

No. 766,905.

PATENTED AUG 9, 1904.

S. D. RUTH.
PAPER CUTTING AND FOLDING MACHINE.

APPLICATION FILED OCT. 13, 1903.

NO MODEL.

4 SHEETS—SHEET 1.

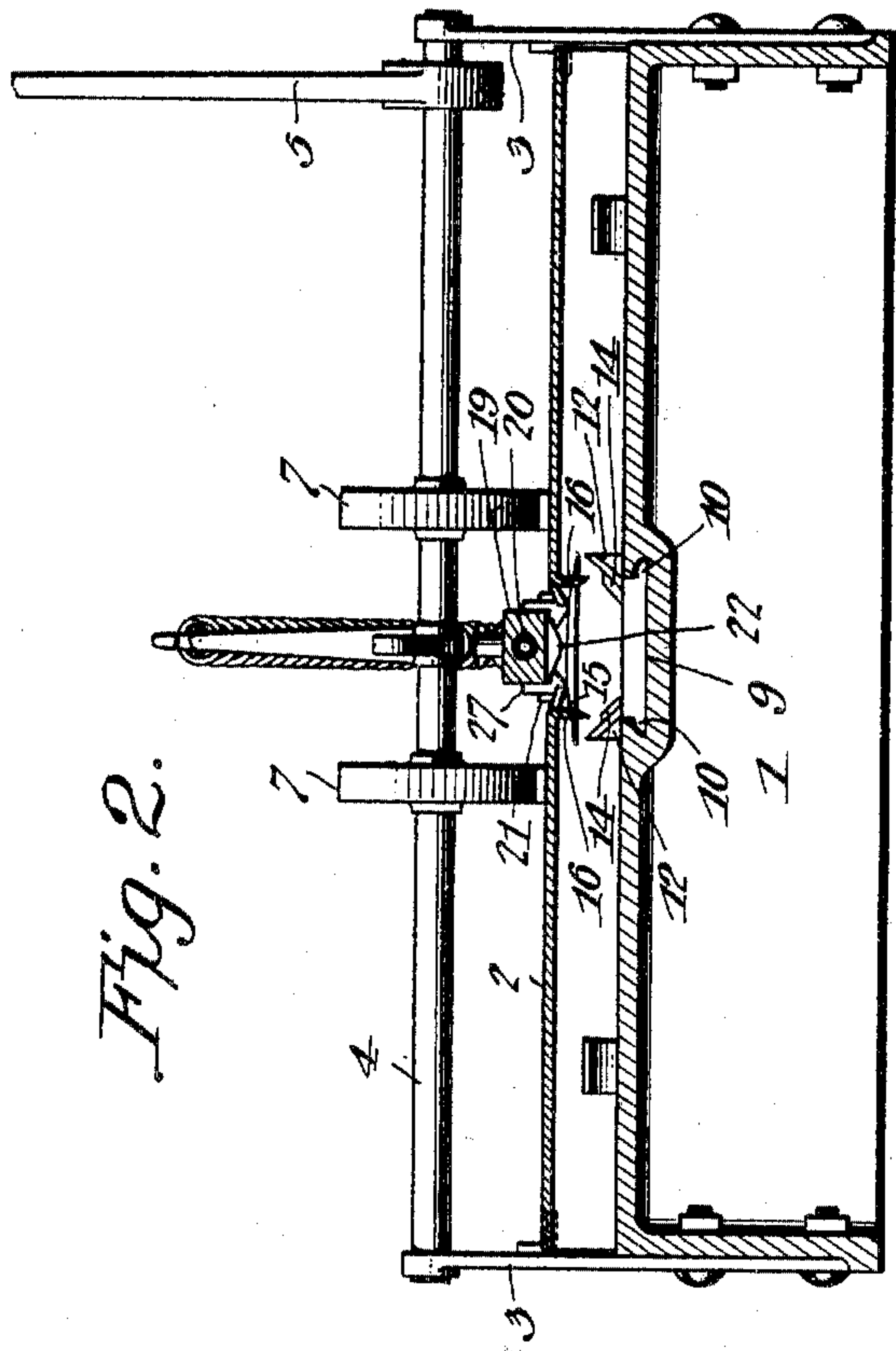


Fig. 2.

