

No. 627,586.

Patented June 27, 1899.

W. S. METCALFE.

ENVELOP MACHINE.

(Application filed Sept. 19, 1898.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.

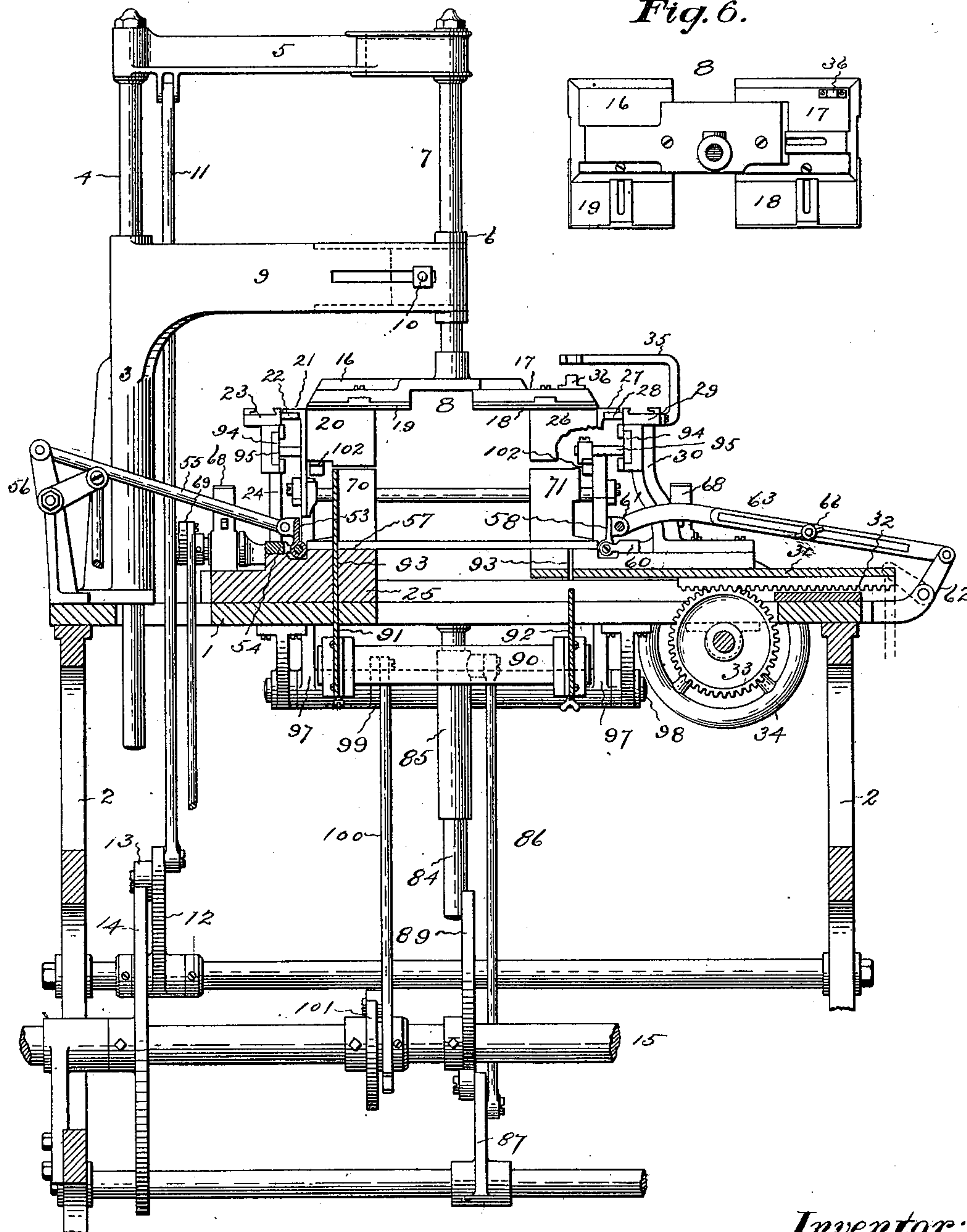
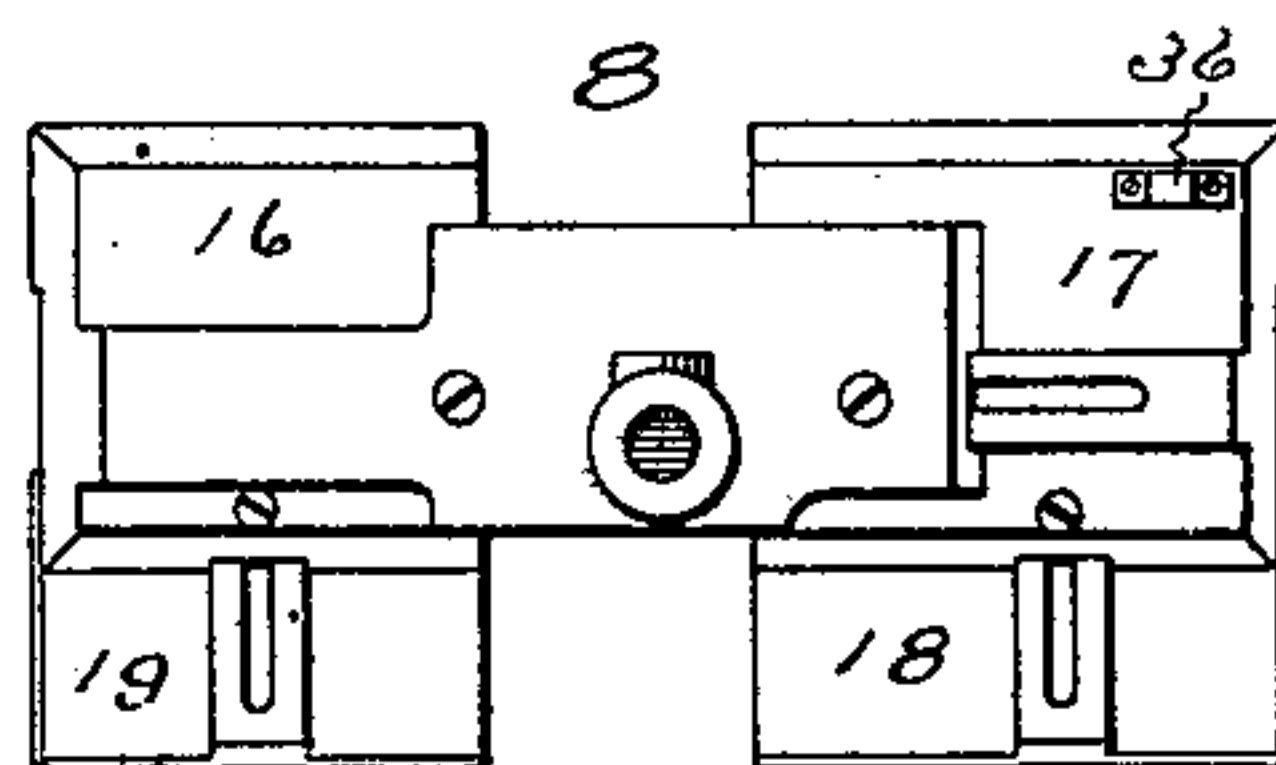


