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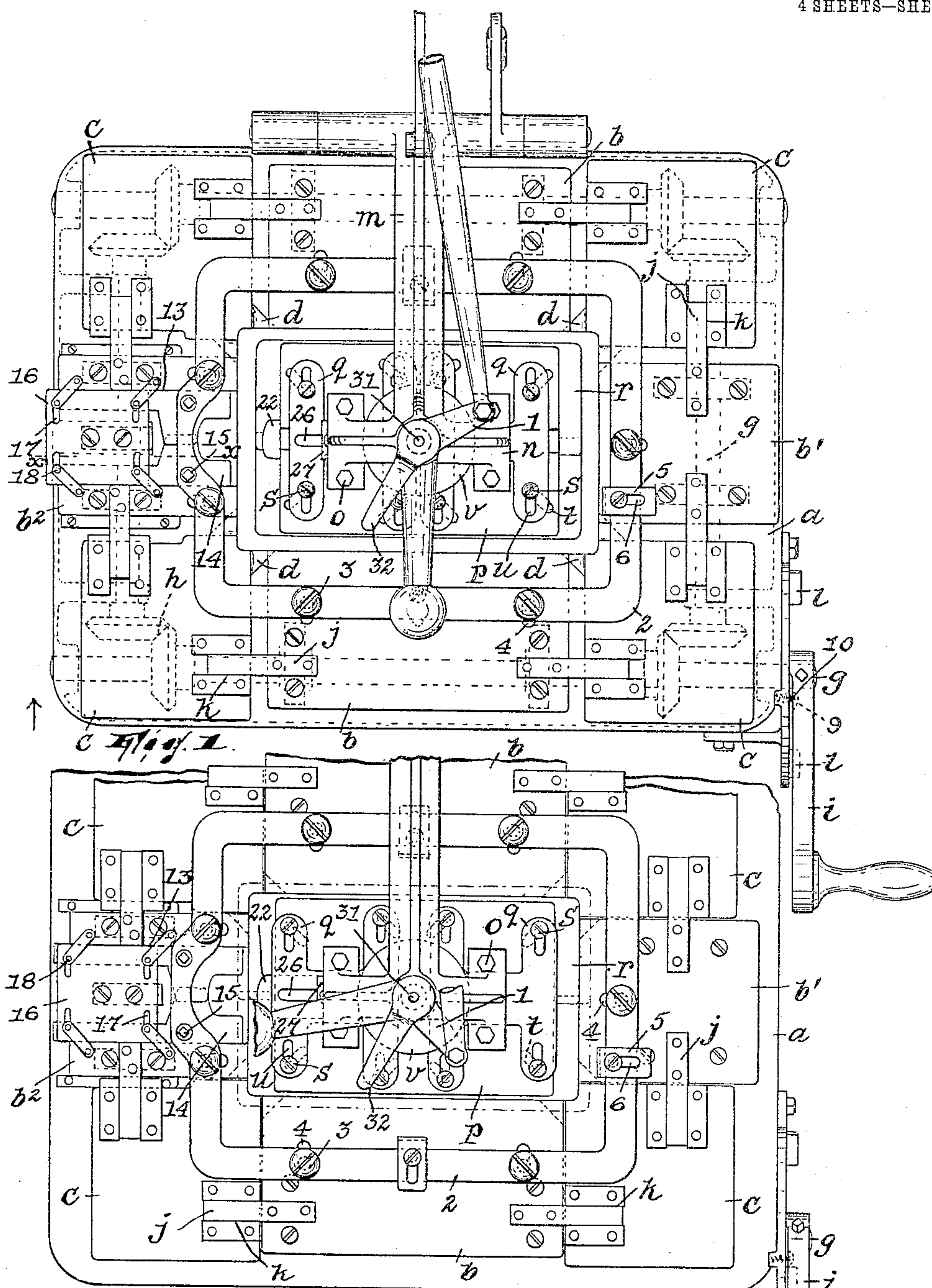
PATENTED DEC. 27, 1904.

C. H. KNAPP.

MACHINE FOR FOLDING CUFF BLANKS OR THE LIKE.

APPLICATION FILED MAR. 19, 1903.

