

W. S. METCALFE.
 ENVELOP BLANK PUNCHING MACHINE.
 APPLICATION FILED JULY 13, 1906.

908,116.

Patented Dec. 29, 1908.

4 SHEETS—SHEET 1.

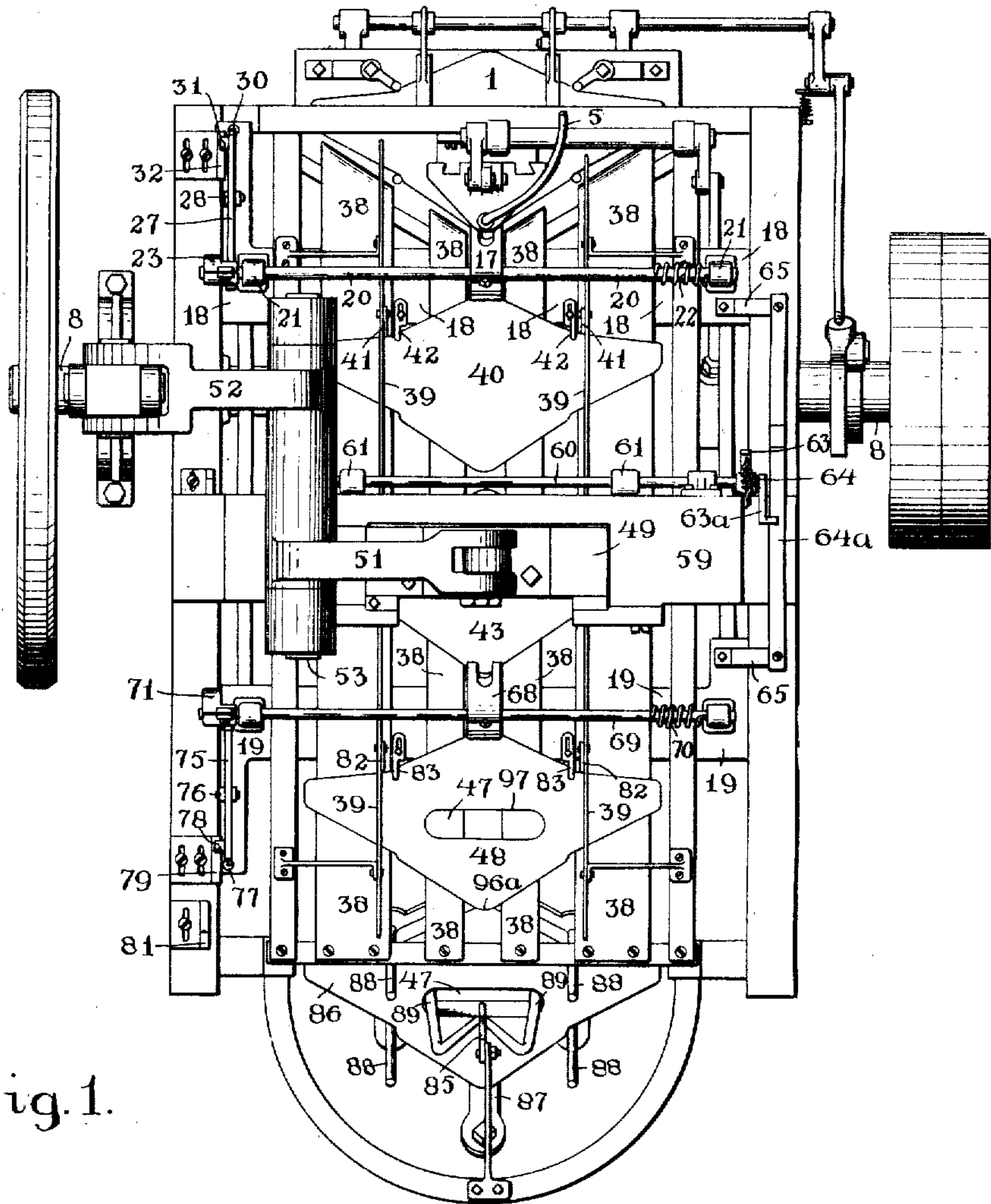


Fig. 1.

Witnesses

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Envelope Komberbach.

