

No. 768,484.

PATENTED AUG. 23, 1904.

S. D. RUTH.

PAPER CUTTING AND FOLDING MACHINE.

APPLICATION FILED DEC. 19, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

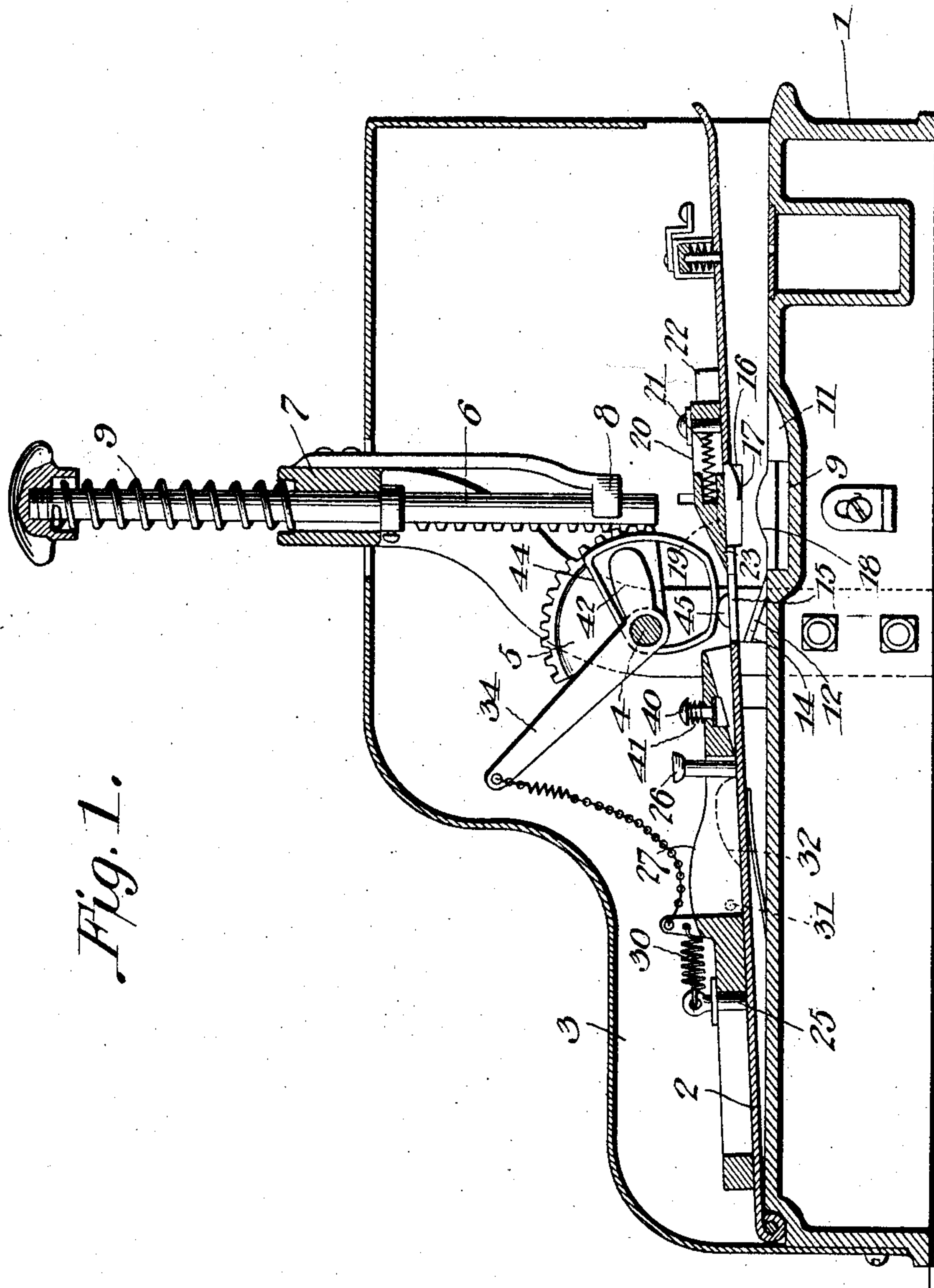


Fig. 1.