Fig. 6.



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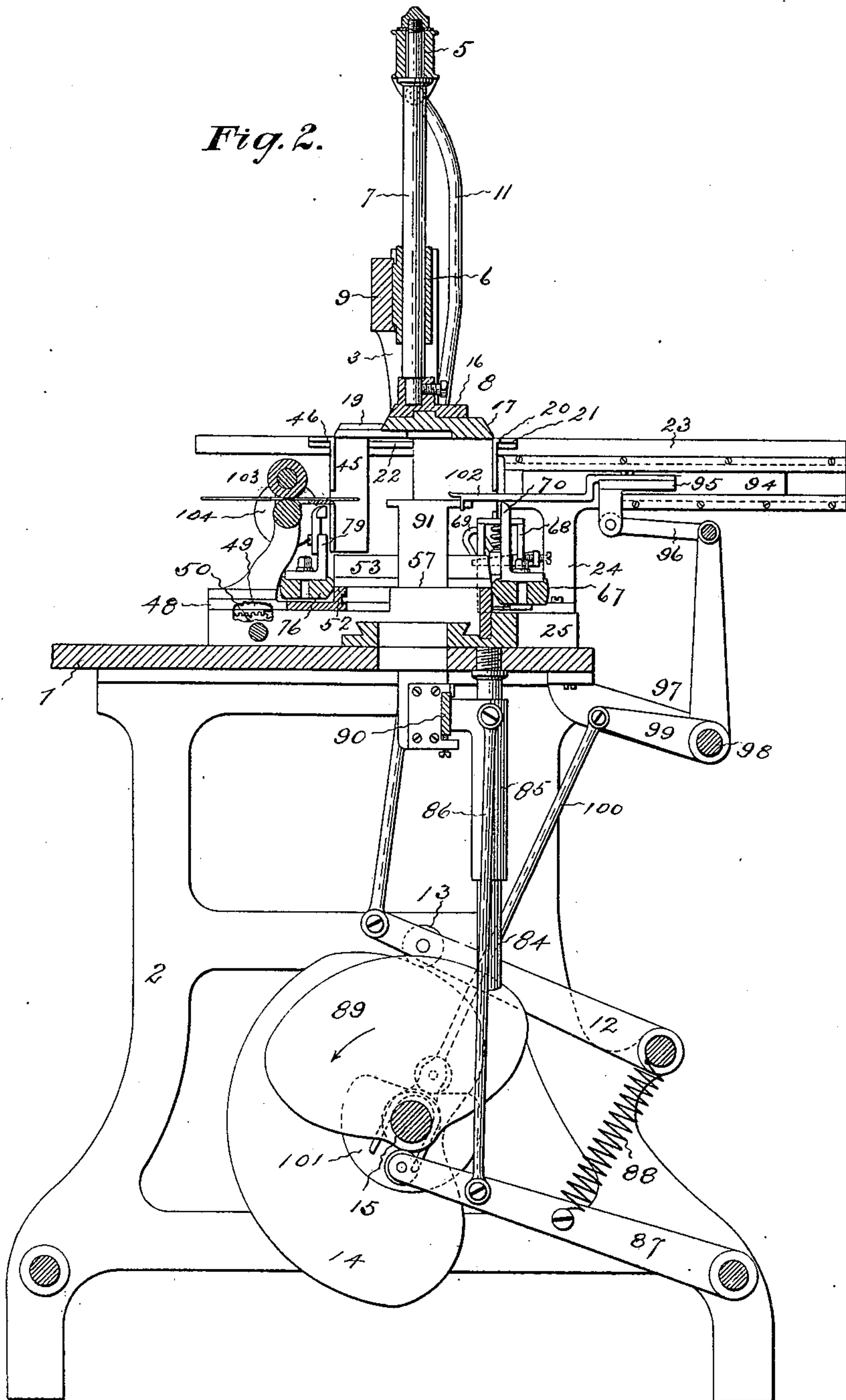
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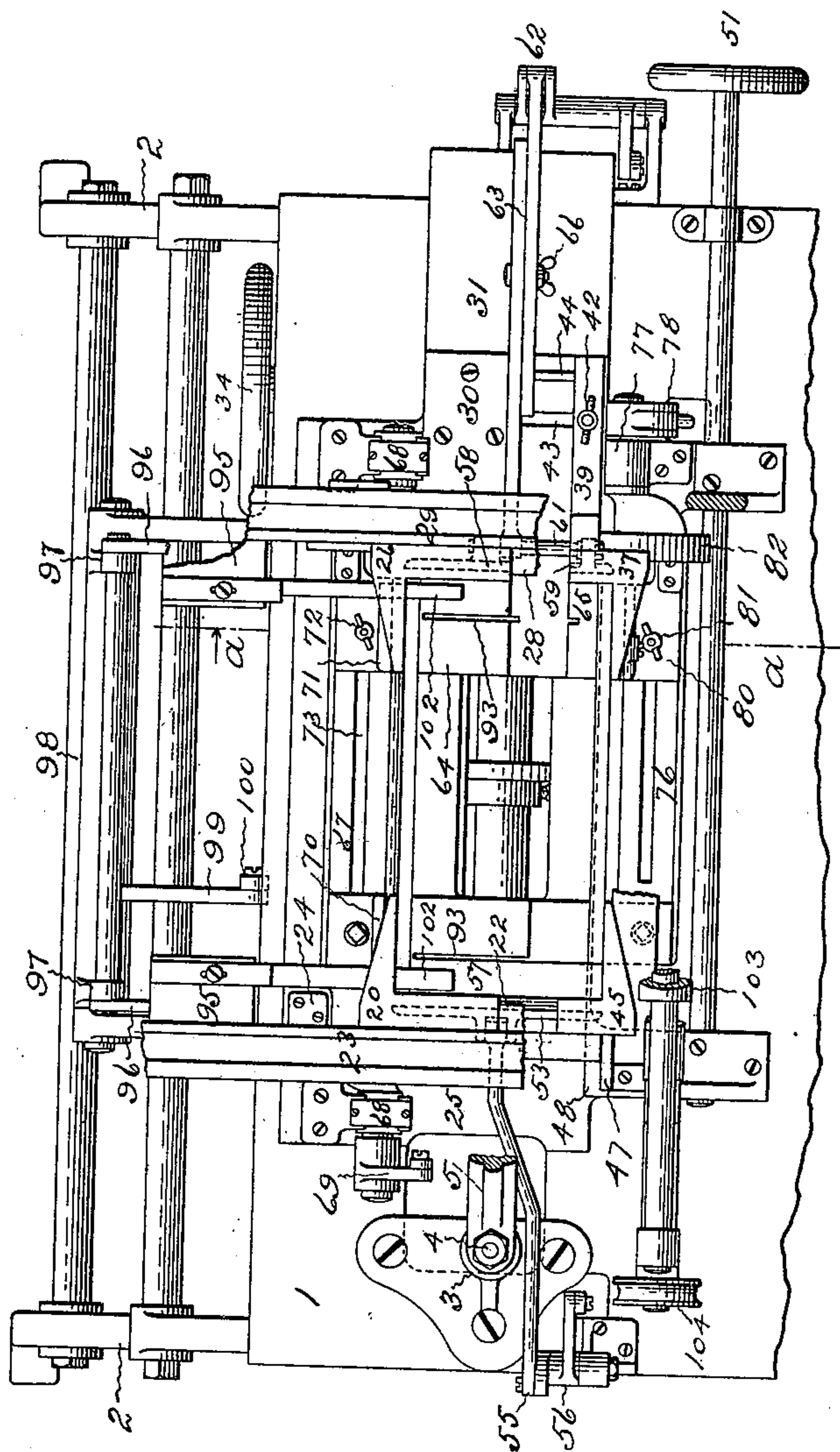
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Fig. 3.