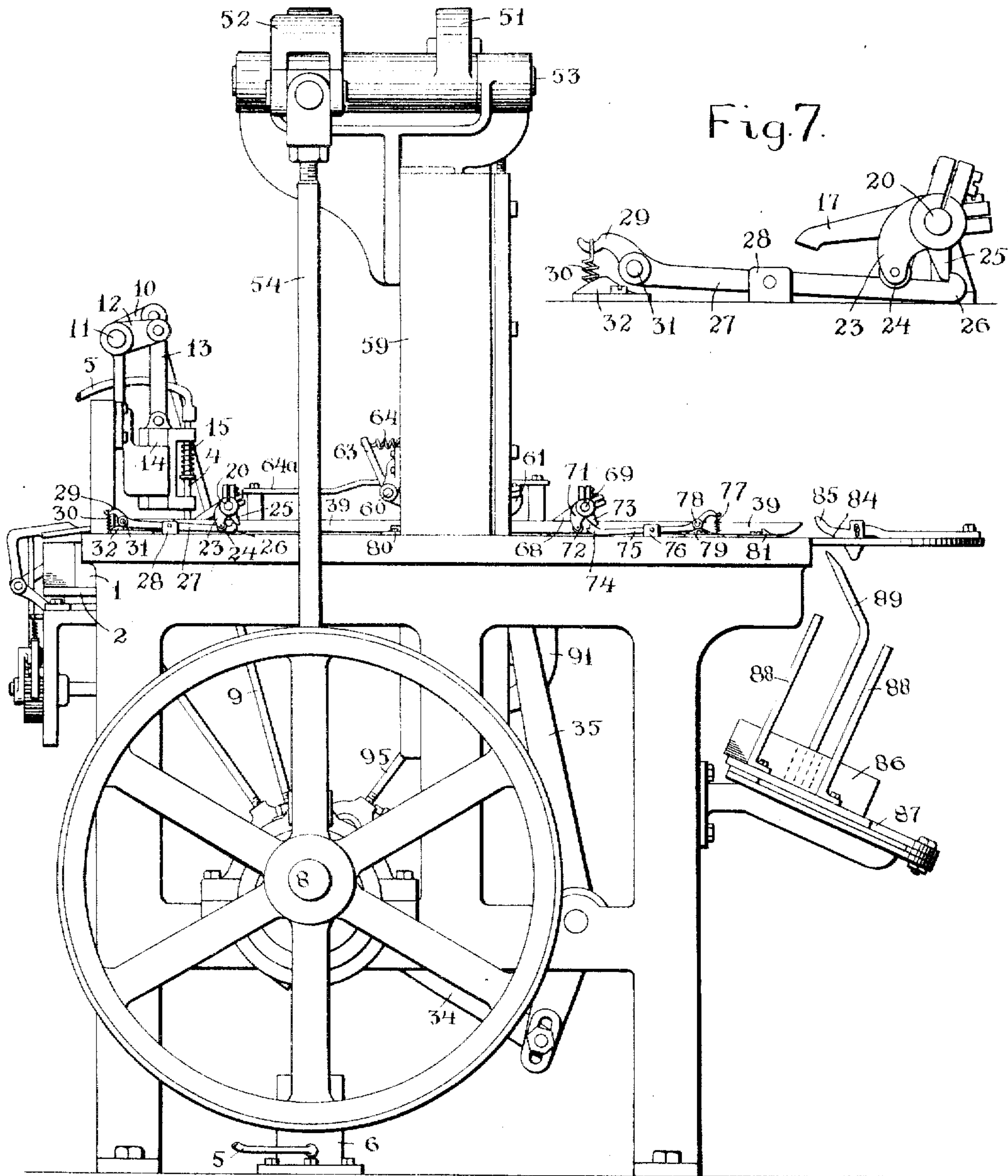
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4 SHEETS—SHEET 2.



Witnesses

Ray D. Tolman.
Enelope Comberbach.

Fig. 2.