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Witnesses

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Jno. E. Parker

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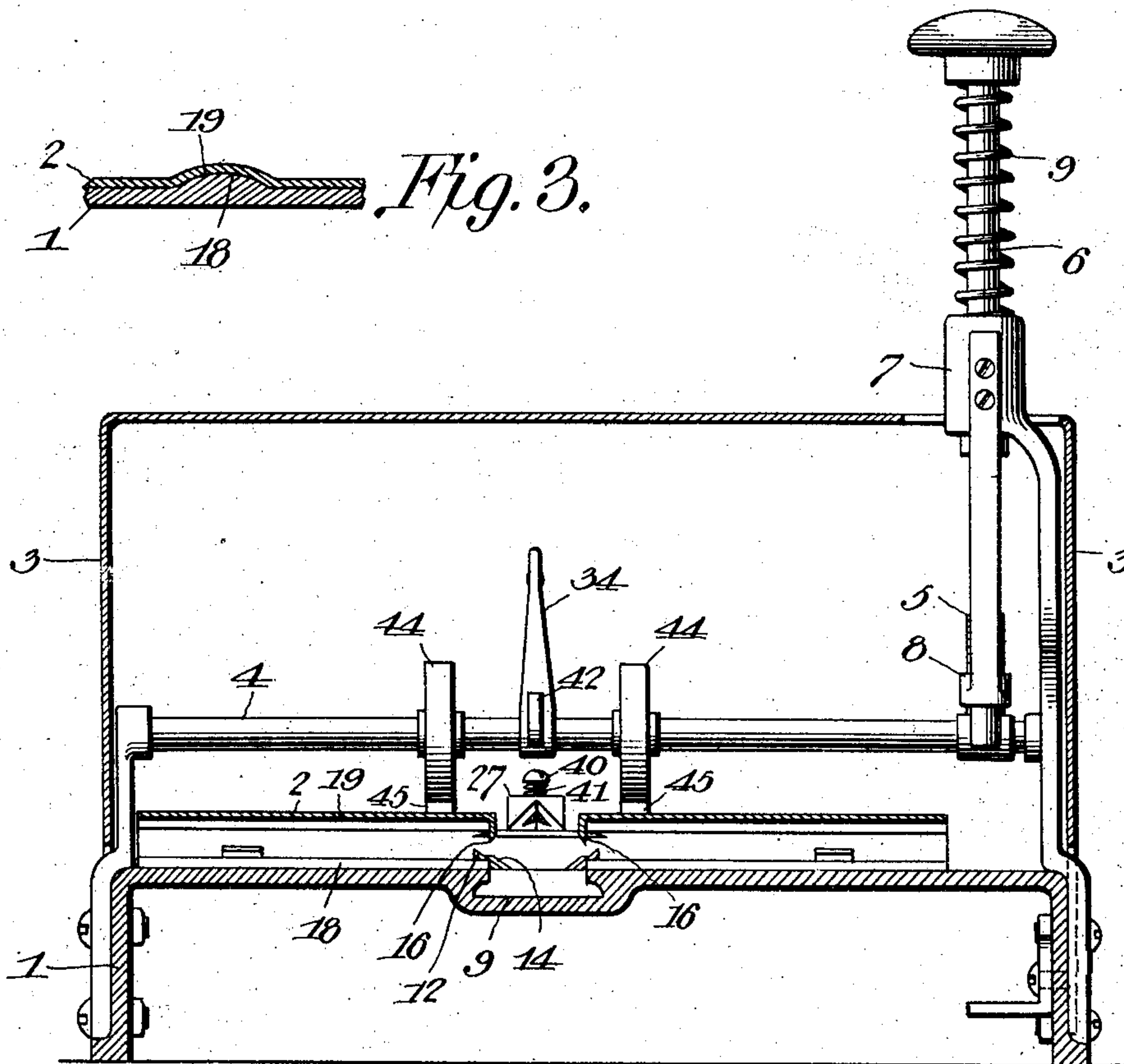
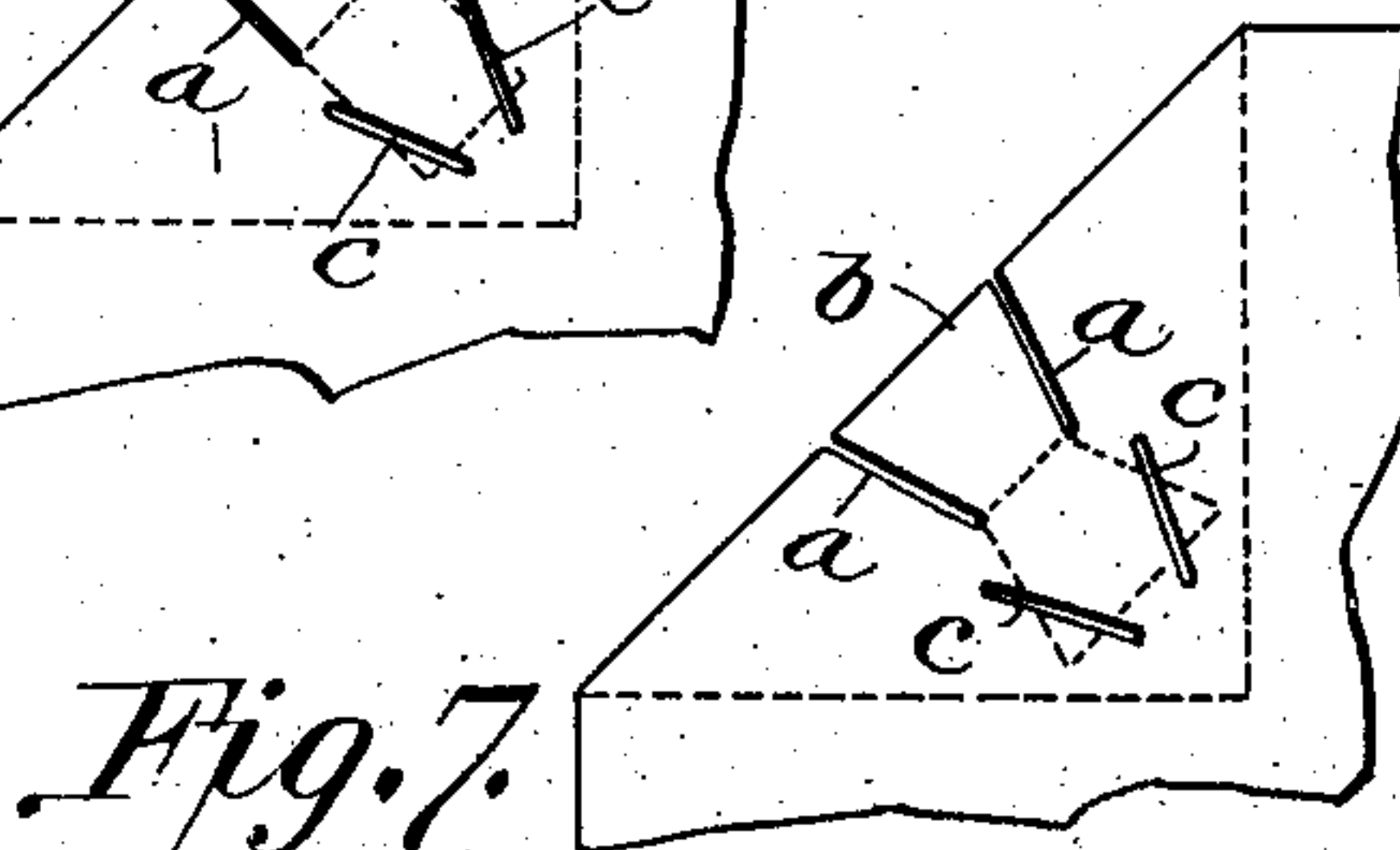
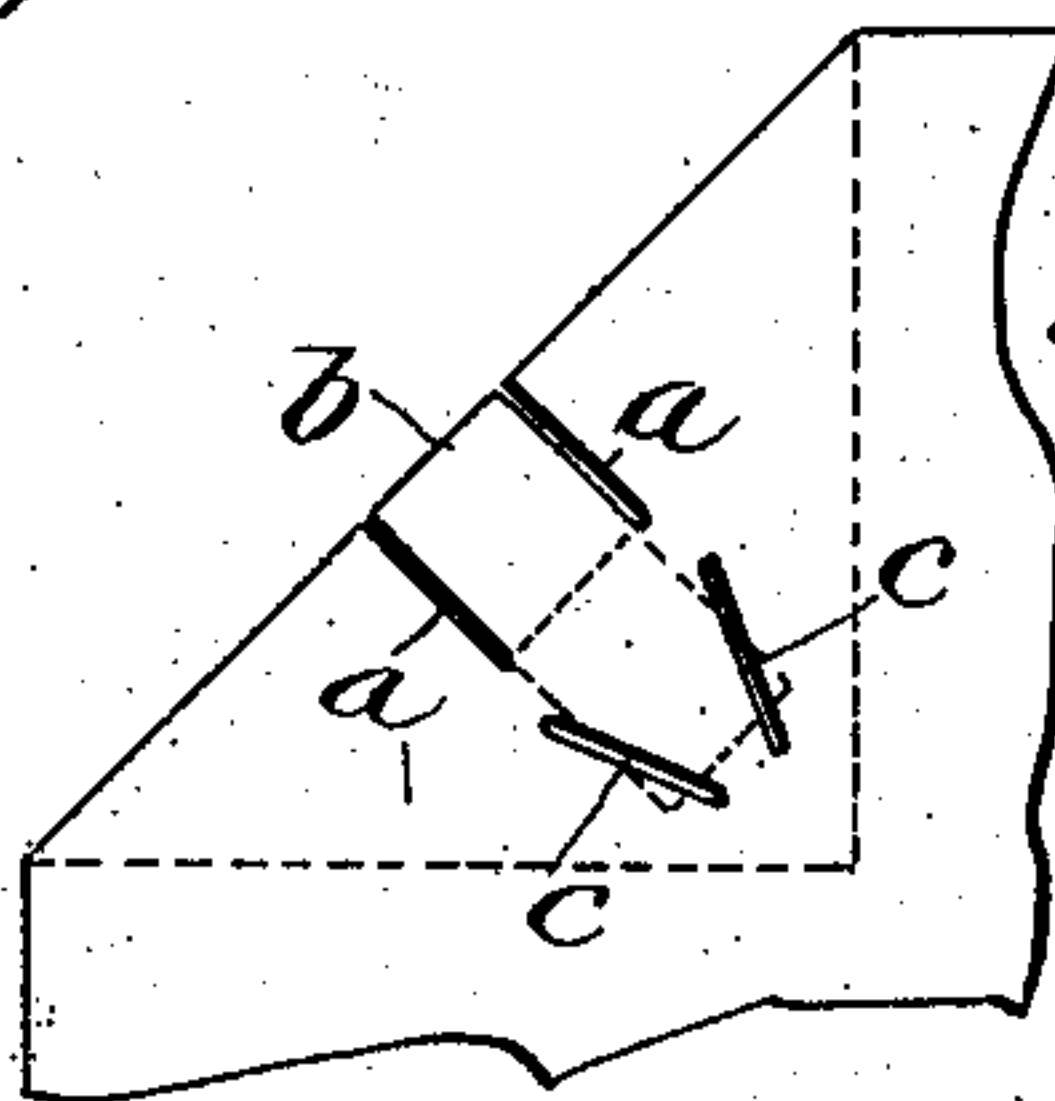
