarged side elevation, partly in section, of the bed-plate and folding-blades of my machine, showing the operative connections; and Figs. 5, 6, and 7, views of details of the folder-blade construction.

In the practice of my invention I construct a bed-plate 8 of any suitable form, mounted upon suitable supports 9, which are provided at each side with a cross-brace 10. In the cross-braces 10 is journaled a main shaft 11, provided with fast and loose running pulleys, respectively, 12 and 13, and with a crank-elbow 14. A suitable driving-belt may operate in connection with the pulleys 12 and 13 to drive the shaft 11, or a foot-treadle may be mounted in connection with the elbow 14, and thus allow of foot operation of the said shaft, which is provided exterior of one of the cross-braces 10 with a fly-wheel 15 and a pinion 16. The pinion 16 engages a gear-wheel 17, mounted upon one end of a supplemental shaft 18, which is journaled in the

supports 9 and provided centrally with a crank-elbow 19. (Shown in Figs. 1 and 2.)

Mounted upon the bed-plate 8, at each side thereof, is a standard 20, and journaled at each end in said standards are four shafts, comprising an upper pair 21 21<sup>a</sup> and a lower pair 22 22<sup>a</sup>, and the upper pair are provided each with a central broad presser-roller 23 and the lower pair each with a narrow discharge-roller 24. The shafts 21<sup>a</sup> and 22 are each provided with gear-wheels 25 and 26, the teeth whereof intermesh, and by means thereof the rollers 23 revolve similarly to the rollers 24. The shaft 22 is provided with a pulley 27 (shown in dotted lines in Fig. 1) and the supplemental shaft 11 with a pulley 28. A belt 29 passes about the pulleys 27 and 28. Mounted upon the bed-plate 8 and extending rearwardly thereof and ranging at right angles to the vertical standards 20 and between said standards are a pair of strips 30, each of which is longitudinally grooved upon its inner edge portion, as at 31 in Figs. 2 and 4, to form guideways. Upon the strips 30 are mounted a pair of cross-plates, respectively, 32 and 33, each end of each of said plates being secured to one of the strips 30, as at 34, and the plates 32 and 33 approximately cover the space between the strips 30 and extend at right angles thereto.

The plate 32 is provided at its inner edge with a backwardly-directed lip 37 and an upwardly-directed fixed blade 35, projecting from said lip and preferably enlarged at its upper end, as shown at 36 in Fig. 2. The plate 32 is also provided at each side of the lip 37 with a backwardly-directed yoke-shaped support 39, in which is mounted a roller 40. The plate 33 is provided at its forward edge with an upwardly-directed fixed blade 41, preferably tapering in form, as shown in Fig. 2, and the blade 41 is arranged parallel to and slightly separated from the blade 35, as shown in Fig. 1.

The feeder-frame of the machine, as shown in Fig. 3, consists of parallel sliding plates 42, provided with a cross-plate 43 and with upright longitudinal flanges 44. The sliding plates 42 fit each in one of the grooves 31 of the strips 30 and operate slidably in connection with said strips and the bed-plate 8. Each of the sliding plates 42 is provided at



its forward end with a flat head 45 and pivoted to each of the flanges 44 and upon the inner face thereof at 46 is a rod or finger 47, provided at its forward end with a flat head 48, which operates in connection with the cross-plate 43 at each side thereof and adjacent the flanges 44 and engages the under surface of the rear end of the adjacent finger 47, normally forcing the head 48 into engagement with the head 45. A transverse roller 50 is journaled between the flanges 44 rearward of the cross-plate 43. Each of the fingers 47 is provided at its forward end, above the head 48 thereof, with a laterally-projected dog 51, and each of the strips 30 is provided at its forward end with a yoke-shaped support 52, in which is pivoted an angular trip-piece 53, the operative portion of which extends rearwardly of and is supported above the strip 30 and the free end of which rests normally upon the inner edge portion of said strip. A plate 54 is secured to each of the strips 30, at the rear end thereof, and provided with a vertical trip-flange 55, the upper edge of which is beveled forwardly, as shown in Fig. 1. Each of the plates 54 is provided with an elongated longitudinal slot 56, by which, in connection with a set-screw 57, it is adjustably connected with the strips 30.