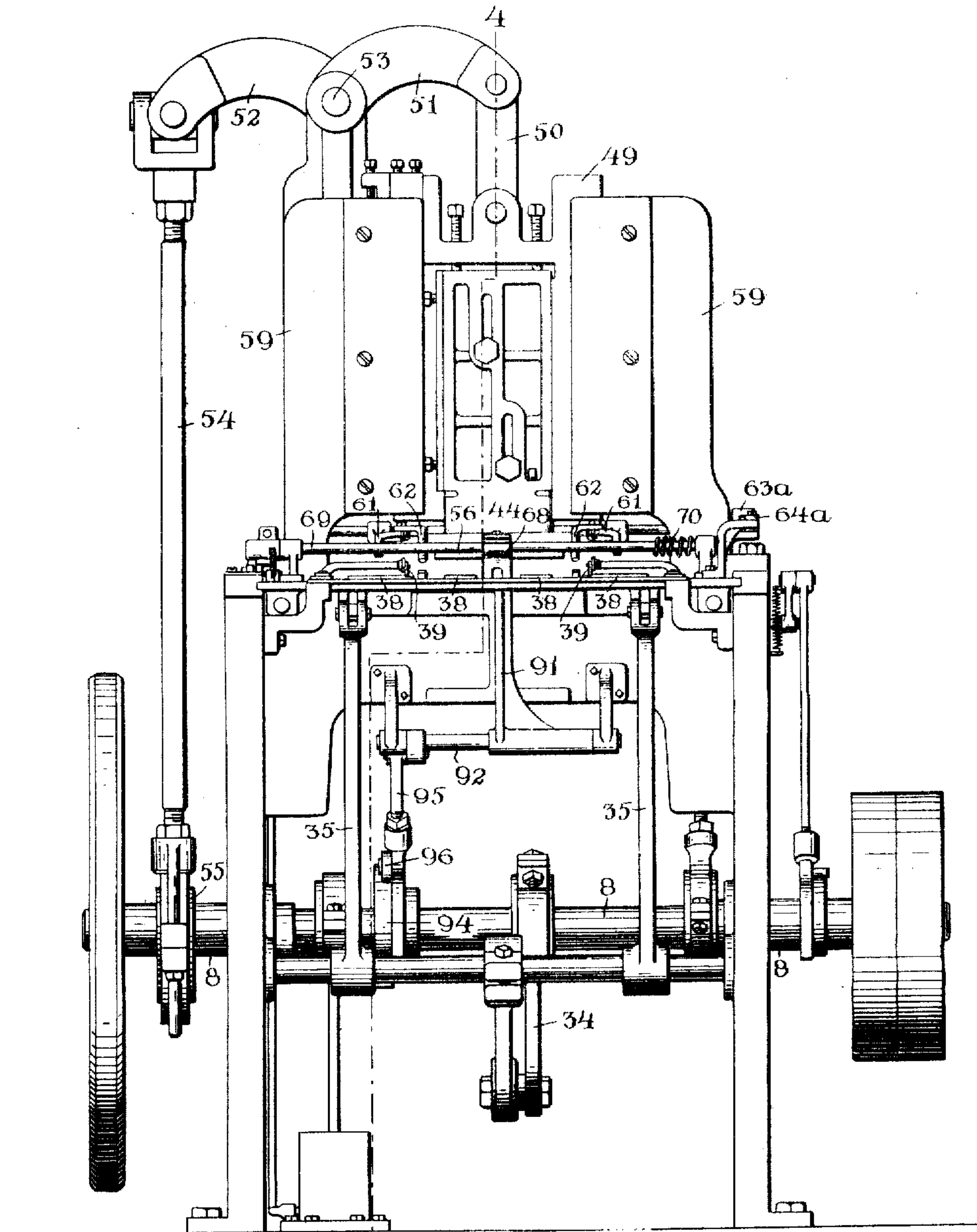
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4 SHEETS—SHEET 3.



Witnesses

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Penelope Comberbach

Fig. 3.