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Fig. 4.

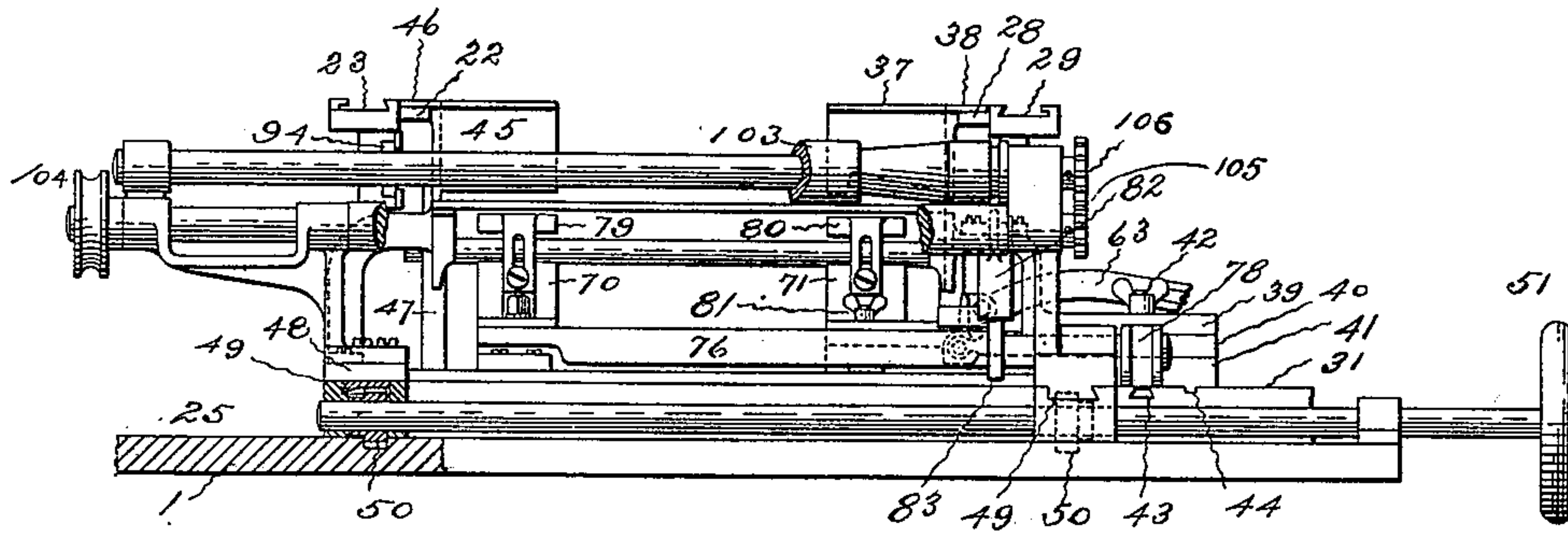
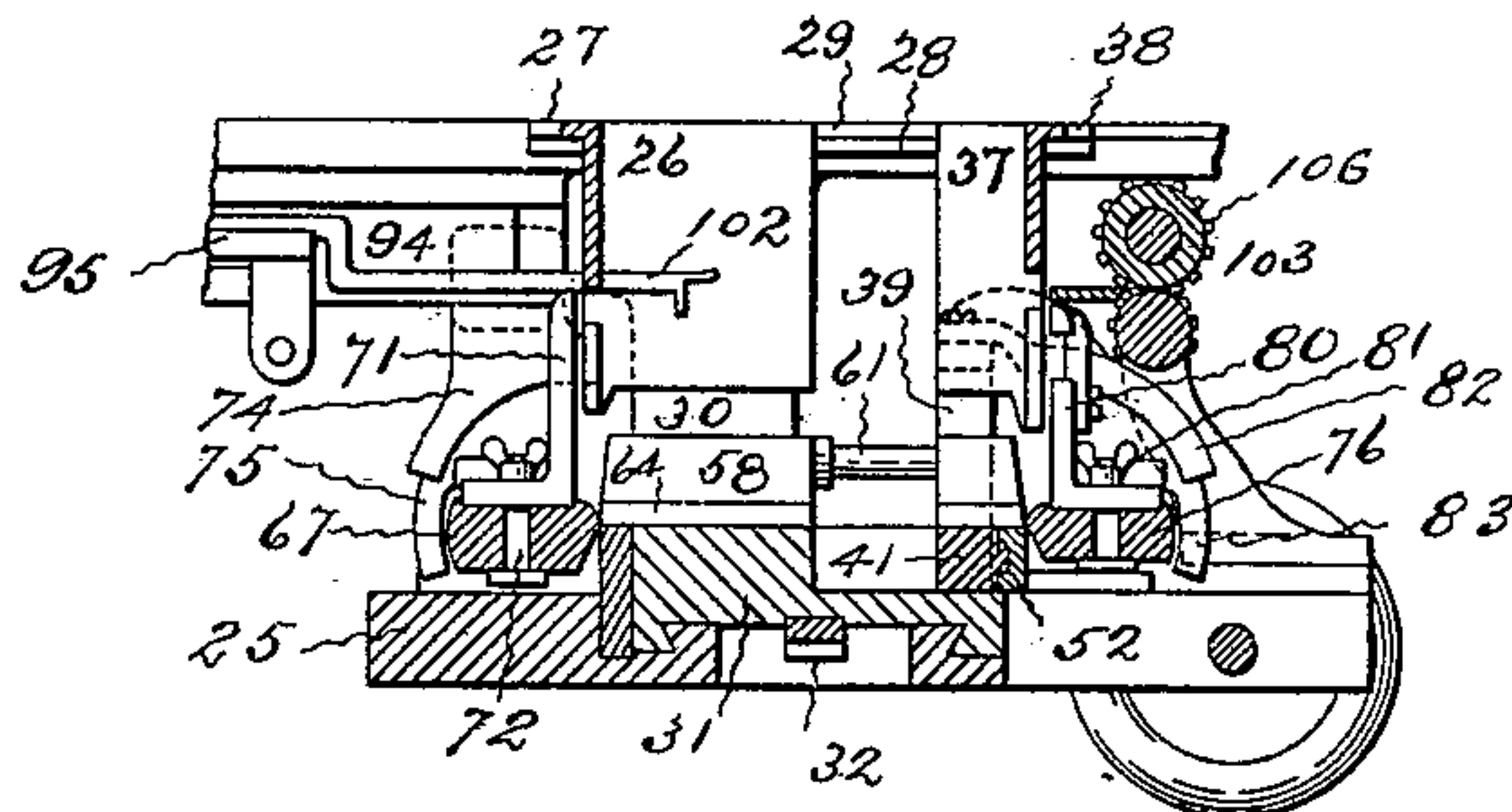


Fig. 5.