4 SHEETS—SHEET 1.



WITNESSES: *Fig. 2.*

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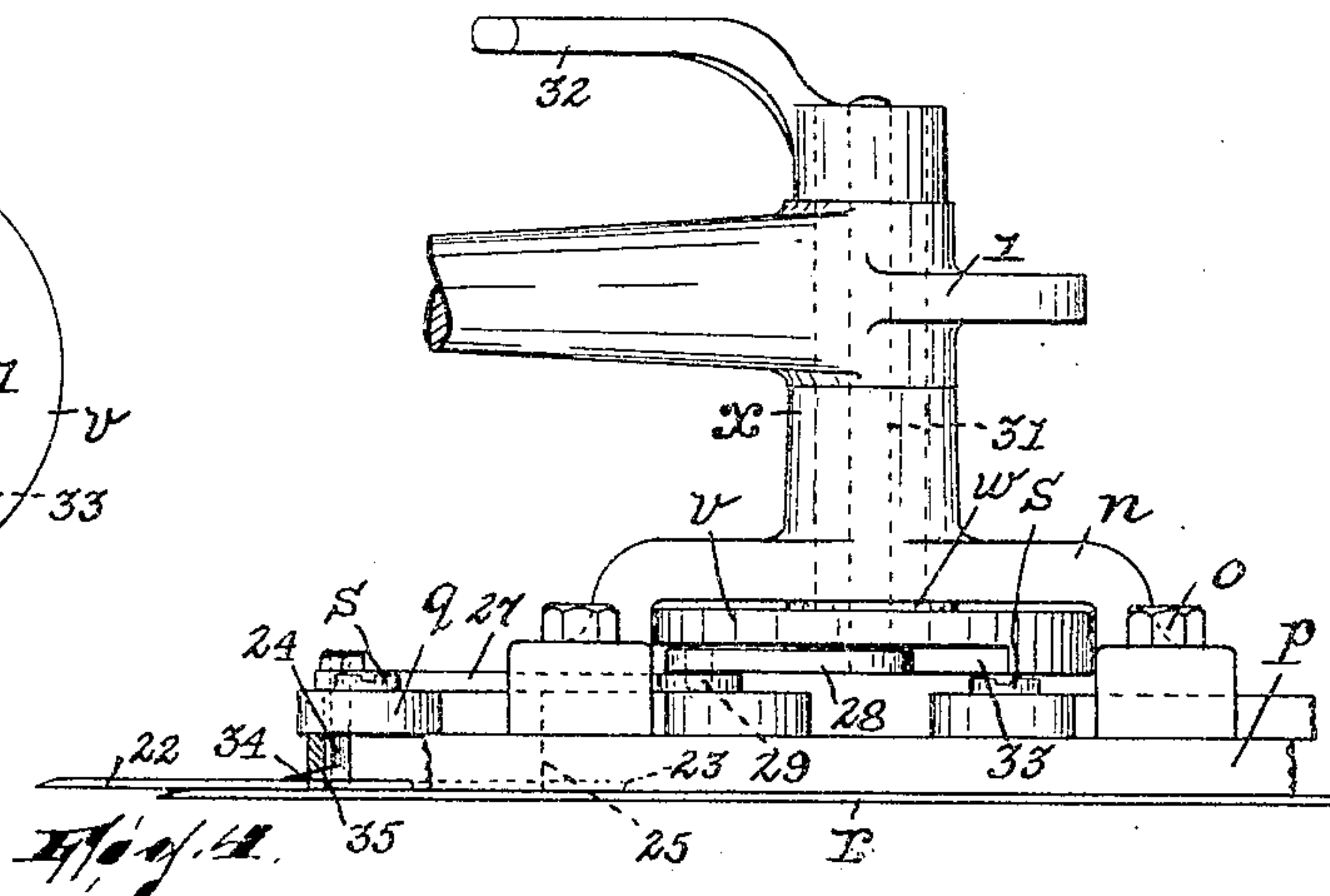