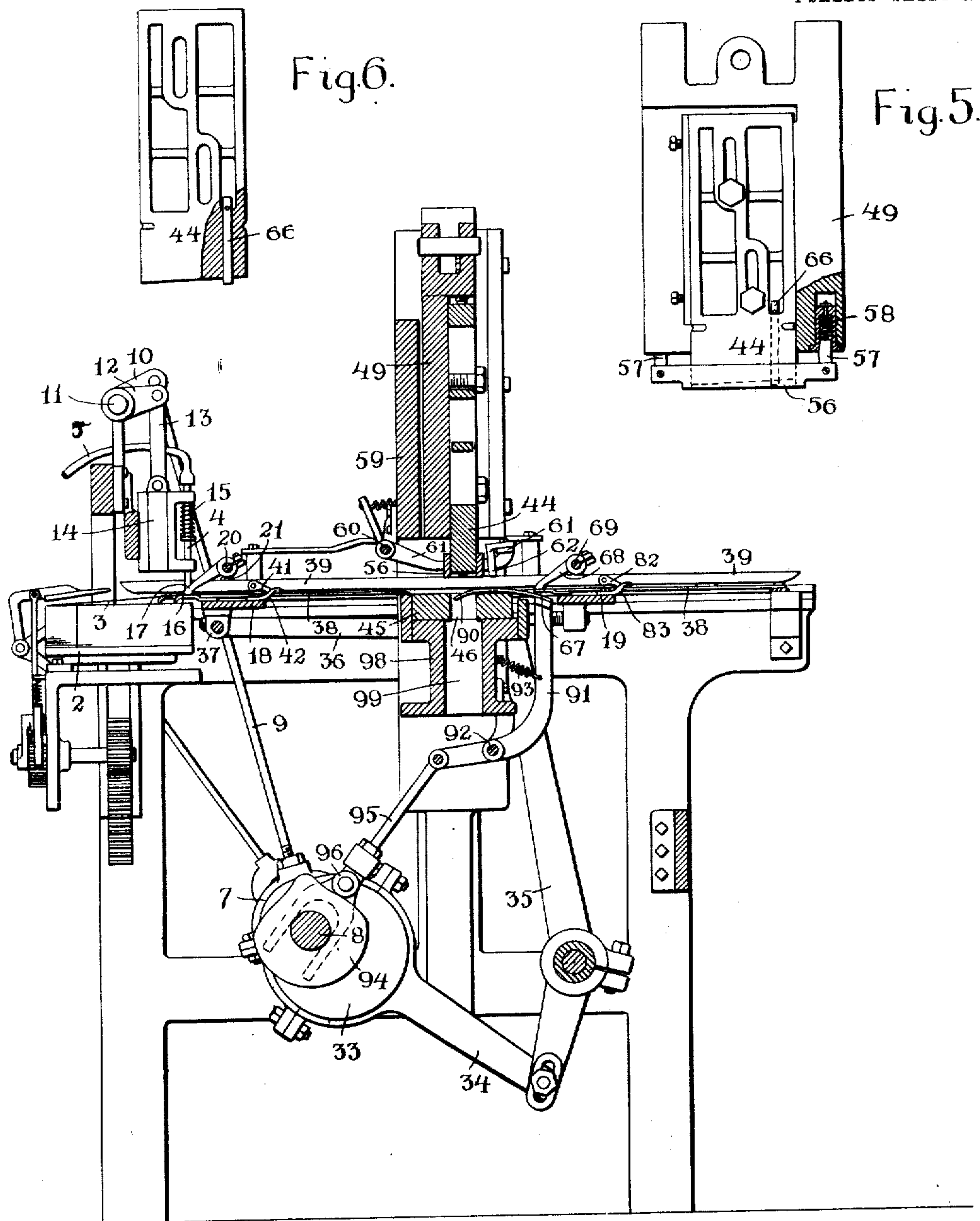
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4 SHEETS—SHEET 4.



Witnesses

Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM S. METCALFE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO UNITED STATES ENVELOPE COMPANY, OF SPRINGFIELD, MASSACHUSETTS, A CORPORATION OF MAINE.

ENVELOP-BLANK-PUNCHING MACHINE.

No. 908,116.

Specification of Letters Patent.

Patented Dec. 29, 1908.

Application filed July 13, 1906. Serial No. 326,055.

To all whom it may concern:

Be it known that I, WILLIAM S. METCALFE, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Envelop-Blank-Punching Machines, of which the following is a specification accompanied by drawings, forming a part of the same, in which—

Figure 1 represents a plan view of a machine embodying my invention. Fig. 2 is a side elevation. Fig. 3 is a rear elevation. Fig. 4 is a vertical sectional view on the plane of the broken line 4—4, Fig. 3. Fig. 5 is a detached view of the reciprocating punch and blank holding mechanism. Fig. 6 is a detached view, partly in section, of the punch, and Fig. 7 is an enlarged view of one of the gripping jaws and tripping lever.