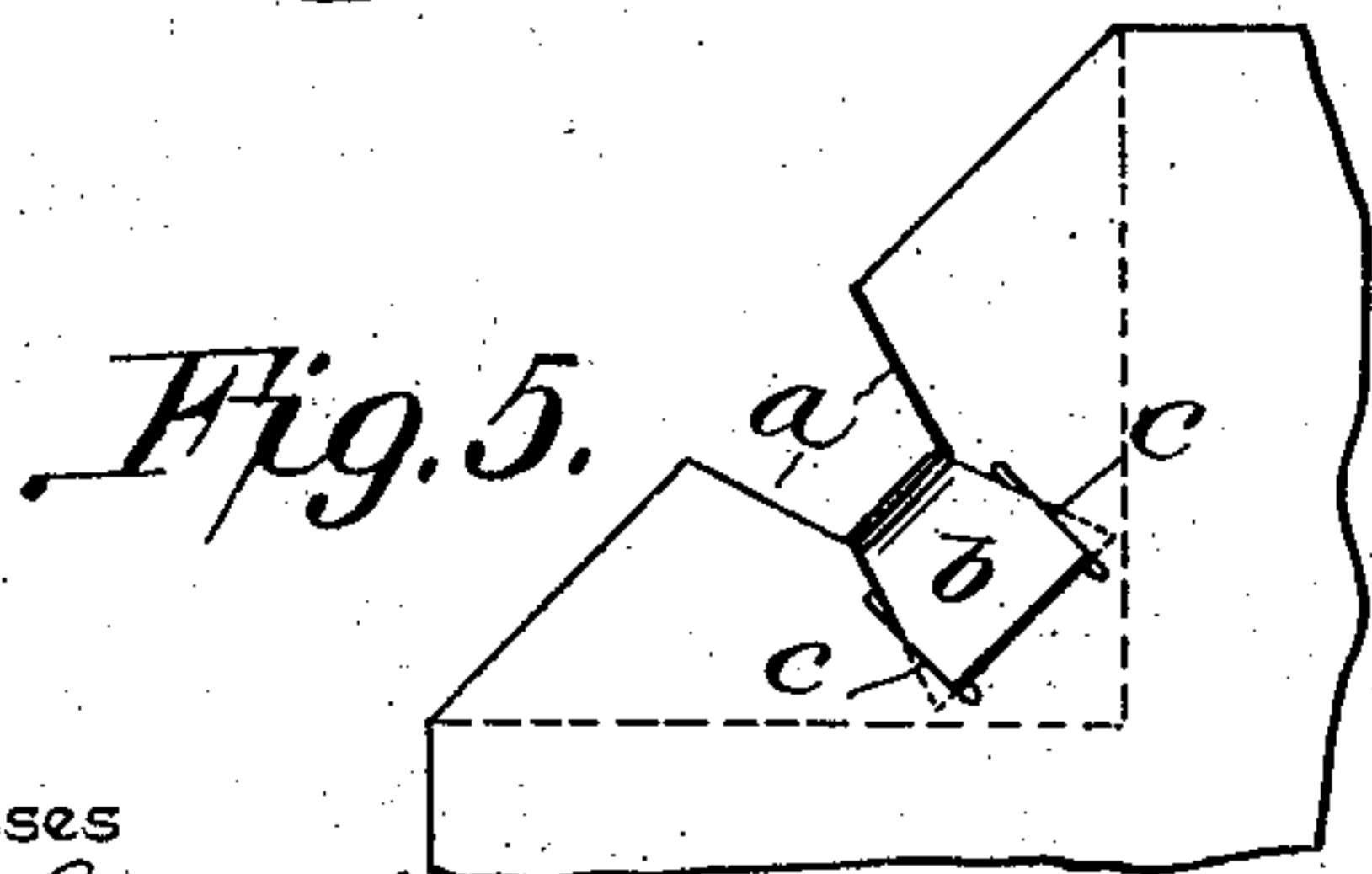
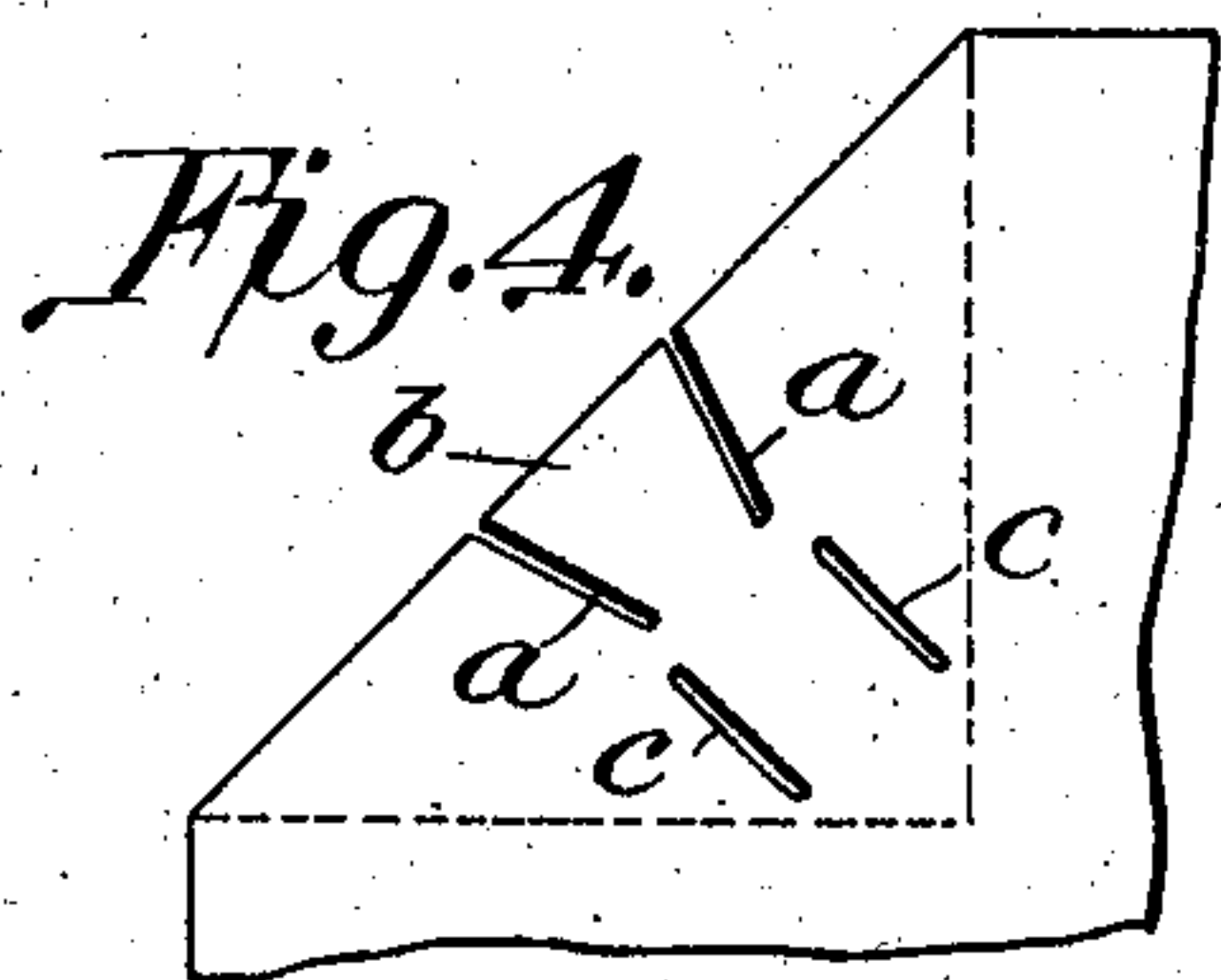