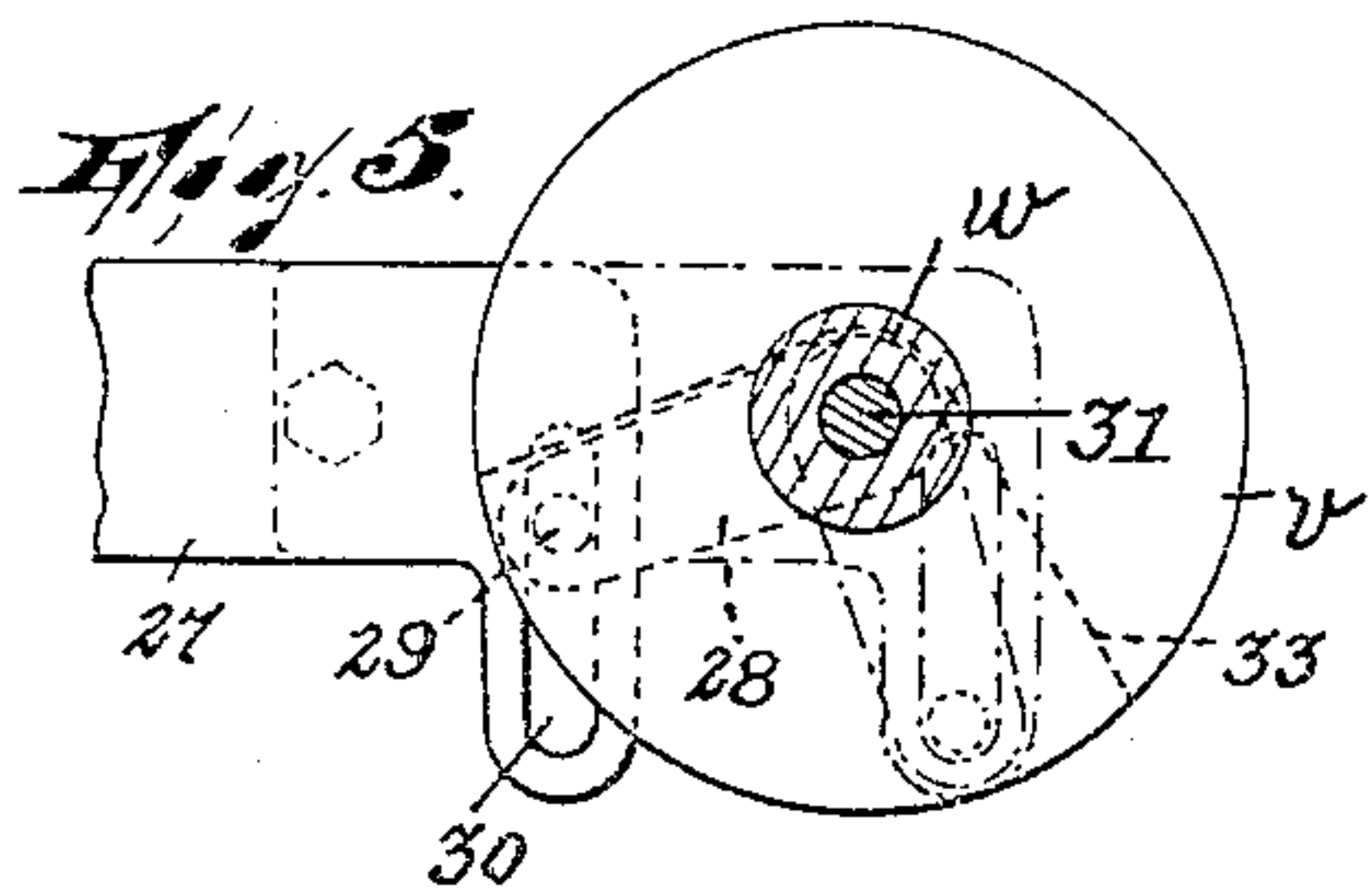
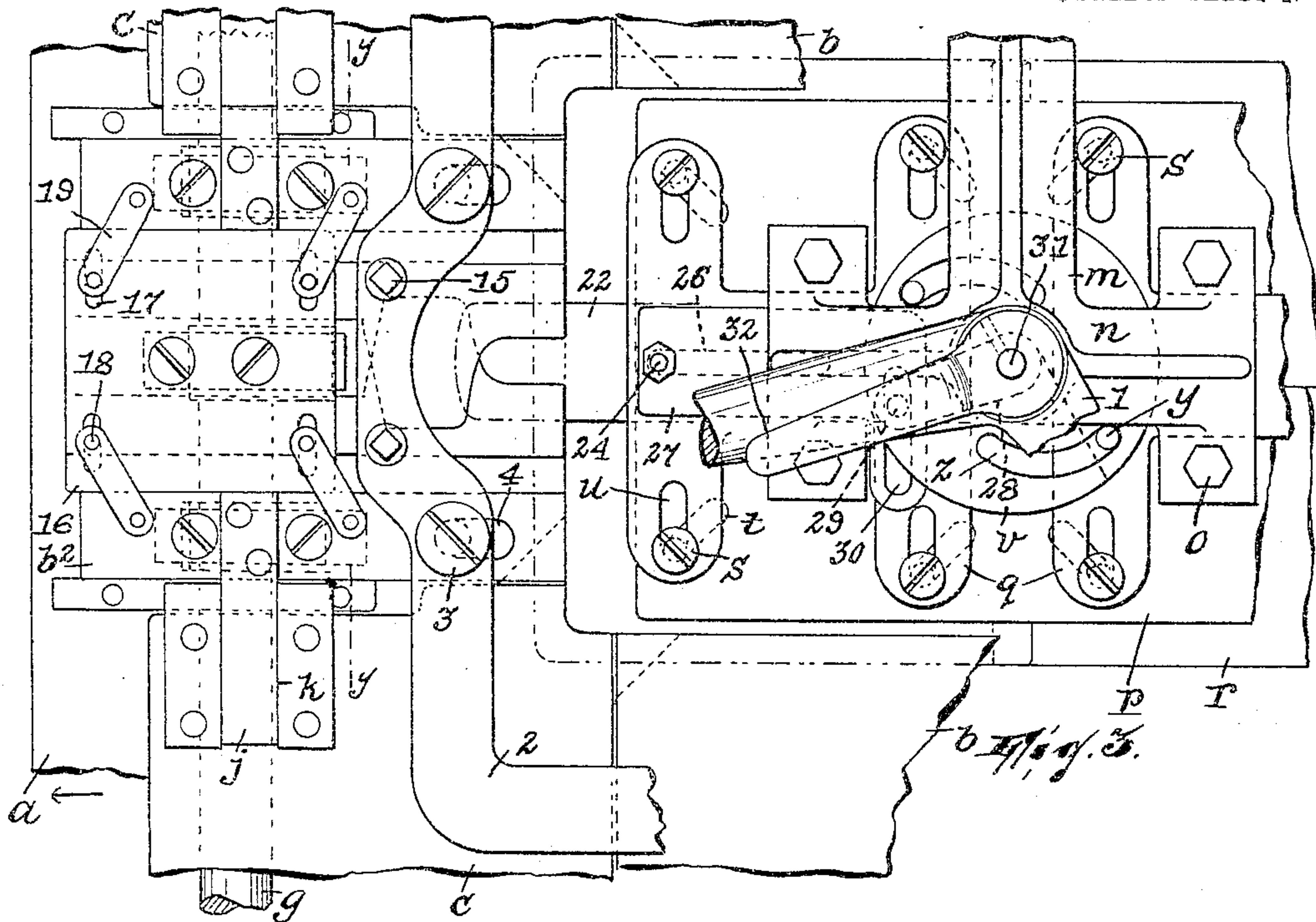
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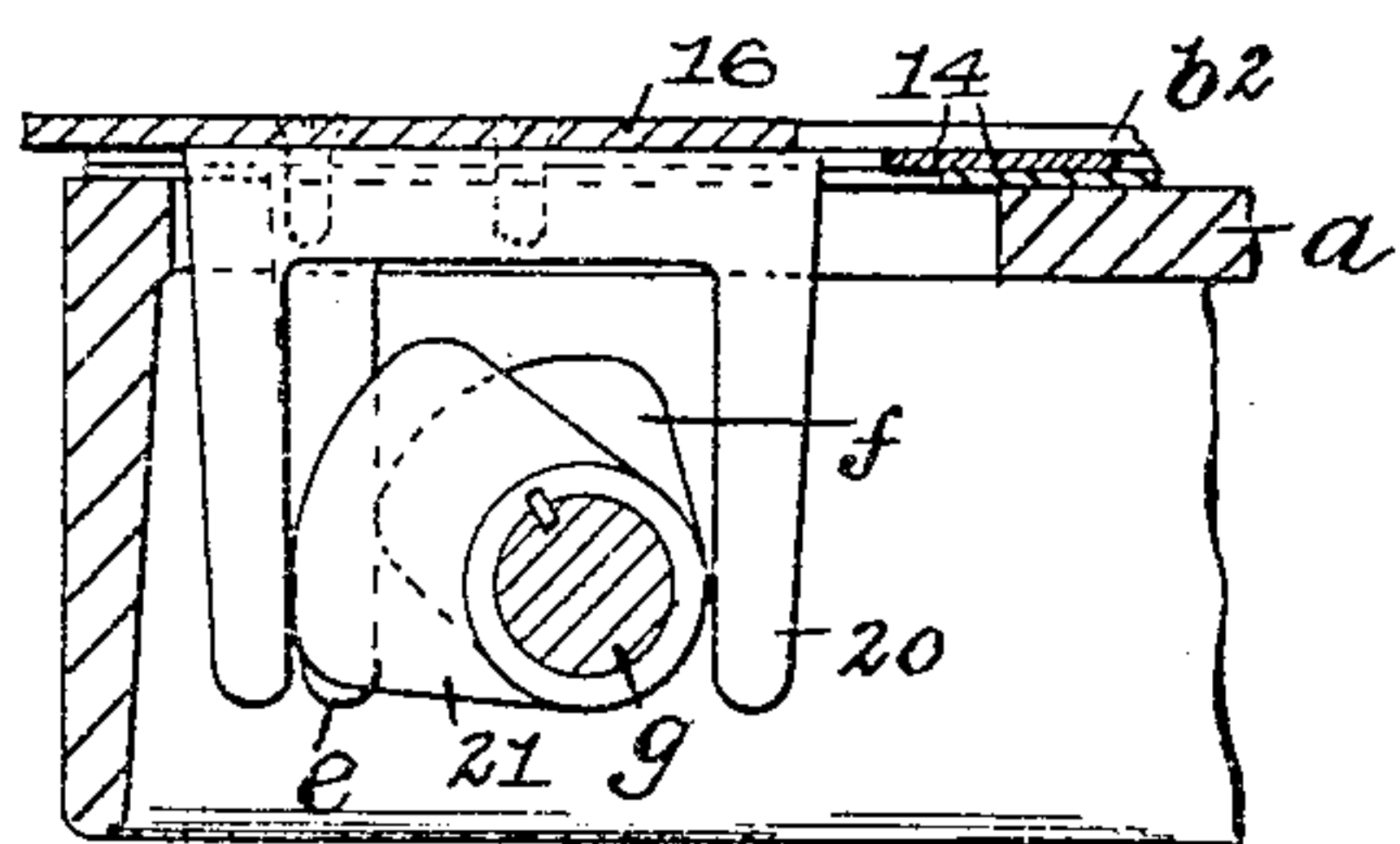