Similar reference letters and figures refer to similar parts in the different views.

My present invention relates to a machine for forming an opening in the body portion of an envelop blank before the latter is folded in order to disclose an address placed upon an inclosure in the completed envelop, and it consists in the construction and arrangement of parts as hereinafter described and specifically pointed out in the annexed claims, by which the operation of forming the opening in the envelop blank can be expeditiously, cheaply and accurately performed.

The machine embodying my present invention comprises means for feeding an envelop blank to the operation of the machine, accurately registering the blank to determine the position of the opening in the body portion of the blank, forming an opening in the blank by means of a reciprocating punch and die, controlling the movement of the envelop blank past the punching mechanism and assembling the punched blanks preparatory to their removal to an envelop making machine.

The envelop blanks to be operated upon having been cut into proper shape to form an envelop when folded, are presented to the machine in a pile or stack each supported upon a feed table 2, to which an intermittent upward motion is given by means of suitable feeding mechanism, such as that now commonly employed in envelop machines, but not described herein in detail, as it forms no part of my present invention.

One edge of the uppermost blank in the pile 1 is periodically lifted, as shown at 3, Fig. 4, by means of a reciprocating tubular suction plunger 4, connected by a flexible tube 5 with an air pump 6, shown at the bottom of Fig. 2. A reciprocating motion is given to the suction plunger 4 by means of an eccentric 7 on the main driving shaft 8, said eccentric being connected by a rod 9 and radial arm 10 with a rocking shaft 11, upon which is carried an arm 12 connected by a link 13 with a sliding head 14, carrying the plunger 4, which itself is capable of a sliding vertical movement within the head 14 against the tension of a spiral spring 15 which allows the plunger 4 to exert a yielding pressure upon the envelop blank at the end of its downward stroke when a vacuum is produced within the plunger by means of the air pump 6, causing the edge of the envelop blank to adhere to the plunger and be lifted with it at its next upward movement. When the uppermost blank has been lifted, into position shown at 3, Fig. 4, a pair of gripping jaws consisting of a stationary jaw 16 and a movable jaw 17 are advanced to inclose the raised edge of the envelop blank when the movable jaw is released and made to close upon the envelop blank as shown in Fig. 4. The gripping jaws 16 and 17 are supported upon a horizontally reciprocating carriage comprising the cross bars 18 and 19. The stationary jaw 16 is attached to the cross bar 18 and the movable jaw 17 is clamped upon a rocking shaft 20 journaled in stands 21, 21, mounted upon the reciprocating carriage. The shaft 20 is provided with a torsional spring 22, the tension of which is applied to the shaft 20 to close the movable jaw 17 upon the stationary jaw 16. Clamped upon one end of the shaft 20 is an arm 23 provided with a cam roll 24, and projecting from the rear side of the arm 23 is a pawl 25 adapted to be engaged by the hooked end 26 of a tripping lever 27, pivoted on a stand 28 and having its opposite end 29 connected by a spiral spring 30 with the frame of the carriage.

The tripping lever 27 carries a cam roll 31 arranged to run upon an inclined cam track 32 in order to rock the tripping lever against the tension of the spring 30 and release the pawl 25 from the hooked end 26 of the tripping lever to allow the tension of the torsional spring 22 to rock the lever 27, and close the movable jaw 17 upon the fixed jaw