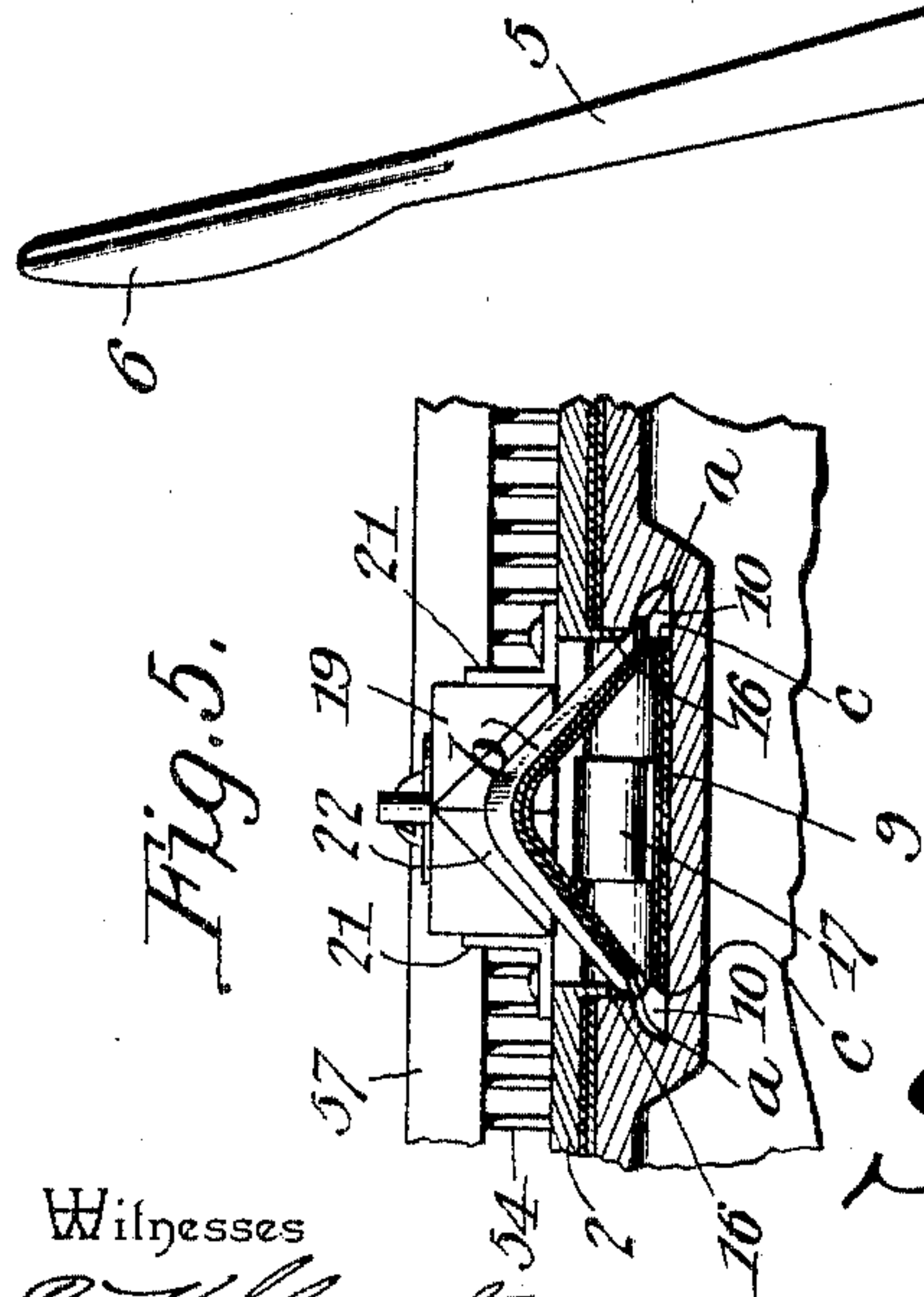


Fig. 5.

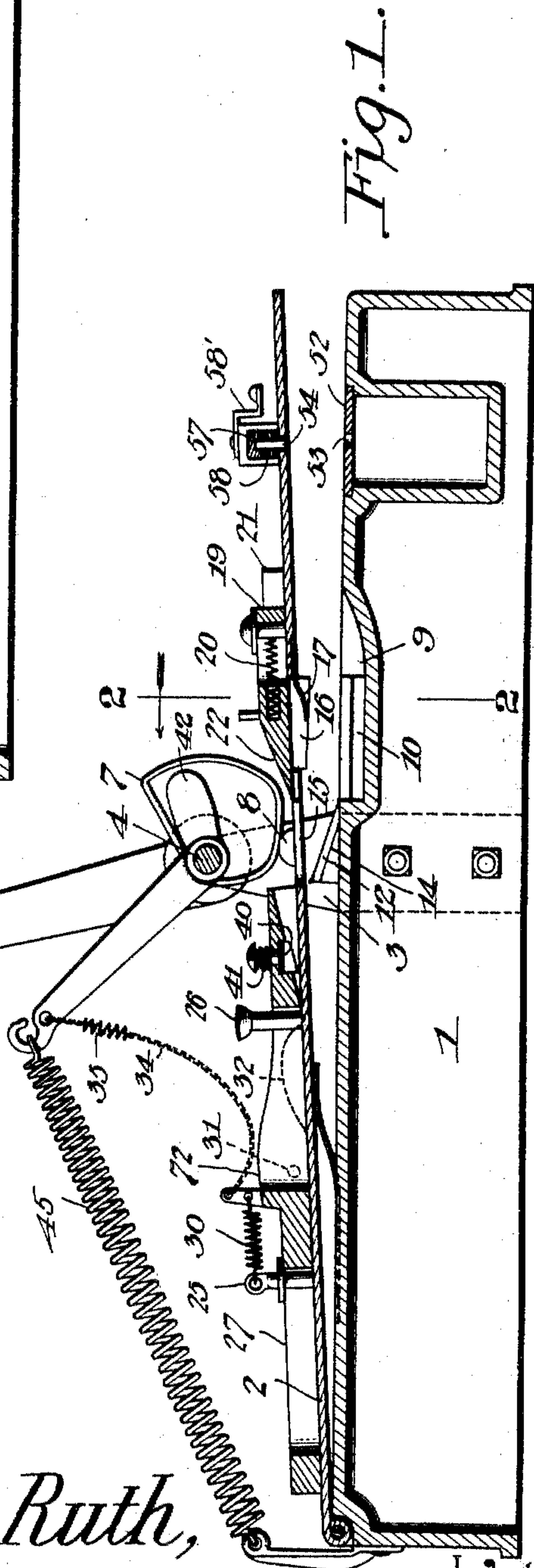


Fig. 1.

Witnesses
E. Stewart
Geo. Parker

S. D. Ruth,

by

C. A. Snow & Co.

Attorneys

Inventor