Fig. 6.

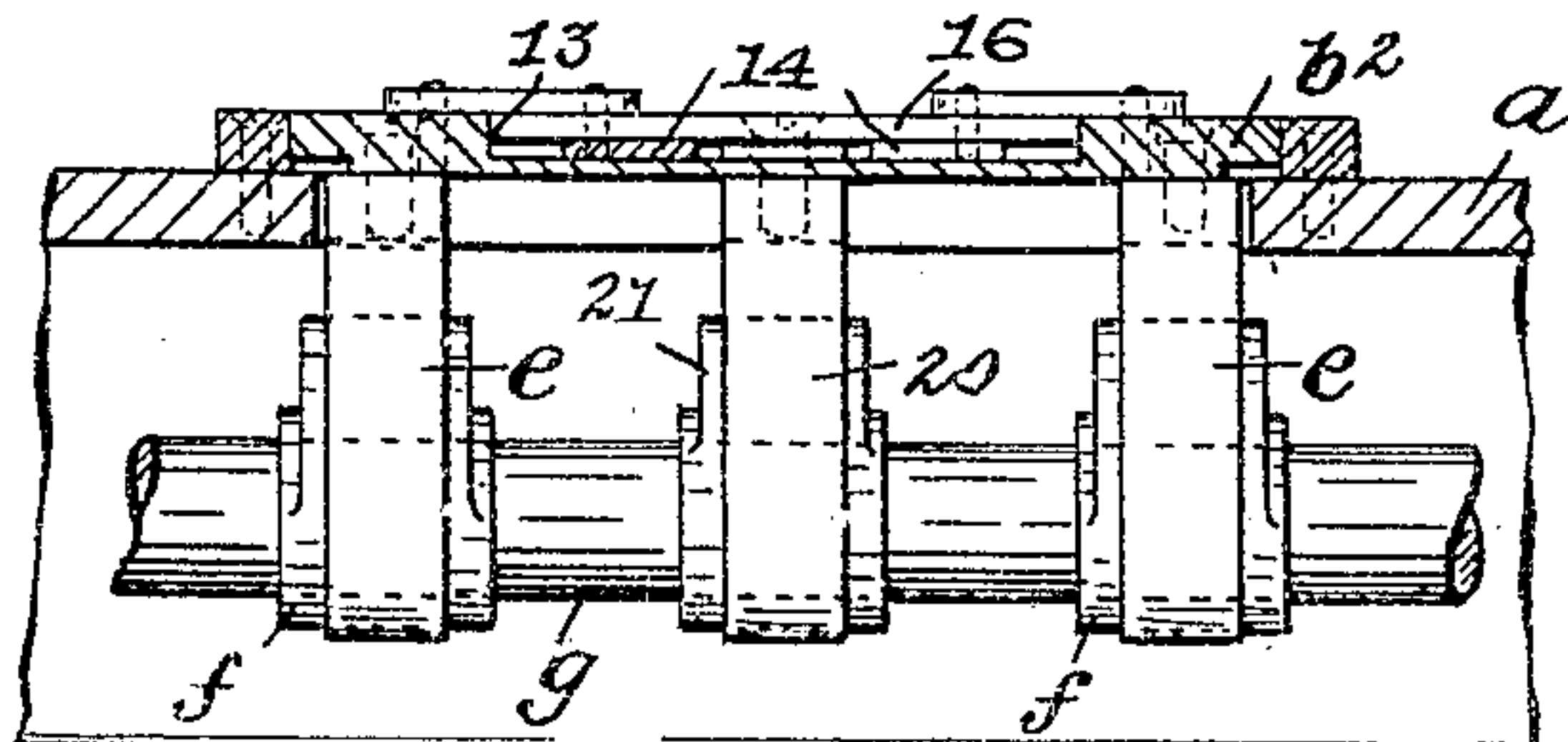


Fig. 7.