Fig. 2.



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# UNITED STATES PATENT OFFICE.

SAMUEL D. RUTH, OF BEATRICE, NEBRASKA.

## PAPER CUTTING AND FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 768,484, dated August 23, 1904.

Application filed December 19, 1903. Serial No. 185,896. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL D. RUTH, a citizen of the United States, residing at Beatrice, in the county of Gage and State of Nebraska, have invented a new and useful Paper Cutting and Folding Machine, of which the following is a specification.

This invention relates to certain improvements in machines of that class employed for the formation of locking-tongues in sheets of paper, envelops, and the like to be employed for securing the sheets or envelops without the use of eyelets, clips, or any of the similar fastening devices of ordinary use.

One object of the invention is to provide a machine of this character in which the operating mechanism is materially simplified and so arranged that the various operations of cutting, crimping, and folding may be carried on successively by the exertion of pressure or by a blow on an operating-knob that is suitably connected to the cutting and folding devices.

A further object of the invention is to improve the construction of machine in such manner as to facilitate the introduction of the tongues of paper formed by one set of slits into the slots or openings formed for their reception.

With these and other objects in view, as will hereinafter more fully appear, the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of a paper cutting and folding machine constructed in accordance with the invention. Fig. 2 is a transverse sectional view of the same. Fig. 3 is a detail view in section of a portion of the bed-plate and upper cutter-carrying plate. Fig. 4 is a view illustrating the number of superposed sheets bent over at one corner and provided with parallel and with divergent

slits. Fig. 5 is a similar view showing the tongue formed by the divergent slits bent over and its edges introduced through the parallel slits. Fig. 6 is a view similar to Fig. 4, showing the reversal of the positions of the divergent slits. Fig. 7 is a similar view showing both pairs of slits arranged on divergent lines.

Similar characters of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The machine forming the subject of the present invention is designed for the formation of a locking-tongue in sheets or envelops and the bending of the tongue and the insertion of its edges in a pair of slits arranged adjacent to the tongue and disposed in such manner that the tongue will be retained in place and all of the sheets of paper or the envelop will be firmly secured, thus dispensing with the ordinary metallic clips or other securing devices ordinarily employed for similar purposes.

In order that the invention may be better understood, reference is first had to Figs. 4 and 5, which illustrate a number of superposed sheets of paper bent at one corner and provided with two divergent slits *a a*, forming a tongue *b*, and a second pair of parallel slits *c*. In practicing the invention the slits are first cut, and then the tongue formed by the divergent slits is bent over on top of the paper and its opposite edges inserted in the parallel slits, as shown in Fig. 5. This forms a positive lock for the paper, and it may be utilized in securing together a number of sheets or may be employed for closing envelops, circulars, and other articles which are to be sent by mail at other than first-class rates. It may be here noted that it is not absolutely essential that the slits *a* be divergent and the slits *c* parallel, as their order may be reversed, as shown in Fig. 6, or both sets of slits may be arranged on divergent lines, as shown in Fig. 7.

The mechanism is mounted on a suitable base 1, to the rear edge of which is pivotally connected a plate 2, that is normally maintained with its front edge slightly elevated above the top of the base-plate, this being ac-



accomplished by the employment of one or more  
 springs or by forming the plate itself of spring  
 metal and riveting or otherwise securing its  
 rear edge to the base-plate. From the oppo-  
 5 site sides of the base rise side plates 3, form-  
 ing a portion of a casing which may be ar-  
 ranged close to all of the operating parts.  
 The side plates form supports for a trans-  
 versely-disposed bar 4, to which is secured a  
 10 toothed segment 5, with which engages a ver-  
 tically-guided bar 6. The bar 6 extends  
 through a guiding-opening in the top portion  
 7 of the supporting-frame, the same being  
 thickened in order to form an extended sur-  
 15 face for contact with the rack-bar, and the  
 lower portion of the rack-bar is held in oper-  
 able relation to the segment by means of a  
 bracket or arm 8, that is recessed to receive  
 the rack-bar and prevent lateral play thereof.  
 20 When the parts are not operating, the rack-  
 bar itself is held in elevated position by means  
 of a helical compression-spring 9, surround-  
 ing the upper portion of the rack-bar and  
 bearing at one end on the top of the casing  
 25 and at the opposite end against the under side  
 of an enlarged knob, which may be depressed  
 by direct pressure or by a blow when oper-  
 ating the machine. This spring further serves  
 to restore the parts to normal inoperative po-  
 30 sition by raising the segment 5 and all of the  
 parts to which it is connected.

In the upper inner face of the base-plate is  
 a recess 11, approximately T-shaped in con-  
 35 tour, the opposite side walls of the longitudi-  
 nally-extended portion of the recess being  
 undercut in order to afford a space for the in-  
 sertion of the edges of the paper tongue dur-  
 ing the operation of inserting the latter  
 through the parallel slits. These walls further  
 40 form cutting edges, which operate in connec-  
 tion with suitable blades carried by the plate  
 2 to form parallel slits. The base-plate is  
 further provided with a pair of cutting-blades  
 12, arranged on divergent lines correspond-  
 45 ing to the angles of the edges of the tongue,  
 and these plates are slightly inclined, their  
 rear edges being somewhat higher than the  
 front edges, so as to act in conjunction with  
 the cutting edges of the plate 2 to effect a  
 50 shear cut. The base-plate is further provided  
 with a pair of lugs or shoulders 14, arranged  
 at the inner walls of the blades 12 and form-  
 ing inclined supports for the tongue, so that  
 the latter when cut will be immediately bent  
 55 at an angle to the general plane of the base-  
 plate and the sheets of paper or envelop  
 thereon. The upper plate 2 is provided with  
 a suitable opening having two inclined walls  
 15 arranged on lines corresponding to the  
 60 angular planes of the tongue edges, and these  
 walls serve as cutting edges in connection  
 with the blades 2. The forward end of the  
 opening is approximately rectangular in form,  
 and depending from its opposite parallel side  
 65 walls are cutting knives or blades 16, that are