In the reciprocation of the feed-frame 42 43, hereinafter described, the dogs 51 operate alternately in connection with the trip-pieces 53 and trip-flanges 55, and said frame reciprocates beneath the plates 32 and 33.

An upright arm 58 is pivoted at its lower end to the base of one of the supports 9, as at 59, and provided with a yoke 60, which engages each end of the shaft 50<sup>a</sup>, upon which the roller 50 is mounted and between the ends of said roller and the flanges 44 of the sliding plates 42.

A helical spring 61<sup>a</sup> is connected at its respective ends with the support 9 and arm 58 and normally retains the arm 58 in upright position.

The arm 58 is provided adjacent the supplemental shaft 18 with a laterally-projected bearing-block 61, and a segmental cam 62, mounted upon the shaft 18, operates in connection therewith to oscillate the arm 58 and reciprocate the feeding-frame 42 43.

A downwardly-projected bracket 63 is secured to the under surface of the bed-plate 8, as shown in Fig. 4, and connected therewith at each side by means of plates 65 and bolts 66 are a pair of vertical sleeves 64, and slidably mounted in said sleeves are a pair of vertical rods 67.

A vertical strip 68 is provided at its lower ends, at either edge, with a pair of vertical sleeves 69, through which the rods 67 are revolvably passed and beneath which said rods are provided or formed with bevel-gear heads 70.

The vertical strip 68 is provided at a predetermined point above the sleeves 69 with a pair of sleeves 71, as shown in Fig. 1, at each

edge thereof, and the rods 67 pass operatively therethrough, and with said rods in such position as shall bring the gear-heads into engagement with the sleeves 69 the said rods are twisted laterally, as at 67<sup>a</sup>, and provided with upwardly-projected blades 72, and by means of the sleeves 71 and 67, the gear-heads 70, and the twists at 67<sup>a</sup> in the rods 67 the latter rods are prevented from longitudinal movement in the said sleeves 71 and 67, but may pass slidably through the sleeves 64.

The bed-plate 8 is provided with a transverse slot 73, opening into the space separating the blades 35 and 41, and the strip 68 may be vertically reciprocated and the upper end thereof pass up through the slot 73 and between the blades 41 and 35, being carried up between the rollers 40 and the blade 35 upon one side and the blade 41 upon the other. The blades 72 are also simultaneously elevated by means of the connection of the rods 67 and the strip 68, which latter is of such length as to extend upward flush with the tops of the blades 72, which are oblong in shape and beveled upon their lower edge, being secured to the rods 67 at the lower corners of the beveled edge portion. The upper ends of the blades 72 and upper end of the strip 68 are preferably notched centrally, as shown at 74 in dotted lines in Fig. 2.

Secured to the lower end of the vertical strip 68 by means of bolts 75, passing therethrough and through a plate 76 integral therewith, is a transverse head 77, provided at each end with a stub-shaft 78, upon which is a segmental bevel-gear head 79, being revolvably secured to the stub-shaft by a pin 80.

The teeth 81 of the gear-heads 79 mesh with the teeth of the bevel-gear heads 70. Secured to either face of the bracket 63 are a pair of brackets 82, from which are adjustably suspended, by bolts 85, a pair of vertical hooked fingers 84, the hooked ends of which are adapted to operate in connection with dogs 86, formed upon the bevel-gear heads 79.

The fingers 84 may be oscillated to bring them out of the path of movement of the dogs 80 as they may be swung upon the bolts 85. Operatively connected with the crank-elbow 19 (shown in Fig. 1) is a connecting-rod 87, which is pivoted, as at 88, Fig. 4, between the arms of a yoke-shaped link 89, secured to the upright strip 68, and provided with flanges 90, which slidably engage either face of the bracket 63. The connecting-rod 87 is slotted longitudinally, and cross-head 19<sup>a</sup> of the crank-elbow 19 operates within said slot.