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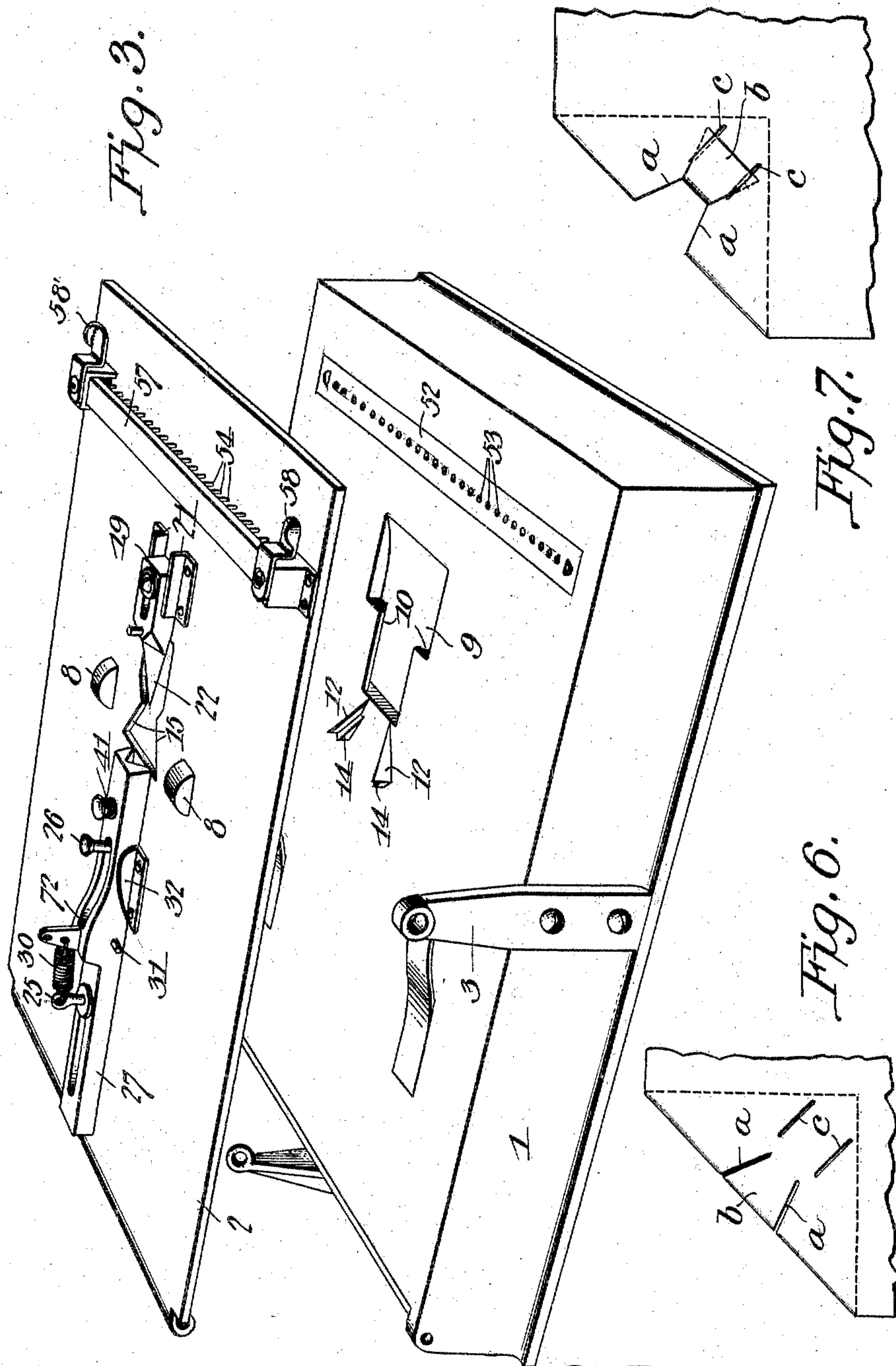
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Witnesses
E. C. Stewart
Geo. E. Parks