adapted to cooperate with the cutting edges  
 of the recess 9 to form the parallel slits in  
 the paper. The blades are preferably in-  
 clined, as shown, in order to form a shear cut;  
 but the blades are so arranged that their cut- 70  
 ting edges will but slightly pass below the  
 upper surface of the base-plate, so that the  
 undercut portions of the walls will be free  
 and unobstructed to permit the sides of the  
 tongues to pass thereinto. In order to force 75  
 the intermediate portion of the paper down-  
 ward, being that portion between the two par-  
 allel slits, a spring 17 is secured to the under  
 side of the plate 2 and engages the paper be-  
 tween the two slits and forces the same down 80  
 to the bottom of the recess, so that the par-  
 allel slits will be held slightly open in readi-  
 ness for the passage of the tongues.

In devices of this class which hitherto have  
 been constructed by me the base-plate has 85  
 formed a practically level supporting-surface  
 for the paper, and in the depression of the  
 loop of paper between the two parallel slits  
 it is found that there is some tendency to  
 buckle the paper, or, if the pressure be excess- 90  
 ive, the paper may tear. To overcome this  
 difficulty, the base-plate is provided with a  
 transversely-disposed rib 18, arranged in  
 alinement with the two parallel slits, and the  
 upper plate 2 is further provided with a trans- 95  
 versely-extending groove or recess 19, into  
 which the paper may pass when elevated by  
 the rib 18. This primarily produces a rib or  
 up-bent convolution of the paper in a direc- 100  
 tion transversely with the machine, and when  
 the cutting operation occurs and the loop of  
 paper between the two parallel slits is bent  
 down it merely reverses this particular por-  
 tion of the convolution—that is to say, for  
 the main portion of the paper the convolution 105  
 will be bent upward, while for that portion of  
 the paper between the two slits the convolu-  
 tion will be bent downward. This forms a  
 wide opening at the slits without in any man-  
 110 ner tending to stretch or tear the paper and  
 permits of the more ready insertion of the  
 side edges of the wedge-like tongue.

On the top of the plate 2 is arranged a lon-  
 gitudinally-disposed slide 20, that is normally  
 projected to a position slightly over the end 115  
 of the opening nearest the front of the ma-  
 chine by means of a compression-spring 21,  
 suitable guides 22 being employed to main-  
 tain the slide in proper position. The rear  
 end of the slide, or that portion which pro- 120  
 jects over the opening, is tapered in order to  
 form a bending-anvil 23, on which the central  
 portion of the tongue is bent, in order that  
 the side edges of the tongue may be brought  
 nearer to each other preliminary to their in- 125  
 troduction through the parallel slits.

The outer plate 2 is provided with a pair  
 of guiding-pins 25 26, that extend through  
 suitable slots formed in a tongue-folding slide  
 27, and the lower portion of the front end of 130



said slide is provided with a V-shaped groove or recess that in part coacts with the similarly-shaped anvil 23 to form the fold in the tongue. The greatest depth of the recess is at the front of the slide, and the upper wall of the recess from thence tapers gradually until it merges into the bottom line of the slide, so that there is formed a V-shaped slot of continuously - decreasing cross-sectional area from the front toward the rear of the slide. The anvil 23 is shaped in corresponding manner and is in cross-section in the form of a triangle of gradually - increasing area from its pointed end toward the front of the slide 19, or, if desired, it may be slightly flattened. The slide 27 is normally maintained in a position to the rear of the cutters by means of a coiled tension-spring 30, and said slide is provided on one or both of its sides with pins or lugs 31, adapted to ride over stationary cams 32, secured to the bed-plate during the advancing movement of the slide, this being for the purpose of permitting the slide to follow the folding movement of the tongue as the latter is bent over onto the anvil 23.

To operate the tongue-folding slide 27, said slide is connected to the bar 4 by means of an arm 34 and chain-spring or other flexible connecting device. During downward movement of the rack-bar 6 and the turning of the segment 5 the slide will be drawn forward and fold the paper tongue over onto the anvil and will then descend as the lugs or pins 31 ride down the forward inclined faces of the cams 32 until the paper tongue is bent and clamped between the two slides. To complete the folding operation, it is necessary, or, at least desirable, to employ an auxiliary member for flattening the tongue, and thus insure the introduction of its edges through the parallel slits. For this purpose the slide 27 is provided with a guiding-opening for the reception of a presser-foot 40, which is held in elevated position by a small compression-spring 41. When the slide has been moved to its full forward position and accomplished its work, a lug 42, operatively connected to the bar 5, comes into contact with the head of the presser-foot and forces the same downward to flatten the tongue.