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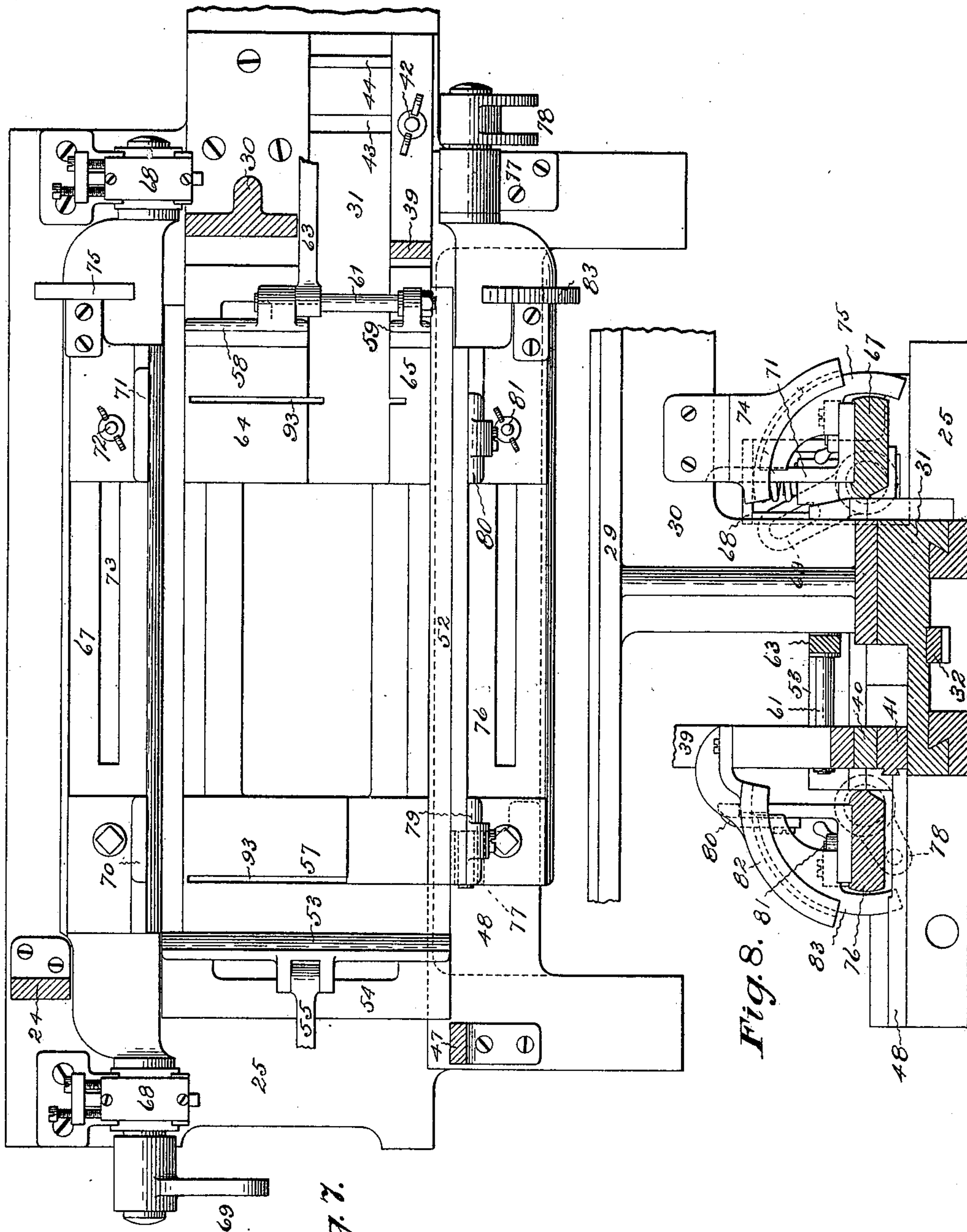
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5 Sheets—Sheet 5.