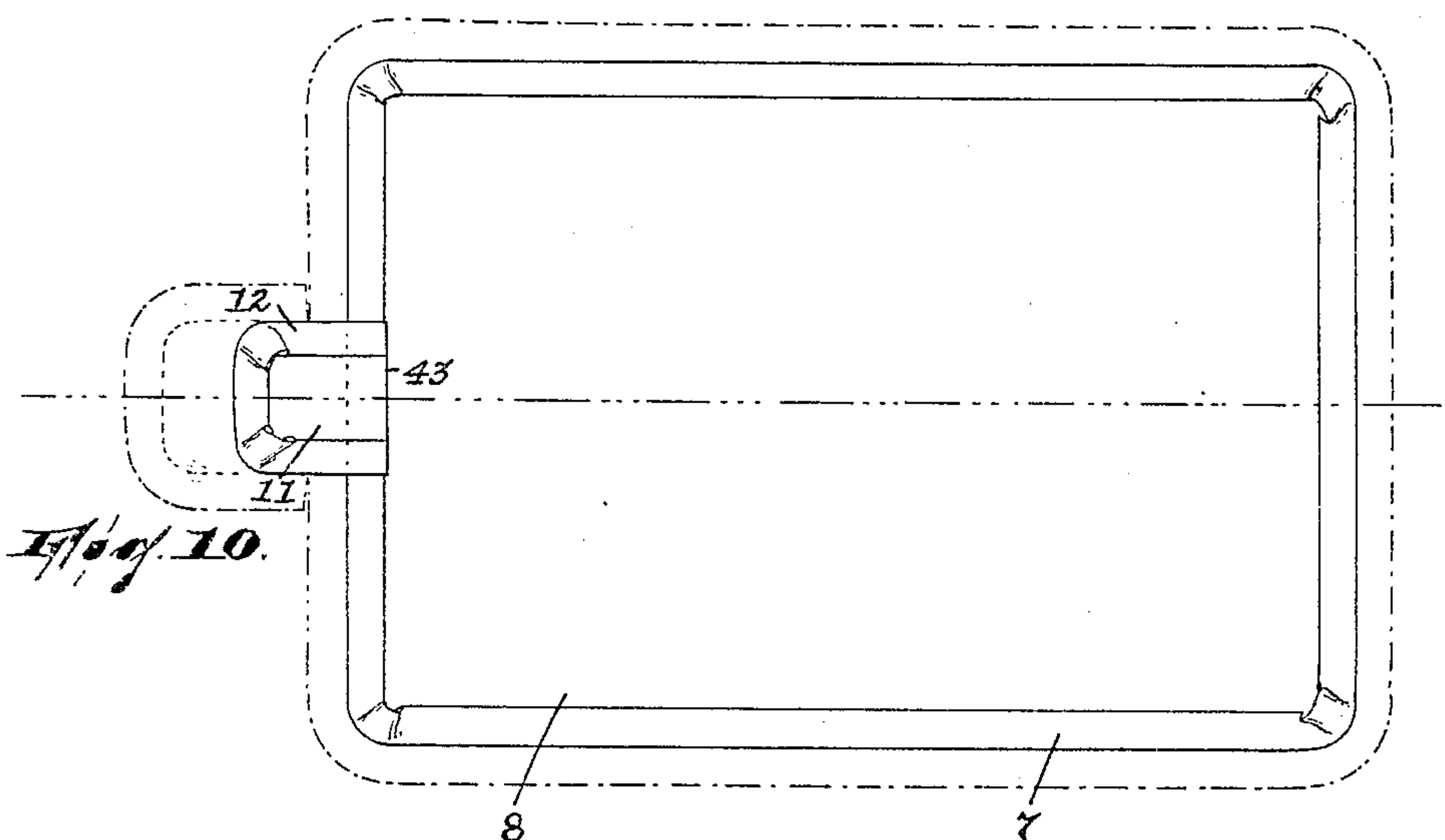


Fig. 10.