The operation of my machine will be evident from the foregoing description when taken in connection with the accompanying drawings and the following statement thereof. By means of the pulley 12 power is applied to the shaft 11 to rotate it and the fly-wheel 15 in the direction indicated by the arrow in Fig. 1, rotating the gear-wheel 17 in the direction indicated by the arrow in connection



therewith. With the parts in the position shown in Fig. 1, it being understood that a paper blank rests upon the bed-plate 8, directly over and bisected by the line of the slot 73, the revolution of the shaft 18 is just about to cause the cam 62 to force the arm 58 rearwardly and to draw the feeder-frame 42 43 rearwardly, and the top flanges 55 operate, in connection with the dogs 51, to raise the head 48 and to release the paper blank in the position described. During this movement of the parts, as stated, the connecting-rod 87 and vertical strip 68 are substantially stationary, the tops of said strip and of the blades 72 being in their lowest position beneath the upper surface of the bed-plate 8, this stationary condition being due to the sliding movement of the cross-head 19<sup>a</sup> of the crank-elbow 19 in the slotted connecting-rod 87, as described. As the shaft 18 continues to rotate the cam 62 allows the arm 58 to be gradually retracted by the spring 61<sup>a</sup> advancing the feeder-frame 42 43 toward the front of the bed-plate 8, where the dogs of the heads 48 thereof engage the trip-pieces 53 and are raised and subsequently depressed by the springs 49 to engage and grip, in connection with the heads 45, a fresh paper blank. Simultaneously the connecting-rod 87 forces the vertical strip 68 upwardly, the upper end thereof and the blade 72 passing through the slot 73 in the bed-plate 8 and engaging the paper blank centrally, forcing it upward into the position shown in Fig. 5, it being thus folded transversely. As the paper blank rises the front fold thereof engages the upright blade 35 and the rollers 40, and the rear fold thereof engages the upright blade 41. At a predetermined point in the upward movement of the strip 68 and blades 72 the hooked fingers 84 engage the dogs 86 upon the gear-heads 79 and rotate said heads, rotating the bevel-gear heads 70 and partially rotating the vertical rods 67 and inwardly folding the blades 72 and over the blade 35, and one of the fingers 84 is of greater length than the other, so that one of the dogs 79 is engaged previous to the other, and the respective gear-heads 79 and connected rod 67 and blade 72 are operated thereby previous to the operation of the other blade 72. According to this construction and arrangement the paper blank receives two vertical folds. The strips 68 continuing to rise, the discharge-rollers 24 24 grip the upper end of the folded paper blank and pass it up to the presser-rollers 23 23, which are approximately of the same width as the folded blank and which in turn pass it into a basket or other receptacle. (Not shown.) When the strip 68 is in its highest position, it temporarily remains there, due to the slotting of the arms of the crank-elbow 19 and the movement therein of the cross-head 19<sup>a</sup>, as explained, and this stationary position of the strip 68 and directly-connected parts allows the discharge-rollers 24 to obtain a firm grip upon the folded blank. The rotation of the shaft 18 continuing, the

upper portions of the strip 68 and blades 72 are withdrawn beneath the bed-plate 8, the hooked fingers 84 engaging the dogs 86 to rotate the rods 67 and laterally extend the blades 72, and the cam 62 will cause the arm 58 to rearwardly move the feeder-frame 42 43 and place a fresh paper blank in position over the slot 73, as described, the strip 68 and directly-connected parts meanwhile remaining temporarily stationary beneath the bed-plate 8, as described.

It is evident that many changes may be made in the form of the elements of the above-described machine and in the operation thereof, although I consider the construction set forth as being the most effective and practical as viewed in the light of the present state of the art. I therefore do not desire to limit myself to the employment of the exact details of construction above elaborated.