S. D. Ruth,
Inventor
by *C. A. Snow & Co.*
Attorneys

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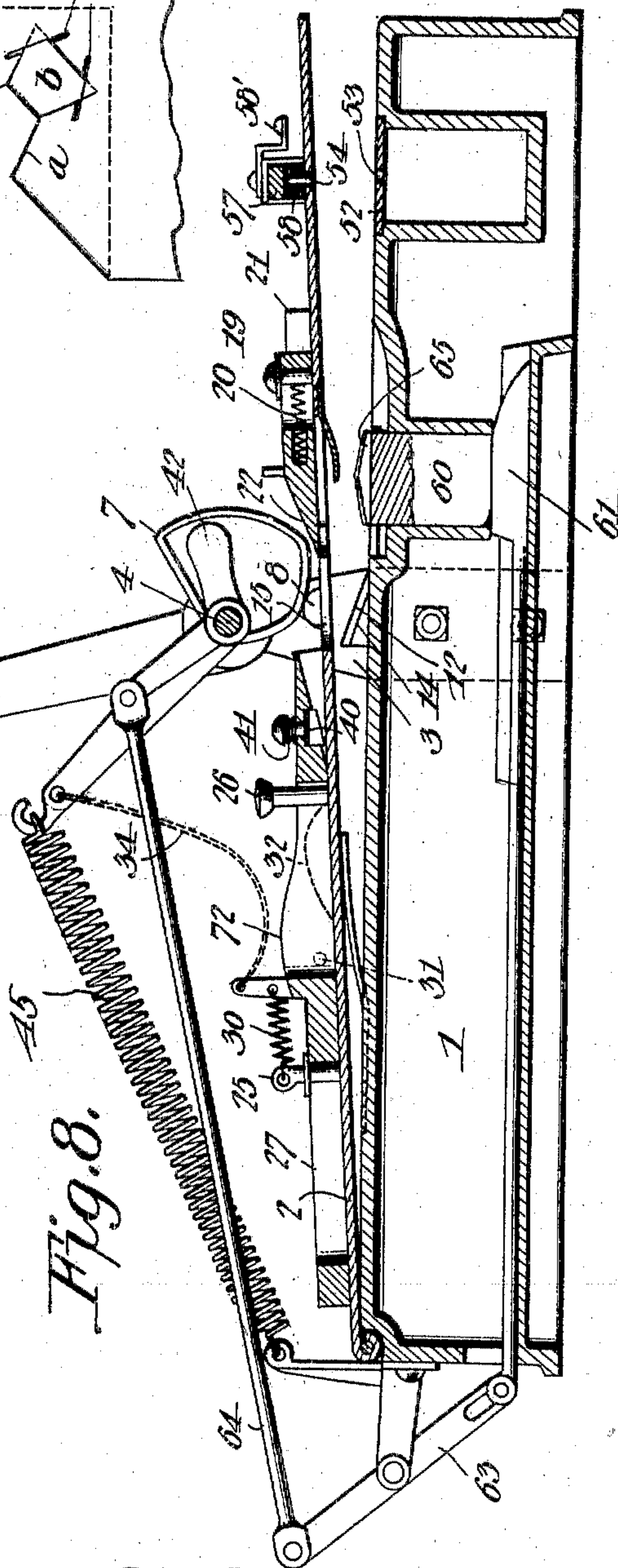
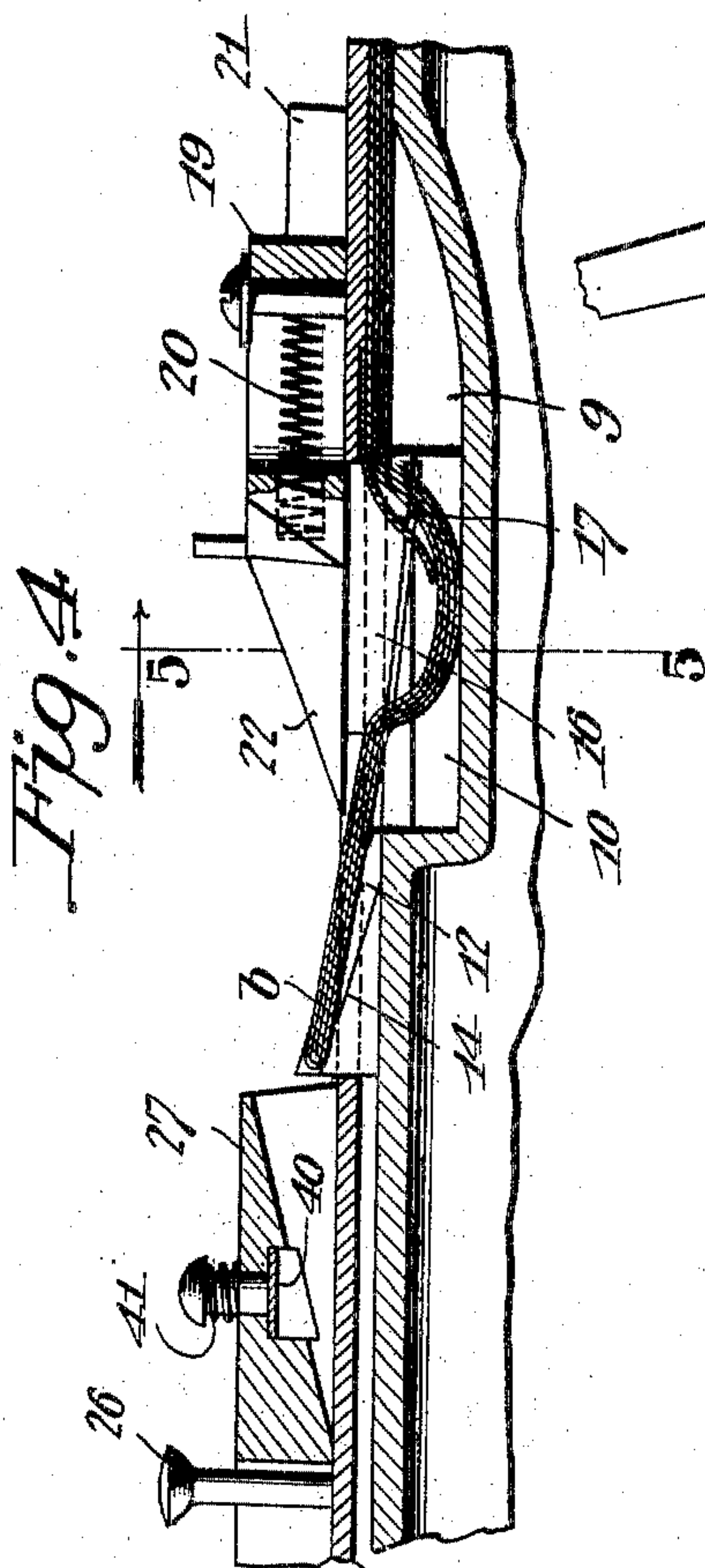