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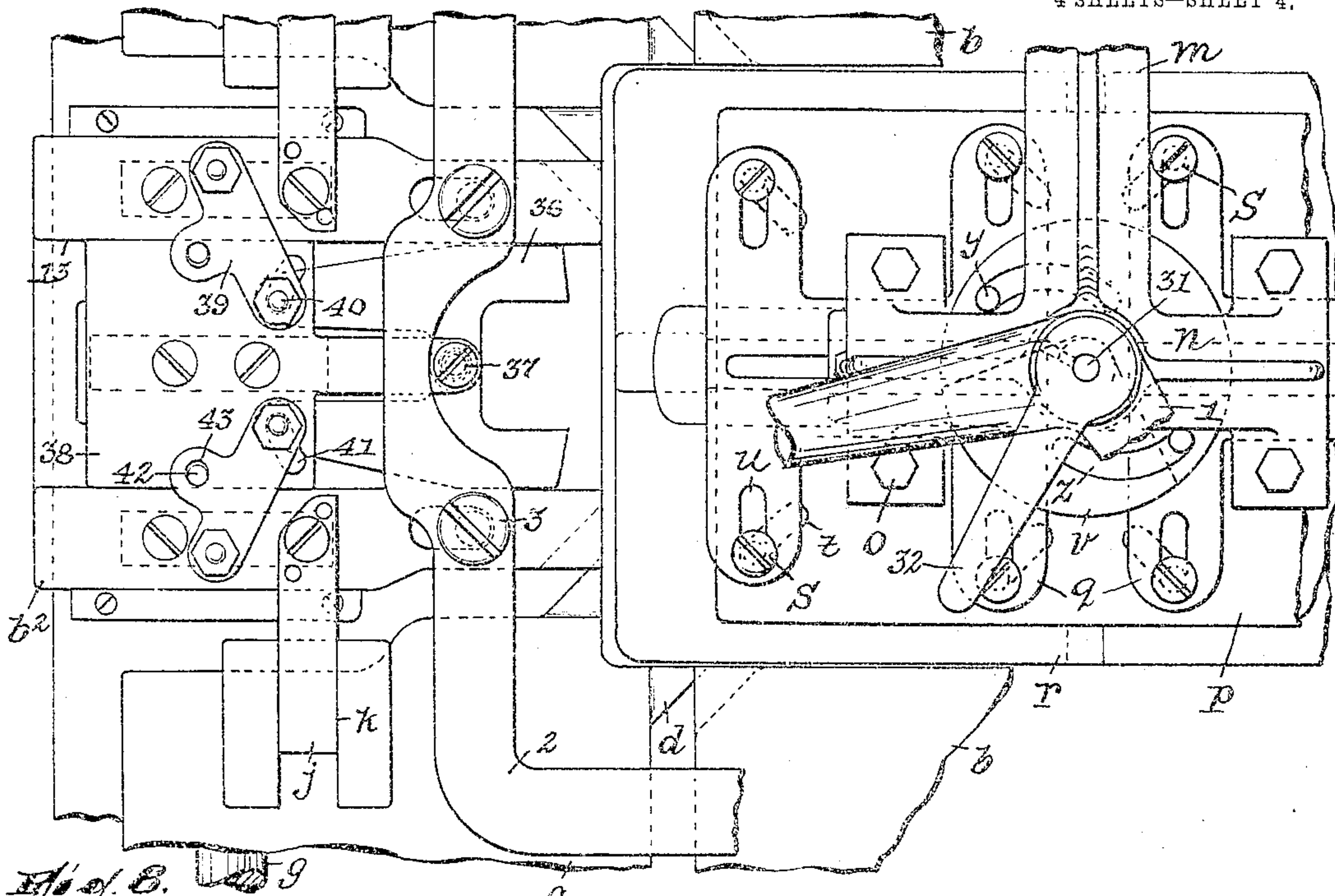
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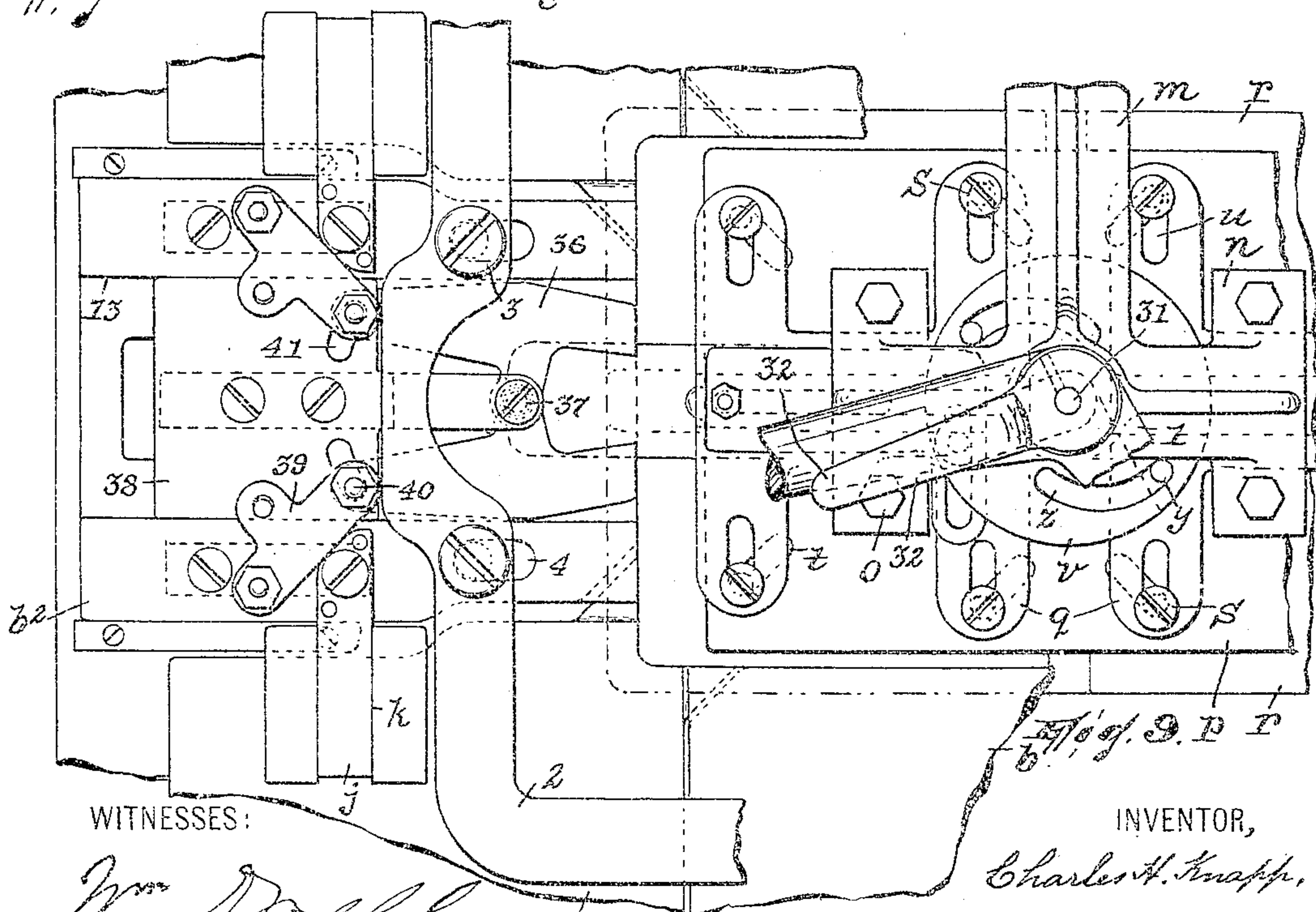
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4 SHEETS—SHEET 4.



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WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES H. KNAPP, OF PATERSON, NEW JERSEY.

MACHINE FOR FOLDING CUFF-BLANKS OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 778,751, dated December 27, 1904.

Application filed March 19, 1903. Serial No. 148,470.

To all whom it may concern:

Be it known that I, CHARLES H. KNAPP, a citizen of the United States, residing in Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Machines for Folding Cuff-Blanks or the Like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

My invention relates to machines of the general nature of those illustrated in my United States Letters Patent Nos. 668,920, 699,132, and 713,112; and it consists in a machine involving certain improvements applicable to the general class of machines indicated, as well as means for folding cuff-blanks or the like, which when completed have the formation illustrated in Fig. 10 of the drawings hereof.