16, and seize the raised edge of the envelop blank as represented in Fig. 4. A reciprocating movement is then given to the carriage by means of an eccentric 33 on the main driving shaft 8, said eccentric being connected with the carriage by means of a link 34, rocking lever 35, and link 36, which is pivotally connected with a lug 37 on the under side of the cross bar 18. By this rearward reciprocation of the carriage the envelop blank is drawn over the top of a pair of supporting strips 38 and beneath horizontal rails 39 into an intermediate position between the feed table and the punching die, as represented by the envelop blank 40, Fig. 1, when the carriage is returned to seize the next succeeding blank held upon the feed table. This reciprocation of the carriage completes the first movement of the envelop blank and deposits it in the position of the blank 40, Fig. 1, immediately at the rear of a pair of engaging pawls 41 pivoted to the sides of the horizontal rails 39 which check the reverse movement of the envelop blank 40 as the carriage again moves forward to seize the next succeeding blank held on the feed table 2. At the next reciprocating movement of the table the blank 40 is engaged by a pair of dogs 42 adjustably held upon the cross bar 18 of the carriage and moved from the second position to the third position, as shown by the blank 43, Fig. 1, and in proper position between a reciprocating punch 44 and a die 45 having an opening 46 corresponding in shape and size with the desired hole 47 shown in the body of the envelop blank 48, Fig. 1, said die 45 being accurately fitted to the reciprocating punch 44. The reciprocating punch is adjustably attached to a vertically reciprocating gate 49 connected at its upper end by a link 50, arms 51 and 52, rocking upon a shaft 53, and an eccentric rod 54 with an eccentric 55 on the main driving shaft 8. The reciprocating punch 44 is inclosed at its cutting end by a yielding stripping sleeve 56 supported upon pins 57 sliding in the gate 49 and pressed downward by springs 58 to cause the sleeve 56 to exert a yielding pressure upon the upper surface of the envelop blank 43 and hold it firmly against the upper surface of the die 45. Journaled upon one side of the upright frame 59 which supports the sliding gate 49 is a rocking shaft 60 carrying a pair of swinging arms 61, to the free ends of which are attached the angular gage plates 62. Attached to the rocking shaft 60 is an arm 63 connected by a spiral spring 64 to the upright frame 59, with the tension of the spring applied to rock the shaft 60 and depress the free ends of the swinging arms 61, in order to carry the gage plates 62 down upon the die 45 in position to contact with the advancing edge of the envelop blank and serve as stops to secure the accurate registration of the blank beneath the punch 44. At-

tached to the end of the rocking shaft 60 is a crank arm 63^a which rests upon the cam bar 64^a. The cam bar 64^a is supported by brackets 65, 65, attached to the cross bars 18 and 19 of the carriage, causing the cam bar 70 to be moved beneath the crank arm 63^a at the reciprocation of the carriage in order to periodically raise and lower the gage plates 62.

In the third position of the envelop blank, shown at 43, Fig. 1, the hole 47 is punched, and as the punch rises, the piece cut from the envelop blank is removed from the clamping sleeve 56 by a clearing pin 66 carried by the reciprocating punch. After the completion of the punching operation, the blank in position 43 is again seized by a gripping mechanism, consisting of a stationary jaw 67 and a movable jaw 68, the former being attached to the cross bar 19 and the latter carried upon a rocking shaft 69, which is provided with a torsional spring 70 in order to close the movable jaw 68 upon the stationary jaw 67. The rocking shaft 69 also carries at one end an arm 71 provided with a cam roll 72 and a pawl 73, adapted to be engaged by the notched end 74 of a tripping lever 75, pivoted on a stud 76, and having at its opposite end a spring 77 and a cam roll 78 which rides upon a cam surface 79 to rock the lever 75 against the tension of the spring 77 and release the pawl 73 to allow the gripping jaws to close. The gripping mechanism mounted upon the rocking shaft 69 and comprising the tripping lever 75 is substantially like the gripping mechanism previously described as carried upon the rocking shaft 20. As the carriage moves to the right, Fig. 2, the cam roll 24 is brought into contact with a stop 80 which rocks the shaft 20, carrying the pawl 25 into position to be engaged by the hook 26 of the tripping lever 27, which opens the gripping jaw 17 and holds it open until the cam roll 31, riding upon the cam track 32, releases the pawl and allows the jaws to close. Similarly the rearward movement of the carriage will carry the cam roll 72 against a stop 81 which rocks the shaft 69 and carries the pawl 73 into position to be engaged by the notched end 74 of the tripping lever 75, thereby opening the jaw 68 and holding it open until the reverse movement of the carriage has been completed. By the reciprocating motion of the carriage the punched envelop blank is carried from position 43 to position 48 where it is engaged by a pair of pivoted pawls 82, 82, pivoted to the sides of the rails 39. The pawls 82 prevent the return movement of the envelop blank as the carriage is reversed, leaving the blank in the position 48 with its rear edge engaged by a pair of dogs 83 adjustably attached to the cross bar 19 of the carriage. At the

next succeeding rearward movement of the carriage the dogs 83 carry the punched envelop blank beyond the supporting plates 38 and against the upwardly curved end 5 85 of a bar 84 which turns the envelop downward and delivers it upon a stack 86 supported upon a receiving table 87. In the stack 86 the envelop blanks are retained between stakes 88 and as the 10 envelop is delivered to the stack its opening 47 passes over the curved guide rods 89.