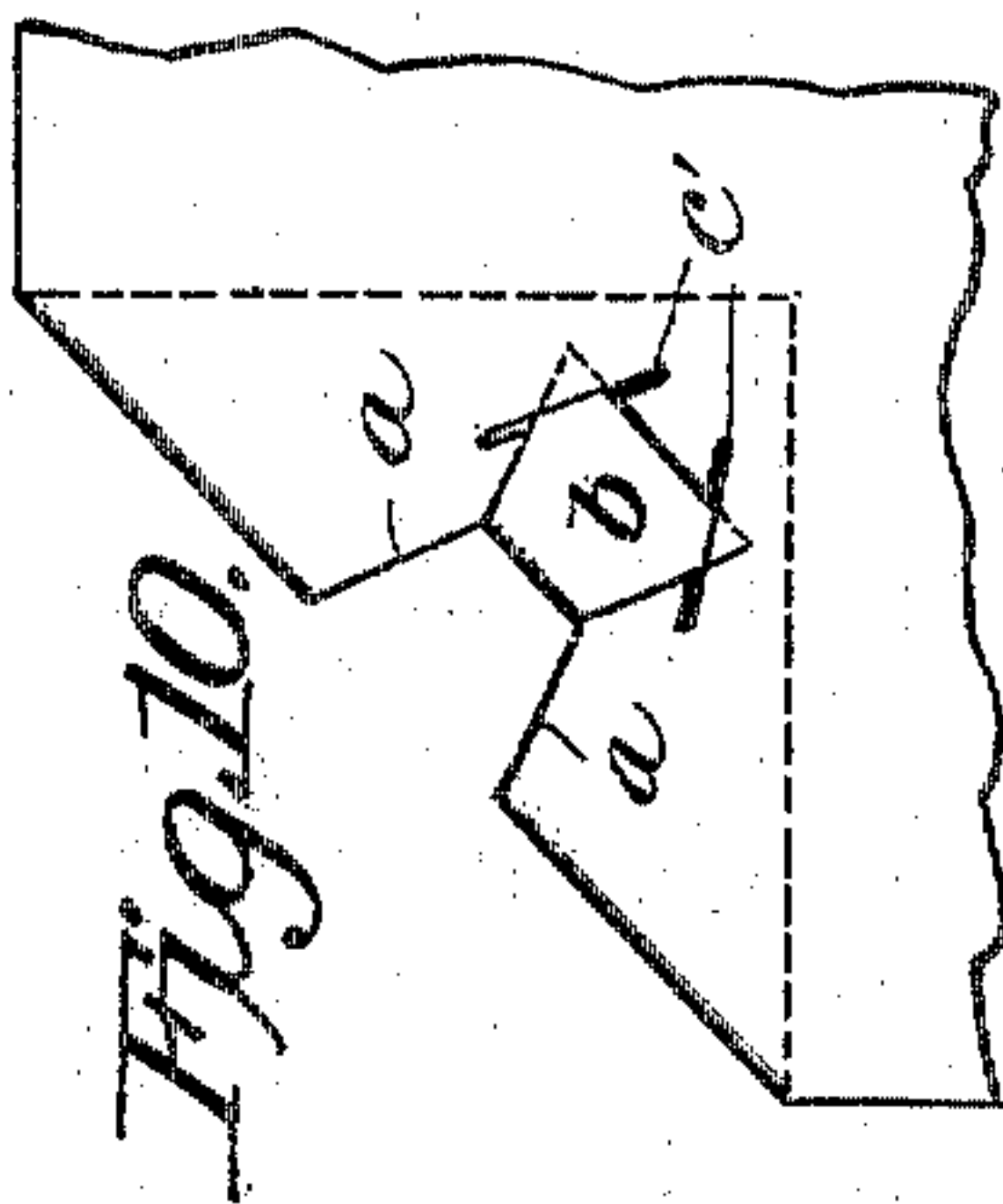
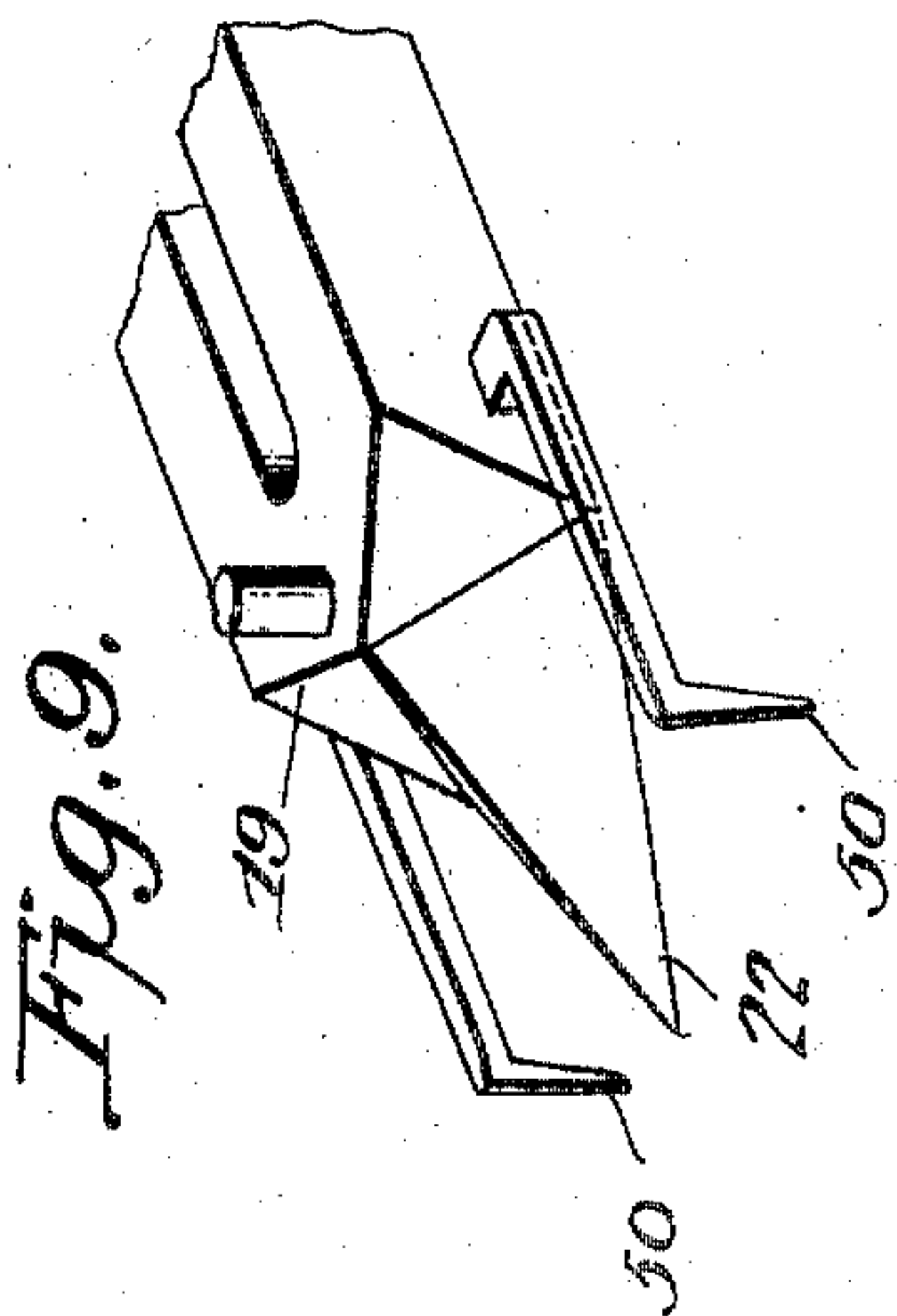
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C. E. Stewart
Geo. Parker