The invention will be found fully illustrated in the accompanying drawings, wherein—

Figure 1 is a top plan view of one form of my improved machine, showing the die-plates and the surrounding folding-plates all retracted. Fig. 2 is a view similar to Fig. 1, but showing the main die-plates and main folding-plates in the folding position—i. e., with the latter overlapping the edges of the former. Fig. 3 is an enlarged top plan view of a portion of the machine, showing all the folding-plates and all the die-plates—i. e., the main folding and die plates and the folding and die plates for the tabs on the article to be folded—in their folding positions. Fig. 4 is a view, partly in elevation and partly in section, of the die. Fig. 5 is a top plan view of the actuating-disk of the die and of the sliding link which directly controls the tab-folding die-plate. Figs. 6 and 7 are vertical sectional fragmentary views taken on the lines *aa* in Fig. 1 and *yy* in Fig. 3, respectively, and looking in the direction of the arrow in

said figures. Figs. 8 and 9 are fragmentary views of another form of the machine, all the folding and die plates being in the one instance retracted and in the other instance contracted; and Fig. 10 shows the finished cuff-blank.

On the usual bed *a* of the machine, which may be heated by steam or otherwise in any well-known manner, is arranged a series of edge-folding plates *b* and *b'* *b*² and a series of corner-folding plates *c*, the inner acting corners of the latter of which are provided with thin triangular fins *d*, which project laterally under the adjacent corners of the plates *b b'* and *b*², as best seen in Fig. 1. The plates *b b'* and *b*² have projecting downwardly therefrom forks *e*, which receive cams *f* on a series of shafts *g*, arranged below the bed in rectangular disposition and connected by bevel-bearing *h*, so that when the actuating-crank *i*, which is carried by one of them, is turned all of the shafts turn in unison. It will be understood that the forks project down through openings provided in the bed and that the rotating of the shafts and cams backward or forward results in the inward or outward movement simultaneously of the folding-plates *b b'* and *b*². In order that the corner-folding plates *c* may move together with the folding-plates *b b'* and *b*², I provide the latter with tongues *j*, which overlap the former and take in grooves *k* in the corner-folding plates. The actuating-crank is limited to move only through substantially one hundred and eighty degrees by stops *l*.

m is an arm pivoted at the back of the bed and formed at its free end with a cross-piece *n*. To this cross-piece is fixed, as by bolts *o*, a plate *p*, between which and the cross-piece are guided two sliding plates *q*, the same being arranged to move to and from each other in a direction lengthwise of the cross-piece. Against the under side of the plate *p* lie the main die-plates *r*. These are arranged so as to move outwardly or inwardly in expanding or contracting the die, and to this end are provided with guide-pins *s*, which project upwardly through oblique slots *t* in the plate *p* and substantially transverse slots *u* in the

sliding plates q and whose heads (said pins being preferably screws) keep the die-plates in place.

The sliding plates q are actuated from a disk v , formed at the lower end of a sleeve w , which has bearings in the head x of arm m , by means of pins y projecting upwardly from the sliding plates and extending into eccentric slots z in the disk. The disk may be rotated from a crank 1, actuated itself in any desired manner.

2 is a substantially rectangular endless or continuous presser-plate, which may be drawn down against the edge-folding and corner-folding plates b , b' , b^2 , and c by headed rods 3, which project through slots 4 in the edge-folding plates and which may itself be drawn down upon by any suitable means. (See, for instance, my prior patents above referred to.) This presser-plate carries gages 5, arranged at right angles to each other and having longitudinal slots 6, which receive the set-screws for fixing said gages in position, said gages being adapted as guides for placing the blank to be folded.

As so far described the machine is adapted simply for folding the edges 7 of the blank 8. To this end the operator first places the blank on the bed, using the gages in order to properly dispose it, and then lowers the die, the same being at this time contracted. The die is then expanded by turning the handle 1 from the position shown in Fig. 1 to that shown in Figs. 2 or 3. Crank i is then turned until a recess 9 therein receives a spring-actuated detent 10, forming a temporary stop. This rotation of the crank is sufficient to turn cams f far enough so that they will have thrown the edge-folding and corner-folding plates b and b' , b^2 and c to their innermost limit, which is where their inner edges overlap the edges of the die-plates. The continued rotation of the crank i in the same direction effects upon the unfolding of the tab 11 the infolding of the edges 12 thereof, so that said tab assumes the disposition and shape shown in full lines in Fig. 10.

Edge-folding plate b^2 has a wide groove or rabbet 13 formed in its top surface, the same being of sufficient depth so that the thickness of the plate is materially reduced. In this groove or rabbet (referring to Figs. 1, 2, 3, 6, and 7) is arranged a pair of tab-edge-folding plates 14, which are kept down in the groove by set-screws 15 on the presser-plate 2. The rear end portions of folding-plates 14 are surmounted by an actuating-plate 16, sliding in the groove 13 and having transverse slots 17, which receive pins 18, projecting up from the folding-plates and forming pivots for parallel links 19, which connect the folding-plates 14 with the main edge-folding plate b^2 , so that when plate 16 is moved inwardly or outwardly a substantially oblique move-

ment is imparted to the folding-plate 14. In order to actuate plate 16, I provide a fork 20, which is carried thereby and projects down through the bed and plate 16 and is adapted to be actuated by a cam 21 on the corresponding shaft g , said cam being arranged to move the fork inwardly a little later than the other cams f move the forks e .

22 is the die-plate which coacts with folding-plates 14. It moves longitudinally with reference to plate p in a groove 23 in the under side thereof and carries a pin 24, which works in a slot 25, penetrating plate p , and another slot 26, penetrating the adjoining sliding-plate q . Pin 24 is connected by a link 27 with a crank 28 through the medium of a pin 29 on the crank and a transverse slot 30 in the link receiving said pin, said crank being on the lower end of a spindle 31, which penetrates the sleeve w and carries at its upper end an actuating-handle 32. The crank 28 is set in a sector-shaped recess 33 in the under side of disk w .