As the envelop blanks pass over the opening 46 in the die 45 the advancing edge of the envelop blank is prevented 15 from drooping and engaging the edge of the opening 46 in the die by means of a guard plate 90, which is carried upon the upper end of a swinging lever 91 having a rocking motion on a shaft 92. The guard 20 plate 90 is brought over the opening 46 in the position shown in Fig. 4, by the tension of a spring 93 connecting the swinging lever 91 with the framework of the machine, and the motion of the guard plate 90 is 25 reversed by means of a cam 94 carried on the main driving shaft 8, said cam actuating the swinging lever by means of a link 95 and cam roll 96.

In the operation of the machine the 30 guard plate 90 is given two movements over the opening 46 during the passage of each envelop blank over the opening. The first movement is to prevent the advancing tip 96^a of the envelop blank, Fig. 1, from 35 striking the edge of the opening, and the second movement is to prevent the edge 97 of the punched hole 47 from striking the edge of the opening. The punch 44 rests upon a cross beam 98 which is provided 40 with a central opening 99 to allow the pieces cut from the envelop blanks to pass downward.

The operation of the machine is as follows:—

A stack of envelop blanks 1 are fed to the 45 machine on the feed table 2, one edge of the topmost blank is raised by the suction plunger 4 and seized by the first set of gripping jaws to carry the envelop into position of the blank 40, Fig. 1. In this position its reverse movement is prevented by 50 the pawls 41 as the carriage is reversed. At the next movement of the carriage the dogs 42 carry the blank into the position of the blank 43 with its advancing edge 55 against the angular gage plates 62. By the release of the envelop by the first gripping jaws and its subsequent movement by the dogs 42 against the gage plates 62 the envelop is allowed to square itself and be brought 60 into perfect registration with the reciprocating punch 44 which descends to cut the hole 47. From this third position of the envelop blank it is carried forward by the second pair of gripping jaws into the fourth 65 position, or that of the envelop blank 48,

and from this position it is moved by the dogs 83 into the fifth position upon the stack 86, each of the blanks when completed being retained between the stakes 88 and strung 70 upon the curved guide rods 89. At each passage of an envelop blank over the die 45 a guard plate 90 is swung over the opening 46 twice, once to lift the advancing tip 96 of the envelop blank, and the second to lift 75 the advancing edge 97 of the hole in the blank and prevent their engagement with the die. Between these two movements of the guard plate 90 and while it is removed from the die by the action of the cam 94 the punch 44 descends carrying the strip- 80 ping sleeve 56 against the envelop blank to hold it firmly upon the upper surface of the die while the continued movement of the punch 44 cuts a piece from the body portion of the envelop blank to form the hole 47. 85

During the movement of the envelop blanks a rising and falling motion is imparted to the gage plates 62 to bring them into contact with the die at the proper period to register the blank which is being 90 punched, and this is effected by means of the traveling cam bar 64^a as it passes beneath the crank arm 63^a. During the operation of the machine, therefore, each envelop blank makes four successive move- 95 ments and occupies five separate positions, as follows:— First, upon the feed table 2; second, the position of blank 40 where it has been released from the gripping jaws and is allowed to be straightened and brought 100 into registration for the operation of punching; third, the position of blank 43 with its advancing edge held by the angular gage plates 62 and its rear edge engaged by the dogs 42; fourth, in the position of blank 48 105 where it is again released from the second pair of gripping jaws and is engaged by the delivery dogs 83, and fifth, in the stack 86.

I claim,

1. In a machine of the character described, 110 the combination of a supporting table for a pile of envelop blanks, means for raising the edge of the uppermost blank in the pile, a pair of gripping jaws for seizing the raised edge of the blank, means for moving said 115 jaws to carry the blank into its second position, means for releasing the jaws, means for preventing the return of the envelop blank, dogs for pushing the rear edge of the blank and moving it into its 120 third position, means for registering the blank, means for punching the blank, and means for delivering the punched blank into a stack, and means for registering the blanks 125 in the stack.