S. D. Ruth,
Inventor
by *C. A. Snow & Co.*
Attorneys

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4 SHEETS—SHEET 4.

Fig. 11.

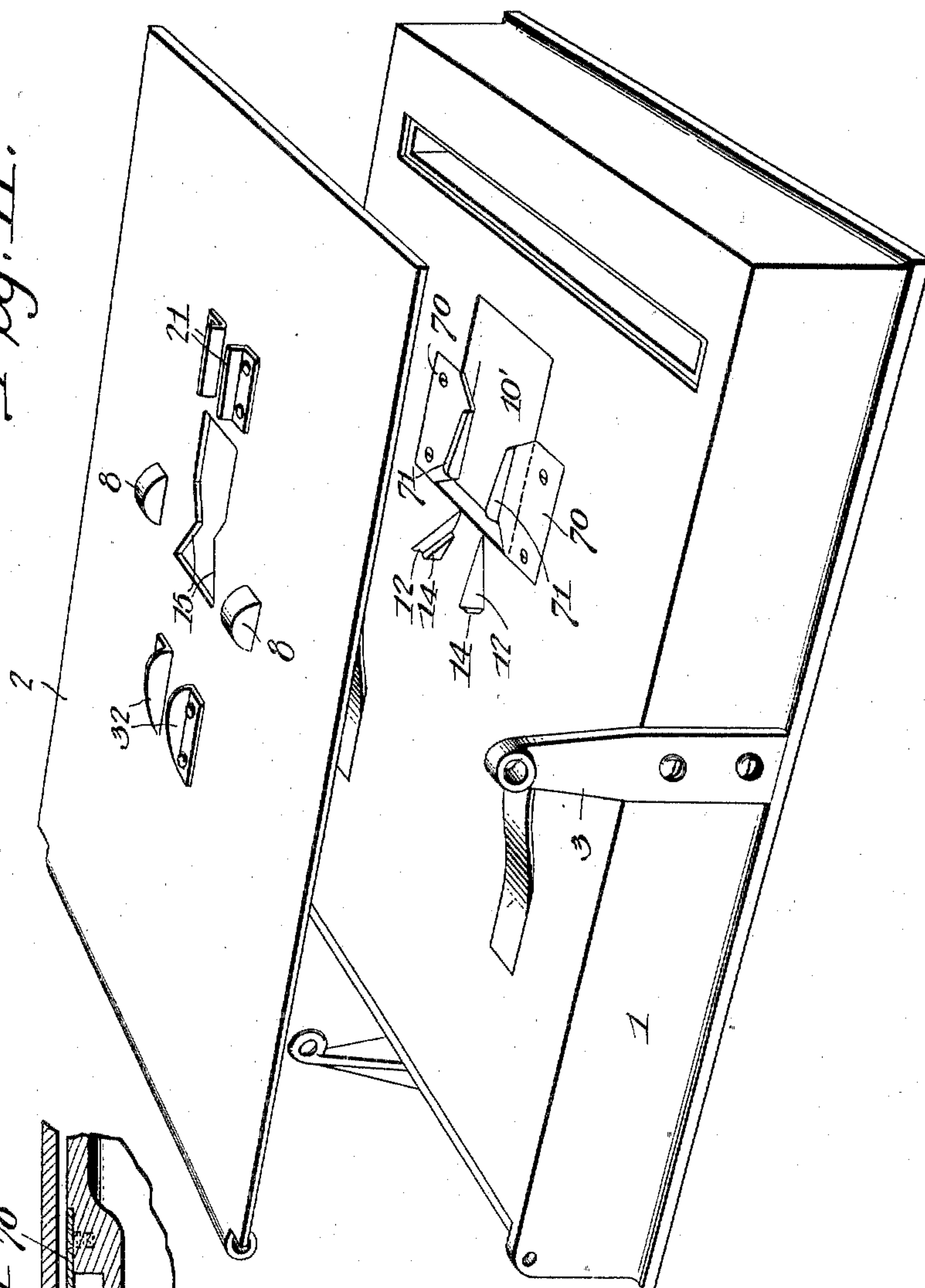
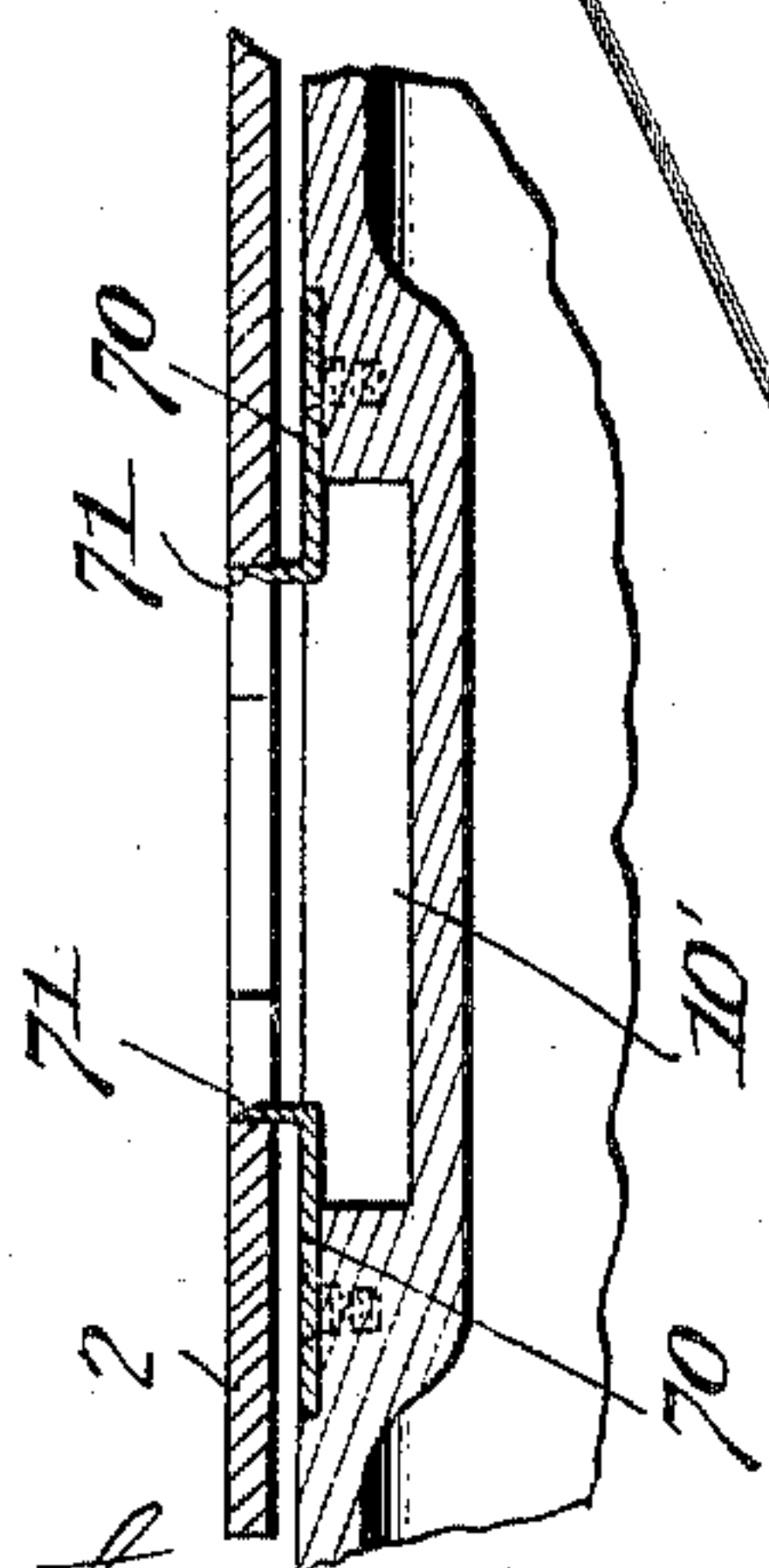


Fig. 12.



Witnesses
E. H. Stewart
Geo. Parker

S. D. Ruth, Inventor
by *Chas. Snow & Co.* Attorneys

UNITED STATES PATENT OFFICE.

SAMUEL D. RUTH, OF BEATRICE, NEBRASKA.

PAPER CUTTING AND FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 766,905, dated August 9, 1904.

Application filed October 13, 1903. Serial No. 176,913. (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, envelopes, and the like, to be employed for securing the sheets or envelopes without the use of clips, eyelets, or any of the similar fastening devices in ordinary use.

One of the principal objects of the invention is to construct a machine by means of which a paper tongue or tongues may be cut in the folded edge of a number of sheets of paper or an envelop and bent over and its opposite edges engaged in holding-slits by a single movement of an operating-lever.

A further object of the invention is to provide a machine by which all of the slits in the sheets may be cut at the same time and by which the tongue formed by one pair of slits may be turned and then inserted in the remaining slits.

With these and other objects in view, as will hereinafter appear more fully, 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 elevation of the same on the line 2 2 of Fig. 1. Fig. 3 is a perspective view of the two main portions of the cutter and folder detached. Fig. 4 is a sectional view, on an enlarged scale, corresponding to a portion of Fig. 1 and illustrating the slit-forming operations. Fig. 5 is a transverse sectional elevation on the line 5 5 of Fig. 4. Fig. 6 is a view illustrating a sheet or sheets of paper

folded at one corner and provided with a pair of parallel slits and a pair of divergent tongue-forming slits. Fig. 7 is a similar view showing the tongue folded over and its edges inserted through the parallel slits. Fig. 8 is a view corresponding to Fig. 1, illustrating a modification of the invention. Fig. 9 is a detail perspective view illustrating a further modification of the mechanism for forming parallel slits. Fig. 10 is a view corresponding to Fig. 7, showing the paper provided with two sets of divergent slits. Fig. 11 is a detail perspective view showing a further modification of the invention. Fig. 12 is a transverse sectional elevation, on an enlarged scale, of a machine of the character shown in Fig. 11.