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Fig. 7.

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UNITED STATES PATENT OFFICE.

WILLIAM S. METCALFE, OF HARTFORD, CONNECTICUT.

ENVELOP-MACHINE.

SPECIFICATION forming part of Letters Patent No. 627,586, dated June 27, 1899.

Application filed September 19, 1898. Serial No. 691,322. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. METCALFE, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Envelop-Folding Mechanism, of which the following is a specification.

This invention relates to a mechanism employed in an adjustable envelop-machine for creasing and folding the blanks and pressing the gummed edges, so that they will properly adhere.

The object of the invention is to provide a mechanism for creasing and folding all four of the flaps of the blanks which is so adjustable that a very large number of different sizes of envelops may be rapidly formed by a single machine.

The mechanism which is illustrated in the accompanying drawings as embodying the invention has a vertically-movable plunger for depressing the blanks to the folding-table, stationary creasers that bend up the four flaps when the blanks are depressed by the plunger, oscillating folders for folding down upon the table the four creased flaps of the blanks, said plunger, creasers, folders, and table being adjustable either lengthwise or widthwise or both lengthwise and widthwise of the envelops, lifters for raising the folded blanks, and pushers for advancing the envelops horizontally to rolls that press and pass the envelops to other parts of the machine.

In the views only so much of an envelop-machine is shown as relates to the creasing and folding of the blanks. Common gumming, conveying, and drying mechanisms may be employed; but as these do not form part of the present invention and as envelop-machine builders will readily understand their application they are not illustrated or described herein.

Of the drawings, Figure 1 is a front elevation of the mechanism with parts cut away to better show the construction. Fig. 2 is a vertical section showing some of the parts in side elevation. Fig. 3 is a plan with some of the parts removed. Fig. 4 is a front view of the creasing and folding parts. Fig. 5 is a vertical section of these parts, taken on the

plane indicated by the dotted line *aa* of Fig. 3. Fig. 6 is a plan of the plunger. Fig. 7 is an enlarged plan of the folding bed and flaps, and Fig. 8 is an end elevation of these with parts cut in section.

The table 1, which is mounted upon any common legs 2, supports a tubular standard 3, movable vertically, in which is a column 4, that at its upper end bears an arm 5. Supported by the outer end of the arm and guided in its movement with the arm by a sleeve 6 is a rod 7, that at its lower end carries the plunger 8. The sleeve 6 is held to an arm 9, projecting from the standard 3 by a bolt and nut 10, and the upper end of the rod or plunger-shank 7 extends through a slot in the arm 5, so that when the nut is loosened the sleeve, with the supporting-rod and plunger, may be moved toward and from the standard. This permits the position of the supporting-rod to be changed so that plungers of different sizes may be used and the fixed corners properly registered with the fixed corners of the creaser-box and folders. A rod 11 connects the arm 5 with a lever 12, that has a roll 13 in contact with a cam 14 on the cam-shaft 15. The rotation of the cam oscillates the lever, which through the rod and arm depresses and raises the plunger, Figs. 1 and 2.

The plunger has a plate 16, that is fixed to the supporting-rod or plunger-shank 7 and forms one corner of the plunger, a plate 17, that is held by a tongue and groove and screw-bolts to the plate 16 in such manner that when the bolts are loosened this plate, which forms another corner of the plunger, may be moved longitudinally of the machine, a plate 18, which forms another corner and is held by a tongue and groove and screw-bolt to the plate 17, so that when loosened it may be moved transversely thereto, and the fourth corner-plate 19, that is held by a tongue and groove and screw-bolt to the plate 16 and when its bolt is loosened is movable transversely of the plunger. To adjust the plunger to the length of the envelops to be formed, the plate 17 is moved longitudinally to the required position. As the plate 17 carries the plate 18, this movement of the former moves the latter properly. The plunger is adjusted to the width of the envelops by moving the plates

18 and 19 transversely of the plates 16 and 17, that support them, and to adjust the plunger both lengthwise and widthwise the plate 17, carrying the plate 18, is moved longitudinally and the plates 18 and 19 moved transversely. In this manner the plunger can be adjusted either lengthwise or widthwise, or both, and used in forming a large number of different sizes of envelops, Figs. 1, 2, and 6.

The blanks are brought singly by any common conveyer beneath the plunger, which is moved downwardly and depresses the blanks past the creasers to the folding-bed, upon which they are folded into envelops. The creasers are angle-plates arranged to form four vertical corners of an open box that cooperates with the plunger in creasing the blanks. The plunger is illustrated in Figs. 1 and 2 at the upper edge of the creasers.

The creaser 20 has along its upper edge a flange 21, that rests upon and is secured to a shelf 22, projecting from the conveyer-track 23, the support 24 of which is permanently fixed to the stationary plate 25 of the folding-bed that is on the table, Figs. 1, 2, and 3.