Having fully described my invention, I claim as new and desire to secure by Letters Patent—

1. The herein-described paper-folding machine, comprising a reciprocating and foldable folding member, means for operating the same, a feeding member for feeding a blank into the path of said folding member, and means for operating the feeding member, the relative construction and arrangement of parts being such that said folding member directly engages and raises said blank, said folding member being during this period of its operation in unfolded position, and is then folded to fold said blank about said folding member, substantially as shown and described.

2. The herein-described machine, comprising a bed-plate provided with a slot, a reciprocating feeding-frame, a reciprocating folding device adapted to operate within said slot and provided with a pair of foldable blades and means for reciprocating said feeding-frame, substantially as shown and described.

3. The herein-described paper-folding machine, comprising a bed-plate provided with a slot, a reciprocating feeding-frame mounted upon said bed-plate, a reciprocating folding member adapted to operate within said slot and provided with a pair of rotatable blades, means for operating said feeding-frame and folding member, and presser-rollers adapted to receive a folded blank from said folding member, substantially as shown and described.

4. The herein-described paper-folding machine, comprising a frame provided with a bed-plate, said bed-plate having a transverse slot, a reciprocating feeding-frame provided with spring-actuated gripping-heads, and mounted upon said bed-plate, a vertical folding member adapted to reciprocate within said transverse slot and provided at either side with a rotatable blade, a shaft provided with a crank connected operatively with said folding member, an arm pivoted at one end to said frame and engaging said folding-frame



at the other end, a cam mounted upon said shaft and adapted to operate in connection with said arm, and devices connected with said bed-plate, and adapted to operate said rotatable blade upon the reciprocation of said folding member, substantially as shown and described.

5. In a machine of the class described, a folding member comprising a vertical strip of suitable material provided at either side, and at the upper and lower portion thereof with a vertical sleeve, a vertical rod revolvably mounted at either side of said vertical strip in a pair of said sleeves, and provided at its lower end with a gear-head, and at its upper end with a folding-blade, a transverse head secured to the lower end of said vertical strip and provided at either end with a gear-head adapted to operate in connection with the gear-heads upon said vertical rods and each provided with a dog, and a pair of hooked fingers connected with said bed-plate, and adapted to operate in connection with said dogs upon the reciprocation of said folding member, substantially as shown and described.

6. In a machine of the class described, a bed-plate, a reciprocating feeding-frame, comprising side plates and a cross-plate, said bed-plate being provided with grooved strips between which and said bed-plate, said side plates operate, spring-actuated fingers pivoted to said side plates and provided with heads adapted to operate in connection with heads formed upon said side plates and devices connected with said bed-plate for operating said fingers upon the reciprocation of said feeding-frame, substantially as shown and described.

7. In a device of the class described, a bed-plate, a reciprocating feeding-frame, comprising side plates and a cross-plate, said bed-plate being provided with grooved strips between which and said bed-plate, said side

plates operate, spring-actuated fingers pivoted to said side plates and provided with heads adapted to operate in connection with heads formed upon said side plates, pivoted trip-pieces connected with said bed-plate at one end of the path of reciprocation of said feeding-frame, and trip-flanges connected with the said bed-plate at the other end of said path of reciprocation, said trip-pieces and trip-flanges being adapted to operate in connection with dogs formed upon said fingers, substantially as shown and described.

8. In a machine of the class described, a frame, a folding member and a feeding member, a shaft mounted in said frame and provided with a cam, an arm pivoted to said frame and operatively connected with said feeding member and adapted to operate in connection with said cam, a crank-elbow formed upon said shaft, and a slotted connecting-rod slidably connected with the cross-head of said crank-elbow and with said folding member, substantially as shown and described.

9. In a machine of the class described, a bed-plate provided with a slot, vertical blades connected with said bed-plate and arranged at either side of said slot, and a folding member provided with a vertical strip adapted to reciprocate through said slot and between said vertical blades, and a rotatable blade connected with either edge of said vertical strip and means for rotating said blades to fold a blank in connection with one of said vertical blades, substantially as shown and described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of the subscribing witnesses, this 6th day of May, 1899.

FRANK WULFF.

Witnesses:

R. A. GRAY,

HENRY MARTIN.