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 envelopes and the bending of the tongue and the insertion of its edges into a pair of parallel 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 a similar purpose.

In order that the invention may be understood better, reference is had first to Figs. 6 and 7, 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. 7. 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 envelopes, circulars, and other articles which are to be sent by mail at other than first-class rates.

The mechanism is mounted on a suitable

base 1, to the rear edge of which is pivoted a plate 2, that is normally maintained with its front edge slightly elevated above the top of the base-plate, this being 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. From the opposite sides of the base rise standards 3, forming supports for a transversely-disposed bar 4, to which is secured an operating-lever 5, having a suitable handle member 6 and provided with a pair of spaced depending arm 7, which bear against blocks 8, secured to or forming a part of the plate 2. This lever serves as a means for operating all parts of the apparatus, and a single forward and downward movement is all that is necessary to accomplish the cutting of the several slits and the bending and insertion of the tongue in the parallel slits.

In the upper face of the base-plate is a recess 9, approximately T-shaped in contour, the opposite side walls of the longitudinally-extended portion of the recess being undercut, as illustrated at 10, in order to afford a space for the insertion of the edges of the tongue during the operation of inserting the latter through the parallel slits. These walls further form cutting edges, which operate in connection 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 corresponding to the angles of the edges of the tongue, and these blades are slightly inclined, their rear edges being somewhat higher than the front edges, so as to act, in conjunction with the cutting edges, on the plate 2 to effect a 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 forming inclined supports for the tongue, so that the latter when cut will be immediately bent 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 angular planes of the tongue edges, and these walls serve as cutting edges in connection with the blades 12. The forward end of the opening is approximately rectangular in form, and depending from its opposite parallel side 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 inclined, as shown, in order to form a shear cut; but the blades are so arranged that their cutting edges will but slightly pass below the upper surface of the base-plate, so that the undercut portions of the walls 10 will be free and unobstructed and permit the sides of the tongues to pass thereinto. In order to force the intermediate por-

tion of the paper downward, being that portion between the two parallel slits, a spring 17 is secured to the under side of the plate 2 and engages the paper between the two slits and forces the same down to the bottom of the recess, so that the parallel slits will be held slightly open in readiness for the passage of the tongues.

On the top of the plate 2 is arranged a longitudinally-disposed slide 19, that is normally projected to a position slightly over the forward end of the opening by means of a compression-spring 20, suitable guides 21 being employed to maintain the slide in proper position. The rear end of the slide, or that portion which projects over the opening, is tapered and inclined in order to form a bending-anvil 22, on which the central portion of the tongue is bent in order that the side edges of the tongue may be brought nearer each other preliminary to their introduction through the parallel slits.

The upper plate 2 is provided with a pair of guiding-pins 25 and 26, that extend through suitable slats formed in a tongue-folding slide 27, and the lower portion of the front end of said slide is provided with a V-shaped groove or recess that in part coacts with the similarly-shaped anvil 22 to form the fold in the tongue. The greatest depth of the recess is at the front end 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 22 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 22.

To operate the tongue-folding slide 27, said slide is connected to the main operating-lever 6 by means of a chain or cord or link, as indicated at 34, and in some cases it may be desired to interpose a spring in the connection, as indicated at 35. During downward movement of the lever 6 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 advisable to employ an aux-

iliary 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 or formed integral with the lever 6, comes into contact with the head of the presser-foot and forces the same downward to flatten the tongue.

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 depresses the lever 6, and 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 cutting 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. The paper tongue is 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, continued forward and downward movement of the lever 6 will result in forward movement of the slide 27, and the front end of the latter will engage the partly-raised tongue and will force the same over on a bending-line, determined by the length of the divergent slits. To permit the slide to more accurately follow the folding movement, the cams 32 and pins or lugs 31 are employed, so that the slide will positively bend the tongue and will then descend on said tongue and clamp it on the anvil, the tongue receiving a longitudinal bend to an extent 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 lateral direction through the parallel slits and into the undercut or recessed portions of the walls 10. 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 lever is released, it is returned to its normal position by means of a

suitable spring 45, and the paper or envelop then is left on the bed-plate, but is to some extent retained thereon by the insertion of the edges of the tongue in the recess of walls 10. The recesses are continued forward to the wider portion of the recess 9, so that by exerting a slight forward pull on the paper or envelop the tongues may be freed from the undercut walls and the paper removed from the machine.

In some cases the spring 17 may be dispensed with and the anvil formed with a depending portion to engage with and depress the paper, as illustrated in Fig. 9.

As a further modification of the invention the anvil-slide may be provided with a pair of depending spaced knives 50, which during the downward movement of the plate 2 are forced through the paper, and then on forward movement of the slide 27 the knives will cut slits of the proper length and remain at the forward ends of such slits during the insertion of the side edges of the paper tongue therethrough.

In some cases, especially where mailing-envelops are to be fastened or sealed by the machine, it may be desirable to perforate the envelop at points below the tongues in order to provide a readily-removable clip for convenience in opening the envelop. For this purpose the base-plate 1 is provided with a perforated plate 52, having a large number of suitable perforations 53, forming the female dies for the reception of the perforating-dies 54, carried by the movable plate 2. The upper perforating-dies are carried by a transversely-disposed bar 57, that is normally held elevated by means of a spring 58 when it is not desired to use the perforator. When perforations are to be formed, the bar is pressed down and is locked in position by suitable catches 58, carried by the bed-plate.

It will of course be understood that the parallel slits through which the tongues pass may be disposed at an angle to each other, as indicated at c' in Fig. 10, and in many cases such an arrangement is preferable, owing to the facility with which the tongues may be introduced.

In Fig. 8 is illustrated a slight modification of the invention, wherein the cutting-recess of the base-plate is dispensed with and in its stead is used a vertically-movable plunger 60, guided in a suitable opening formed in the base-plate and having its lower end supported by a longitudinally-movable wedge-block 61. The rear end of the wedge is connected by a lever 63 and link 64 to an arm on the main shaft 4, so that during downward movement of the main lever the wedge will be moved from under the block 60. The block 60 carries a pair of cutting-knives 65 to coact with cutters carried by the movable plate, and a depending spring-tongue 17 serves to engage that portion of the paper between the two slits and force the same down in order to

open the slits and permit the passage of the paper tongue. In the operation of this portion of the mechanism downward movement of the handle or operating-lever will first effect the cutting of the two slits, and then as the downward movement is continued the wedge-block 61 will be withdrawn from under the cutter-block 60 and the latter will fall, so that its cutting edges or knives pass below the upper surface of the base-plate and permit the depression of the intermediate portion of the paper, so that the tongue may be more readily inserted.