34 is an inclined shoulder on the die-plate 22, which when the die-plate is extended takes against the under side of plate p at 35 to hold the die-plate down, but which when the die-plate is retracted and said shoulder is unopposed to plate p at 35 permits a slight upward movement of the die-plate.

In that form of the invention shown in Figs. 8 and 9 a somewhat different mechanism for folding the tab edges 12 from that above described is provided. In the groove 13 is arranged a pair of folding-plates 36, which have a common pivot on a stud 37, projecting from a plate 38, arranged to also slide in groove 13 like plate 16. Each plate 36 is connected at its rear end with the main edge-folding plate b^2 by means of a pivoting-link 39, the pivots 40 between the links and plates 36 extending through curved slots 41 in plate 38. The plates 36 are given a scissors-like action by moving plate 38 backward and forward in groove 13. Their motion is limited by pins 42, arranged on plate 38 and working in openings 43 in the links. The fork 20 may be secured to plate 38 to transmit action from cam 21 the same as it transmits the cam's action to plate 16, as above described.

When crank i has been thrown to the position where it is temporarily stopped by detent 9, it leaves the tab projecting inwardly with its edges unfolded. The tab is next folded outwardly, its folding or creasing line being coincident with the inner edge of the fold of the blank from which it projects, as at 43 in Fig. 10. This is accomplished by turning handle 32 to the left, so that through crank 28, link 27, and pin 24 the die-plate 22 is thrown outwardly, folding the tab at 43. Thereupon crank i is thrown to the extreme limit of its motion, so that cams 21 are brought into ac-

tion to move the forks 20 and the plate 16 (or 38) controlled thereby inwardly. The effect of the inward movement of the plate 16 (or 38) is to move plates 14 (or 36) not only inwardly, but at their inner ends together, so that their forming edges 44 take an inwardly-oblique direction, and so fold back the edge 12 of the tab into the position shown in Fig. 10. The next step in the operation is that simply involved in effecting the pressing downwardly of the presser-plate 2, so as to permanently establish the creases in the blank where folded.

The machine is "opened," so as to permit the removal of the folded blank and the insertion of a new one, by first rotating crank *i* back to the starting-point and then turning crank 1 to the right. Crank 1 not only acts to directly contract the main die-plates, but as it turns disk *v* it brings the face 32 of the recess in said disk against crank 28, so that the latter causes the tab-folding die-plate 22 to retract.

The arrangement of tab-folding die-plate 22 is such that until it almost reaches its outer limit of movement it is free for slight vertical motion. This permits it to "ride up" on the tab, as it were, in unfolding the same; but at its extreme limit of motion its shoulder 34 engages plate *p* at 35 in such manner that the die-plate is held firmly down against the tab.

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

1. In a machine for forming reverse folds in cuff-blanks, the combination of the bed, several folding devices, two of which are movable in substantially the same direction in spaced planes and the third of which is movable substantially oppositely in a plane between the planes of movement of said first-named devices and in between said devices themselves, and means for confining said devices to their respective planes of movement, substantially as described.

2. In a machine for forming reverse-folds in cuff-blanks, the combination of the bed and several folding devices, two of which are movable in substantially the same direction in spaced planes and the third of which is movable substantially oppositely and in between said first-named devices, substantially as described.

3. In a machine for folding articles having projecting tabs, the combination of the bed, folding devices acting in reverse directions to fold back the portion of the blank having the tab, means for moving one of said folding devices to effect this folding, another folding device acting to fold back the tab relatively to, and subsequently to the folding back of, said portion, and means for moving said last-named folding device to effect this latter folding, substantially as described.

4. In a machine for folding cuff-blanks having projecting tabs, the combination of the bed, edge-folding devices arranged on the bed, a die having die-plates coactive with said edge-folding devices, a tab-folding die-plate carried by said die and movable therein to effect the folding, and tab-edge-folding plates carried by one of the first-named edge-folding devices and movable therein to effect the tab-edge folding, substantially as described.

5. In a machine for folding cuff-blanks having projecting tabs, the combination of the bed, folding devices acting in reverse directions to fold back the portion of the blank having the tab, and other folding devices acting to fold back the tab relatively to said portion and to fold back the tab edges, substantially as described.

6. The combination of the bed, an edge-folding plate, a die-plate coactive with said folding-plate, a tab-folding die-plate and a tab-edge-folding plate carried by said edge-folding plate and coactive with said tab-folding die-plate, said tab-edge-folding plate being movable in the edge-folding plate to effect the tab-edge folding, substantially as described.

7. The combination of the bed, edge-folding and tab-edge-folding devices arranged on said bed, and a movable die comprising die-plates coactive with the edge-folding devices, another die-plate coactive with the tab-edge-folding devices, and separately-actuating means for moving the respective die-plates, substantially as described.

8. In a die for a machine for folding cuff-blanks, the combination of a supporting member, a group of contractile die-plates arranged in said supporting member, another die-plate movable independently of said first-named die-plates, means for actuating said group of die-plates together, and separate means for actuating the independently-movable die-plate, substantially as described.

9. In a die for a machine for folding cuff-blanks, the combination of a supporting member, die-plates movable independently of each other and arranged in said supporting member, rotary actuating members, operative connecting means between one of said members and one of the die-plates, operative connecting means between the other member and the other die-plate, and a projection-and-recess connection between said members permitting one to move a part of its extent of movement independently of the other, substantially as described.

10. The combination of a suitable support, folding devices arranged the one over the other and each movable in the plane in which it lies and in the same direction as the other, together therewith, one of said devices being also movable to and from the other in a direction transverse of said plane, and contacting devices for

crowding said last-named folding device toward the other during its movement in the plane in which it lies, one of said contacting devices being carried by said last-named folding device and the other being relatively fixed and disposed in the path of movement of said first-named contacting device, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 2d day of 10 March, 1903.

CHARLES H. KNAPP.

Witnesses:

JOHN W. STEWARD,
JAMES B. NEWTON.