The creaser 26 has a flange 27, that rests upon and is secured to a shelf 28, projecting from the conveyer-track 29. The support 30 of this track is fastened to a slide-plate 31, that forms a part of the folding-bed. The plate 31 is movable longitudinally of the machine on a dovetail way on the stationary bed-plate 25 and is provided on its under face with a rack 32, meshing with which is a pinion 33 on the shaft, having the hand-wheel 34. The rotation of this hand-wheel through the rack and pinion moves the slide-plate, together with the conveyer-track and creaser 26, so as to adjust them to the length of the envelops to be formed, Figs. 1 and 3.

Projecting upwardly from the conveyer-track 29 and extending over the plunger is an arm 35 with an opening in its upper end. The plate 17 of the plunger is provided with a lug 36, which when the plunger is raised extends into the opening in the arm, so that when the parts are adjusted longitudinally by the hand-wheel 34 the plunger-plates 17 and 18 will be adjusted with them, Fig. 1.

The creaser 37 has a flange 38, that rests upon the shelf 28; but in this case the flange is not fastened to the shelf. The support 39 of the creaser 37 is mounted on a plate 40, that is on a plate 41, which forms another movable part of the folding-bed. A screw-bolt 42 passes through the foot of the support 39 and the plates 40 and 41 into a slot 43 in the slide-plate 31. The plate 41 is also connected with the slide-plate 31 by a tongue and groove 44. When the bolt 42 is loosened, these plates, carrying the creaser 37, are free to be moved transversely of the machine on the slide-plate 31 independently of the creaser 26 to adjust the creaser 37 to the width of the envelops to be formed; but, of course, when the plate 31 is moved by the

hand-wheel and rack and pinion, as already described, and the creaser 26 is moved longitudinally of the machine the creaser 37 will also be moved longitudinally to adjust it to the length of the envelops, Figs. 3, 4, and 5.

The creaser 45 has a flange 46 resting upon the shelf 22. In this case the creaser is not fastened to the conveyer-track, but its support 47 is mounted upon a slide-plate 48, which forms another movable part of the adjustable folding-bed. This plate 48 is held to the bed 25 by dovetail tongues and grooves 49, and on the under faces of the dovetails are rack-teeth, with which mesh pinions 50 on a shaft having a hand-wheel 51. When this wheel is rotated, the pinions and racks move the slide-plate 48, bearing the creaser 45 transversely of the machine, so as to adjust it to the width of the envelops to be formed, Figs. 2, 3, and 4.

In the back face of an upright portion of the plate 48 is a dovetail groove, and fitting this is a dovetail projecting from the edge of the plate 41, which is movable transversely upon the slide-plate 31 and carries the creaser 37. By means of this dovetail connection the plate 41, carrying the creaser 37, while free to be moved longitudinally with the slide-plate 31 and the creaser 26 when the hand-wheel 34 is turned, will be moved transversely of the machine, with the plate 48 and the creaser 45, when they are adjusted by the hand-wheel 51, Figs. 2, 3, and 5.

The end folder-flap 53, which extends from front to rear in a single piece the full width of the widest envelops to be formed, is hinged to a plate 54, that is secured to the top of the fixed plate 25 of the folding-bed. A link 55 connects the back of this flap with rocker-arms 56, that are adapted to be rocked by mechanism (not shown) common in this class of machines. When these arms are rocked, the flap 53 is oscillated, so as to fold one of the end flaps of the blank down upon the folding-surface 57 of the fixed part 25 of the bed-plate, Figs. 1 and 3. The folder-flap at the other end is formed in two parts 58 and 59. The former of these is hinged to a plate 60, that is fastened to and is moved longitudinally of the machine with the end slide-plate 31 of the bed, and the latter is hinged to the plate 40, which is movable longitudinally of the machine with the end slide-plate 31 and transversely with the slide-plate 41 when that is carried by the front slide-plate 48. A shaft 61 is loosely connected with the backs of these wings of the end flap, and connecting this with rocker-arms 62 is an extensible link 63. The arms 62 may be connected in any common manner with ordinary means (not shown) for rocking them and causing the flap-wings to oscillate and fold an end of the blank down upon the folding-surface 64 of the longitudinally-movable slide-plate 31 and surface 65 of the longitudinally and transversely movable

slide-plate 41, Figs. 1, 3, and 7. When the set-screw 66, that connects the parts of the link 63, is loosened, the flap-wings are free to be moved longitudinally of the machine as the hand-wheel 34 is turned, and the end slide-plate 31, carrying the flap-wings, also the creasers 26 and 37 and the conveyer-track 29, that is connected with the plunger-plates 17 and 18, is moved for adjusting these parts to the length of the envelopes to be formed, Figs. 1, 3, and 7.

The back folder has a rocking bed 67, that is held to the fixed bed-plate 25 by bearings 68, that are adjustable to allow for varying thicknesses of paper. A rocker-arm 69, fastened to one end of the bed 67, is adapted to be connected with any common means whereby the back folder may be oscillated. Permanently secured to the rocking bed 67 is a wing 70, and adjustably mounted upon the rocking bed is a wing 71 of the back folder-flap. The wing 71 is held in a grooved way by a screw-bolt 72, that passes through a slot 73. When this bolt is loosened, the wing 71 may be moved along the rocking bed longitudinally of the machine. Secured to the support 30 of the adjustable conveyer-track 29 is a block 74 with a curved groove, and fastened to the foot of the wing 71, so as to project into the groove, is an arc 75. This form of connection causes the wing 71 to be moved and adjusted longitudinally of the machine with the conveyer-track and other parts without interfering with the oscillation of the folder-flap, Figs. 3, 5, 7, and 8.

The front folder has a rocking bed 76, supported by bearings 77, fixed to the front slide-plate 48 of the adjustable folding-bed, so that the bed 76 will be moved transversely of the machine when the hand-wheel 51 is turned. A rocker-arm 78, that is adapted to be oscillated by any ordinary means, is attached to the end of this rocking bed, Figs. 4, 5, 7, and 8. An extensible flap-wing 79 is permanently fastened to the bed 76, and an extensible flap-wing 80 is set into a groove in the top of the plate and temporarily held in position by a screw-bolt 81. Fastened to the support 39 of the creaser 37 is a block 82 with a curved groove, and secured to the foot of the flap-wing 80, so as to extend into the groove, is an arc 83. This permits the wing 80 to be oscillated for folding, but requires it to move longitudinally of the machine with the creaser 37.