2. In a machine of the character described, a support for a pile of envelop blanks, means for feeding a blank to a punching mechanism, a punching mechanism, a pair of pushing 130 dogs for engaging one edge of the blank, a

pair of gage plates for engaging the opposite edge of the blank, and means for moving the gage plates out of the path of the envelop.

3. In a machine of the character described, 5 a support for an envelop blank as it is presented to the machine, a reciprocating carriage, gripping jaws on said carriage, means for actuating said jaws to seize and release an envelop blank, means for checking the 10 reverse movement of the blank, dogs on said carriage for continuing the movement of the blank to the punching mechanism, a punching mechanism, a pair of gage plates for engaging the advancing edge of the blank, 15 and means for moving the gage plates out of the path of the envelop.

4. In a machine of the character described, a support for an envelop blank as it is presented to the machine, means for feeding 20 ing the blank to a punching mechanism, a punching mechanism, consisting of a die and a reciprocating punch, and a reciprocating plate for lifting the blank above the opening in the die during the movement of the blank.

25 5. In a machine of the character described, a support for an envelop blank, a punching mechanism comprising a reciprocating punch and a die, means for feeding said blank over said die, a movable guard plate and means 30 for interposing said guard plate between the blank and the opening in said die during the feeding of the blank over said die, and means for withdrawing said guard plate as said punch descends.

35 6. In a machine of the character described, the combination with a punching mechanism, consisting of a reciprocating punch and a die, of means for moving an envelope blank between the punch and die preparatory to 40 punching the blank, a guard plate, means for interposing the guard plate between the die and the advancing edge of the blank during the movement of the blank, means for withdrawing the guard plate, means for 45 reciprocating the punch, means for again interposing said guard plate between the blank and the opening in the die, and means for withdrawing the blank from the punching mechanism.

50 7. In a machine of the character described, the combination with a punching mechanism for punching a hole in the body of an envelop blank, and consisting of a reciprocating 55 punch and a die, of a curved guard plate, a swinging arm by which said guard plate is moved in the arc of a circle, means for moving a blank between the punch and die, means for withdrawing the blank, and 60 means for imparting a double swinging movement to said guard plate at each movement of an envelop blank over the die.

8. In a machine of the character described, the combination with a punching mechanism consisting of a reciprocating punch and a 65 die, of a curved guard plate, and means for

periodically moving said guard plate over a portion of said die with its curved end entering the opening in the die.

9. In a machine of the character described, the combination with a support for an 70 envelop blank as it is presented to the machine, and a reciprocating carriage, of gripping mechanism held on said carriage, and consisting of a stationary jaw, a movable jaw, a spring to close said movable jaw, 75 means for opening the jaw to release the blank, a tripping lever for holding the movable jaw open, and means for actuating said tripping lever to allow the movable jaw to close.

80 10. In a machine of the character described, the combination of means for supporting an envelop blank, means for feeding said blank to a punching mechanism, means for registering said blank with the 85 punching mechanism, said feeding means arranged to stop the feeding movement as soon as said blank is brought into said registration, means for punching a hole in said blank, means for withdrawing said 90 blank from said punching mechanism, and means for assembling the punched blanks.

11. In a machine of the character described, the combination of the following 95 instrumentalities acting in the sequence named, means for supporting an envelop blank, means for presenting the blank to gripping mechanism, means for moving the gripping mechanism, means for releasing 100 the blank from the gripping mechanism, means for squaring the blank with its line of movement and registering it with a punching mechanism, means for punching a hole in the blank, means for withdrawing 105 the blank from the punching mechanism, and means for assembling the punched blanks.

12. In a machine of the character described, the combination with feeding and 110 punching mechanism, of means for assembling the punched envelopes and comprising a swinging support for the punched envelopes, a pair of curved guide rods adapted to enter the holes in the envelopes, and stakes 115 for registering the envelopes as they are assembled.

13. In a machine of the character described, the combination of means for supporting an envelop blank, reciprocating 120 means for feeding said blank to a punching mechanism, a stop arranged to register said blank with said punching mechanism, means for withdrawing said blank from said punching mechanism, and means for assembling said blanks.

Dated this 10th day of July 1906.

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Witnesses:

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