The depression of the plate 2 and the operation of the parts are accomplished by cams 44 that are carried by the shaft 4, and said cams act preferably on small wear-blocks 45, arranged near the opposite sides of the plate 2.

In the operation of the mechanism the folded sheets of paper or the envelopes are introduced into the apparatus at a point between the base-plate and the plate 2, the paper being pushed toward the rear until its edge strikes against the rear edges of the blades 12, the latter being preferably elevated to form stops for limiting the movement of

the paper. The operator then strikes the operating-knob 10, and by a blow or by the exertion of gradual pressure depresses the rack-bar 6 and turns the segment 5. The first effect of the movement is to cut the two pairs of slits by means of the blades 12 and 16 and their coacting edges. The blades 16, as before noted, extend down to a short distance below the upper edges of the slots 10, so that the undercut portions of these walls will be unobstructed. As the plate further descends the rib 18 will tend to force the paper upward into the transverse groove 19 of the plate 2, and thus form an up-bent convolution in the paper transversely of the machine. The spring 17 will engage the paper loop formed between the two parallel slits and will depress the same until the convolution between the two slits will extend downward instead of upward, and owing to the transverse bend in the paper this is accomplished without strain and without danger of tearing. The paper tongue is now held at a slight angle with respect to the base by resting on the shoulders or lugs 14. When the plate has been fully depressed, further downward movement of the knob 10 will result in moving the lever 34 in such manner as to pull the slide 27 toward the front of the machine. The front end of the slide will engage the partly-raised tongue and force the same over, the length of the tongue so bent being determined by the length of the divergent slits. In order to permit the slide to more readily accomplish its work, the cams 32 and the pins or lugs 31 are employed, so that the slide will first be moved up to follow the tongue and will then descend on the tongue and clamp it on the anvil, the tongue receiving a longitudinal bend sufficient to reduce its apparent width to less than the distance between the two parallel slits. Continued movement of the lever will still force the slide 27 forward, and the latter will, through the intervening paper, force the anvil-slide forward, and the gradually-reducing areas of the slot and anvil will result in flattening of the tongue and the forcing of its edges in a lateral direction through the parallel slits and into the undercut or recessed walls of the base. This movement may be continued until the tongues are quite flat, or the operation may be completed by the employment of the presser-foot 40. In the latter case the lug 42 comes into contact with the head of the presser-foot and forces the same down in a positive manner, so that the anvil will be forced to the front and the foot will positively engage with and flatten the tongue. When the rack-bar 6 is released, its return to its normal elevated position by means of the spring 9 and the paper or envelop is left on the bed-plate and to some extent retained thereon by the insertion of the edges of the tongue in the recessed or under-



cut walls. The recesses are continued forward to the wider portion of the recess 11, so that by exerting a slight forward pull on the paper or envelop the device may be freed  
5 from the undercut walls and the paper removed from the machine.

Having thus described the invention, what is claimed is—

1. In a paper cutting and folding machine,  
10 a base having a transverse rib and provided with cutting devices in alinement with the rib, a movable member grooved to receive the paper bent upward by the rib, and means for engaging and depressing that portion of the  
15 paper between the cutters, substantially as specified.

2. In a paper cutting and folding machine, a relatively stationary base having a transverse rib and provided with a recessed portion  
20 in alinement with the rib, a plate having a groove coacting with the rib in the forming of a convolution in the paper, cutting devices for the formation of slits in the paper, means for depressing a portion of the paper between  
25 two of the slits and in alinement with said convolution to form a loop bent in a direction opposite to such convolution, and folding devices for engaging a paper tongue formed between two of the slits and bending the same

to pass the edges of the tongue through the  
30 slits at the sides of the loop.

3. In a paper cutting and folding machine, the combination with a base, of a plate, coacting cutting and folding devices carried by the base and the plate, a transversely-disposed  
35 shaft, means mounted on the shaft and serving to depress the plate, a toothed segment secured to the shaft, and a longitudinally-movable rack-bar engaging the teeth of the segment.  
40

4. In a paper cutting and folding machine, a base, a movable plate, coacting cutting and folding devices carried by the base and the plate, a transverse shaft, cams carried by the shaft and serving to depress the plate, a rack-  
45 bar for engaging the segment, a casing having an opening that forms an upper bearing for the rack-bar, and a recessed bracket carried by the casing and serving to engage the lower  
50 portion of said rack-bar.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

SAMUEL D. RUTH.

Witnesses:

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PETER PENNER.