The back folder-flap has a fixed reach and the front folder-flap is made extensible, so that it can be adjusted to reach to the back flap whatever the size of the envelopes that are being formed, Figs. 1, 4, and 5.

In the mechanism shown the front flap folds the front flap of the blank down upon the surface 57 of the fixed plate 25 and the surface 65 of the movable plate 41 of the bed. Then the back flap folds the back flap of the blank over and presses it down on the front flap, so that the gummed portions will ad-

here. After this one end flap folds down and presses an end flap of the blank. Then the other end flap folds over the other end flap of the blank, thus completing the envelop, Figs. 7 and 8.

On a post 84, that depends from the table, is a sleeve 85. A link 86 connects this sleeve with a lever 87, that is raised by a spring 88 and depressed by a cam 89 on the cam-shaft. The sleeve bears a horizontally-extending plate 90. A vertical plate 91 is fixed to one end of the horizontal plate, and a vertical plate 92 (that is broken off in the drawings) is movably mounted upon the horizontal plate near the other end. These plates 91 and 92 extend upwardly through slots 93 in the parts of the folding-bed and after a blank has been folded they are raised through these slots, so as to lift the folded blank from the folding-bed into the plane of movement of the pusher, Figs. 1, 2, and 3.

When the lifter-plates are elevated, the movement longitudinally of the end slide-plate 31 causes the movement with it of the lifter-plate that is loosely supported by the horizontally-extending plate 9, Figs. 1, 2, and 3.

Slides 94 are located in ways that extend horizontally in the side faces of the conveyer-tracks 23 and 29, and projecting from these are plates 95. Links 96 connect these plates with rocker-arms 97. One of these rocker-arms is fixed to the shaft 98, while the other rocker-arm, which is connected with the slide supported by the movable conveyer-track, is loosely mounted upon the shaft 98. A rocker-arm 99, fixed to the shaft 98, is through a rod 100 adapted to be oscillated by a cam 101 on the cam-shaft. Fastened to the plates 95 and projecting forwardly are the pusher-fingers 102. After a folded blank has been raised by the lifter-plates the pushers are moved by the cam and connections so as to thrust the blank forward until it is caught by the pair of rolls 103, which press and feed the now-formed envelop to other parts of the machine, Figs. 1, 2, and 3.

The bearings for the rolls 103 are mounted one above the other on the transversely-movable plate 48 of the bed. The shaft of the lower roll is provided at one end with a driving-pulley 104 and at the other end with a gear 105, that meshes with a gear 106 on the shaft of the upper roll, Fig. 4. These rolls revolve continuously and pass the envelopes as they are received from the pushers to a box or to conveyers, as desired, Figs. 2 and 5.

A blank conveyed into position is depressed by the downward movement of the plunger past the creasers, which turn up the flaps, to the folding-bed. After the plunger has been lifted the front folder oscillates and folds down the front flap, and the back folder oscillates and folds the back flap over and presses it down on the front flap, so that the gummed parts of these flaps will adhere.

Then an end flap is folded down and pressed, and afterward the fly-flap is folded over, the machine shown being designed for forming envelops that open at one end. After the
5 folders have operated the lifter-plates raise the envelop from the folding-bed into the path of the pushers, which then advance the envelop to the rolls.

By turning the hand-wheel 34 the slide-
10 plate 31 of the folding-bed is moved longitudinally, and when this slide-plate moves the folding-surfaces 64 and 65 of the bed the wings 58 and 59 of the end folder-flap, the movable wing 71 of the back folder-flap, the
15 wing 80 of the front folder-flap, the conveyer-track 29, the creasers 26 and 37, the pusher connected with the movable track, the plunger-plates 17 and 18, and the movable lifter-plate are adjusted simultaneously longitudi-
20 nally of the machine, according to the length of the envelops to be formed. By turning the hand-wheel 51 and moving the plate 48 both wings 79 and 80 of the front folder-flap, the wing 59 of the end folder-flap, the fold-
25 ing-surface 52 of the plate 48, the folding-surface 65 of the plate 41, the creasers 37 and 45, and the rolls 103 may be adjusted transversely of the machine, according to the width of the envelops.

30 I claim as my invention—

1. In combination with the folding mechanism of an envelop-machine, a plunger having an operative surface formed by a plate, two plates movably supported by that plate
35 and adapted to be moved respectively along lines at right angles to each other, and a plate supported by one of the two plates and adapted to be moved at right angles to the direction of movement of the plate by which it is
40 supported, whereby the extent of plunger-surface may be varied both lengthwise and widthwise, substantially as specified.

2. In combination with the folding mechanism of an envelop-machine, a plunger having a plate with a relatively-fixed corner, a plate supported by the fixed corner-plate so that its corner is movable longitudinally of the machine, a plate supported by the fixed corner-plate so that its corner is movable
45 transversely of the machine, and a plate supported by one of the movable corner-plates so that its corner is movable both longitudinally and transversely of the machine whereby the distance from each other of the corners of the plunger may be varied both
55 lengthwise and widthwise, substantially as specified.

3. In combination with the folding mechanism of an envelop-machine, a supporting-frame, a bearing adjustably supported by the frame, a plunger-shank movably held by the adjustable bearing, a plate connected to the plunger-shank, a plate supported by the plate connected with the plunger-shank and movable longitudinally with relation thereto, a
65 plate supported by and movable with the

longitudinally-movable plate, and also movable transversely independent thereof, and a plate supported by the plate connected with the plunger-shank and movable transversely thereto, whereby the area of the plunger may be varied and the position of the shank changed for plungers of different sizes, substantially as specified.

4. In combination with the adjustable folding-flaps of an envelop-machine, a creaser-box located above the folder-flaps and having a fixed corner, a corner that is movable longitudinally of the box, a corner that is movable longitudinally and transversely of the
80 box, and a corner that is movable transversely of the box whereby the area outlined by the corners of the creaser-box may be varied lengthwise and widthwise, substantially as specified.