The construction of the mechanism may be further modified in the manner shown in Figs. 11 and 12, wherein the upper plate 2 is provided with a simple opening, the edges of which coact with the cutters and the base to form both sets of slits. In this construction the base-plate is recessed at 10' and is further provided with shallow recesses for the reception of plates 70, the edges of which project over the parallel walls of the recess and are turned upward to form cutters 71, that coact with the walls of the opening in the plate 2. This permits of the ready formation of slits, and the space below the knives 71 readily permits the entrance of the sides of the angular tongue during the folding operation.

It will be observed that the upper face of the main folder is provided with a rounded or curved cam-surface 72, so that during the final portion of the folding operation the engagement of this surface with the head of the foremost guiding-pin will serve to positively depress the folder on the paper tongue, although this in all cases is not necessary.

Having thus described the invention, what is claimed is—

1. In a paper cutting and folding machine, means for cutting a pair of divergent slits in the paper to thereby form an angular tongue, means for bending the tongue at an angle to the plane of the paper immediately after the cutting operation, means for engaging the partly-bent tongue and for folding the same over and downward upon the paper of which it forms an integral part, and means coacting with such folding means for forming a central longitudinal crease in the tongue and for gradually flattening and spreading the tongue, substantially as specified.

2. In a paper cutting and folding machine, a base, a pair of angularly-disposed cutting-knives carried by the base, a movable plate having an opening the walls of which coact with said knives to form a pair of divergent slits in the sheet of paper, means carried by the base for bending the tongue formed by said slits upward into the opening after the completion of the cutting operation, and means carried by the plate for engaging the partly-bent tongue and for folding the same backward and downward upon the paper of which it forms an integral part.

3. In a paper cutting and folding machine, a base having a recess the walls of which are undercut, cutting-knives carried by the base and arranged at an angle to each other, a movable plate having an opening, a portion of the walls of which coact with the angularly-disposed knives during cutting, a pair of blades carried by the plate and coacting with the undercut walls of the recess to form a second pair of slits in a sheet of paper, means carried by the base for bending the tongue formed by the angular knives upward through the opening in the plate, and means carried by the plate for engaging the partly-bent tongue and for forcing the same over and downward upon the paper of which it forms an integral part, and means associated with said folding means for forming a central longitudinal crimp in the tongue and for subsequently flattening the tongue and forcing its opposite edges through the second pair of slits and into the undercut portions of the walls of said recess.

4. In a paper cutting and folding machine, means for cutting a pair of slits for the formation of a tongue, means for initially bending the tongue, a longitudinally-movable folder for engaging a partly-bent tongue, and means for imparting vertical movement to said folder to follow the tongue during the progress of the folding operation.

5. In a paper cutting and folding machine, means for cutting a pair of divergent slits to form an angular tongue, a folder for engaging the tongue, means for imparting longitudinal movement to the folder, and a cam for engaging and raising the folder during its longitudinal movement, substantially as specified.

6. In a paper cutting and folding machine, means for cutting a pair of divergent incisions for the formation of an angular tongue, a tongue-folder having in its lower face an angular groove of gradually-decreasing depth inward from its tongue-engaging end, means for imparting longitudinal movement to said folder, means for raising and lowering the folder during such longitudinal movement, and a folding-anvil coacting with said folder for the formation of a longitudinal crease in the tongue.

7. In a paper cutting and folding machine, means for cutting a pair of divergent incisions for the formation of an angular tongue, a folder having in its end face a slot or groove of gradually-decreasing area inward from its tongue-engaging end, means for imparting longitudinal movement to the folder, means for raising and lowering the folder during such movement, and a folding-anvil on which the tongue is bent, said anvil being operated by the folder, substantially as specified.

8. In a paper cutting and folding machine, means for cutting a pair of divergent incisions for the formation of an angular tongue, means for folding the tongue, a pair of movable cut-

ters, a base having a recess the walls of which coact with said movable cutters to form a second pair of slits, said walls being undercut to receive the sides of the angular tongue during the folding operation, the undercut portions being continued to the ends of the walls and terminating at an extended portion of the recess to permit the disengagement of the tongues, substantially as specified.

9. In a paper cutting and folding machine, a base having a recess two of the walls of which are undercut, a pair of angularly-disposed cutting-blades carried by the base, inclined tongue-engaging shoulders carried by the base at points adjacent to the blades, a movable plate having an opening, a portion of which wall coacts with the blades to form a pair of divergent slits in a sheet of paper, cutters depending from the plate and coacting with the undercut walls of the recess to form a second pair of slits in the paper, a spring-tongue carried by the plate for engaging with that portion of the paper between the second pair of slits, a pair of folding devices carried by the plate and movable therewith, a pivotally-mounted cam-lever adapted to depress the plate, and means connecting said cam-lever to one of the folding members thereby to impart longitudinal movement to the latter during the downward movement of the plate.

10. In a paper cutting and folding machine, a base having a recess two of the walls of which are undercut to form tongue-receiving recesses, a pair of divergent blades carried by the base, a pair of tongue-engaging shoulders carried by the base at points adjacent to the blades, a movable plate having an opening a

portion of the wall of which coacts with the angularly-disposed cutters to form a tongue in a sheet of paper, a pair of depending blades carried by the plate and coacting with the undercut walls to form a pair of tongue-receiving slits in the paper, a spring-tongue carried by the plate for engaging that portion of the paper between the tongue-receiving slits, a pair of folders carried by the plate and provided with means for forming a longitudinal crease or fold in the tongue, a cam carried by the plate, a lug or pin carried by one of the folders for engaging said cam, a flattening or presser foot carried by one of said folders, a pivotally-mounted cam-lever for depressing the plate, means for connecting said cam-lever to the main folding member, and an auxiliary lug carried by the cam-lever for engaging said presser-foot, substantially as specified.

11. In a device for folding, cutting and perforating paper, a base having cutters for the formation of insertions and provided with female perforating-dies, a removable plate carrying auxiliary cutters for folders, male perforating-dies carried by the plate, and a single operating means for moving the plate and the base and causing the operation of the cutters, folders and perforating devices.

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:

J. H. PENNER,

W. H. H. PENNER.