5. In combination with the adjustable folding-flaps of an envelop-machine, a creaser-box having four substantially vertical walls above the folding-flaps, the parts forming the front wall being movable toward and from
90 the parts forming the back wall and the parts forming one end wall being movable toward and from the parts forming the other end wall, whereby the cross-sectional area of the creaser-box may be varied, substantially as
95 specified.

6. In combination with the adjustable folding-flaps of an envelop-machine, a creaser-box located above the folder-flaps and formed of four angular parts, one angular part being
100 fixed, one angular part being movable longitudinally of the machine toward and from the fixed part, one angular part being movable transversely of the machine toward and from the fixed part and one angular part being
105 movable longitudinally of the machine toward and from the transversely-movable part and also movable transversely toward and from the longitudinally-movable part, substantially as specified.

7. In combination with the folding mechanism of an envelop-machine, an end folder-flap formed of a single part, an end folder-flap formed of two parts that are both adjustable toward and from the single end flap, a back
115 flap formed of two parts, one of which is connected with the adjustable end flap so as to move with it toward and from the single end flap, and a front flap formed of two parts both of which are connected with one part of
120 the adjustable end flap so as to move with it toward and from the back flap while one part of the front flap is connected with the adjustable end flap so as to move with it toward and from the single end flap, substantially as
125 specified.

8. In combination with the folding mechanism of an envelop-machine, an end folder-flap held by a plate that is fixed to the bed of the machine, an end folder-flap formed of two
130 parts, one of which is mounted upon a plate movable longitudinally of the machine while

the other is mounted upon a plate that is placed upon the longitudinally-movable plate so as to be moved transversely of the machine, a back folder-flap formed of two parts, one of which is mounted upon a plate fixed to the bed of the machine while the other is connected to a plate that is movable upon the fixed plate longitudinally of the machine, and a front folder-flap formed of two parts, one of which is mounted upon a plate that is movable transversely of the machine while the other is connected to a plate that is placed upon the transversely-movable plate so as to move longitudinally of the machine, substantially as specified.

9. In combination with the folding mechanism of an envelop-machine, an end folder-flap of fixed length held against movement longitudinally of the machine, a back folder-flap of adjustable length held against movement transversely of the machine, an end folder-flap of adjustable length movable longitudinally of the machine, and a front folder-flap of adjustable length movable transversely of the machine, substantially as specified.

10. In combination with the folding mechanism of an envelop-machine, an end folder-flap of fixed length held against movement longitudinally of the machine, an end folder-flap of two parts, one of which is only movable longitudinally of the machine and the other is movable both longitudinally and transversely of the machine, a back folder-flap formed of two parts both of which are immovable transversely of the machine but one is movable longitudinally of the machine with the longitudinally-movable end flaps, and a front folder-flap formed of two parts, both of which are movable together transversely of the machine with the transversely-movable part of the end flap, while one is also movable longitudinally of the machine with such longitudinally-movable end flap, substantially as specified.

11. In combination with the folding mechanism of an envelop-machine, an end folder-flap formed with a single wing, an end folder-flap formed with two wings, one of which is mounted upon a slide that is movable longitudinally of the machine and the other is mounted upon a slide that is movable transversely of the machine and is placed upon the longitudinally-movable slide, a back folder-flap formed with two wings, one of which is fixed while the other is movable longitudinally of the machine, and a front folder-flap that is formed of two wings, both of which are mounted upon a slide movable transversely of the machine while one is also movable longitudinally of the machine toward and from the other, substantially as specified.

12. In combination with the adjustable folding mechanism of an envelop-machine, a folder-bed having a fixed folding-surface, a folding-surface that is movable longitudinally of the machine toward and from the

fixed surface, and a folding-surface that is movable transversely of the machine toward and from the fixed and the longitudinally-movable surfaces, whereby the extent of folding-surfaces may be varied, substantially as specified.

13. In combination with the adjustable folding mechanism of an envelop-machine, a folding-bed having a fixed folding-surface, a surface that is movable longitudinally of the machine toward and from the fixed surface, said longitudinally-movable surface being formed of two parts, one of which is also movable transversely of the machine, and a surface movable transversely of the machine, substantially as specified.

14. In combination with the adjustable folding mechanism of an envelop-machine, a folding-bed having a fixed folding-surface, a slide having a folding-surface movable longitudinally of the machine upon the fixed bed, a slide having a folding-surface movable transversely of the machine upon the longitudinally-movable slide, and a slide having a folding-surface movable transversely of the machine upon the bed and connected with the slide that is movable transversely of the machine upon the longitudinally-movable slide, substantially as specified.

15. In an envelop-folding mechanism, a vertically-movable plunger that is adjustable longitudinally and transversely of the machine, a creaser-box through which the plunger passes, that is adjustable longitudinally and transversely of the machine, four folder-flaps that are adjustable longitudinally and transversely of the machine below the creaser-box, a bed having a folding-surface that is adjustable longitudinally and transversely of the machine below the folder-flaps, a vertically-movable lifter, a horizontally-movable pusher, and connections between the plunger and the creaser-box, and between the creaser-box and the folder-flaps, and between the bed and the folder-flaps, and between the bed and the lifter whereby the parts are adjustable together, substantially as specified.

16. In an envelop-folding mechanism, in combination, a vertically-movable adjustable plunger, a creaser-box that is adjustable longitudinally and transversely of the machine, folder-flaps that are adjustable longitudinally and transversely of the machine, a bed having a folding-surface that is adjustable longitudinally and transversely of the machine, connections between the folding-bed and folders and creasers, whereby they may be adjusted longitudinally or transversely of the machine simultaneously, a vertically-movable lifter, and a horizontally-movable pusher, substantially as specified.

17. In an envelop-folding mechanism, in combination, a vertically-movable plunger that is adjustable longitudinally and transversely of the machine, a creaser-box that is adjustable longitudinally and transversely of

the machine, four folder-flaps that are adjustable longitudinally and transversely of the machine, a bed having a folding-surface that is adjustable longitudinally and transversely
5 of the machine, connections between the folding-bed and folders and creasers and between the creasers and plunger, whereby they may be adjusted longitudinally or transversely simul-

taneously of the machine, a vertically-movable lifter, and a pusher movable transversely 10 of the machine, substantially as specified.

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