

(No Model.)

3 Sheets—Sheet 1.

W. H. NORTHALL.

MACHINE FOR FORMING SHEET METAL BOTTLE CAPS.

No. 374,553.

Patented Dec. 6, 1887.

Fig. 4.

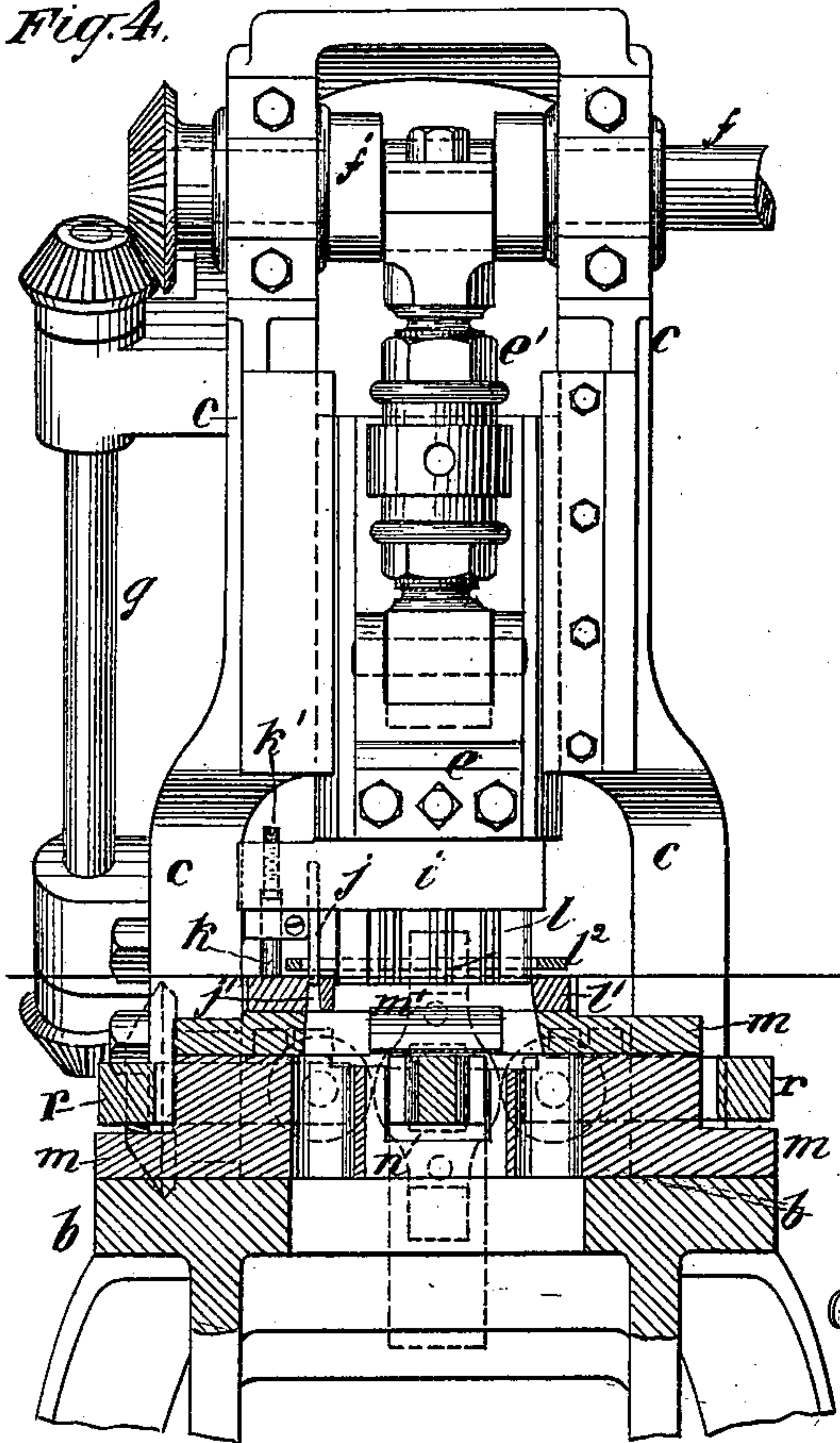


Fig. 2.

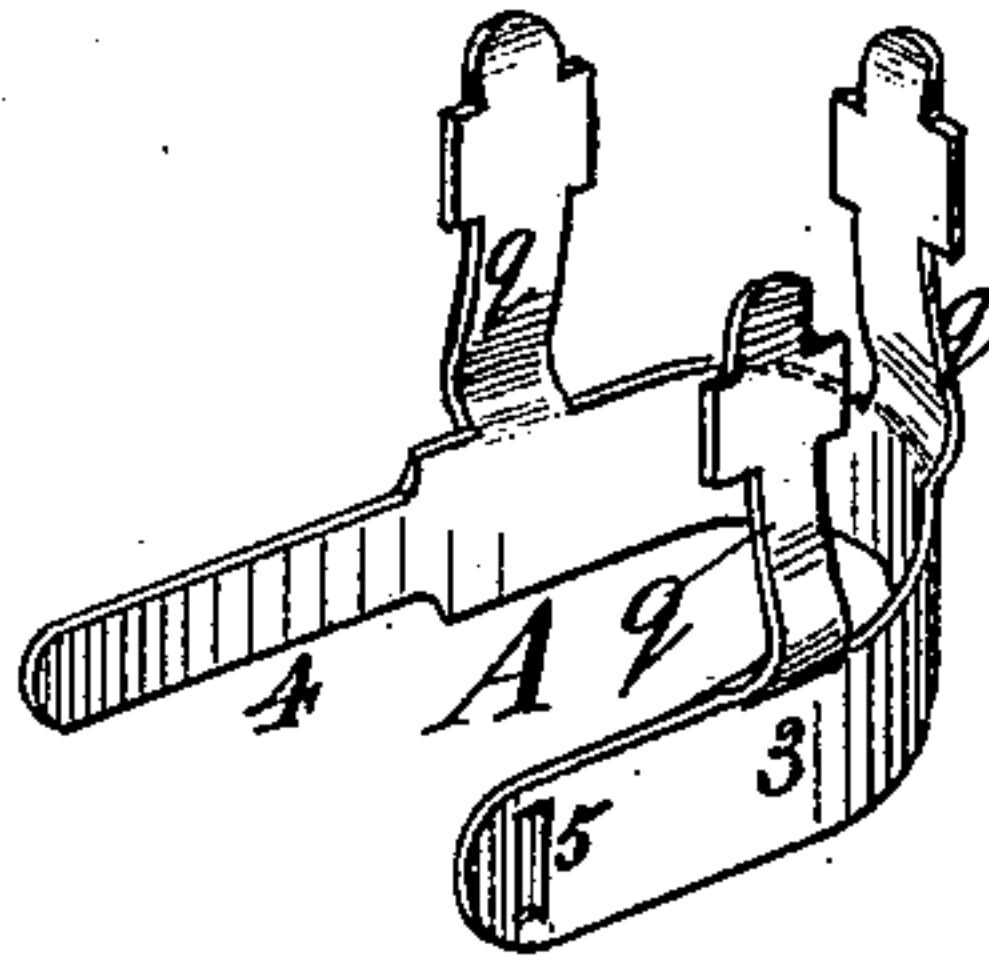


Fig. 3.

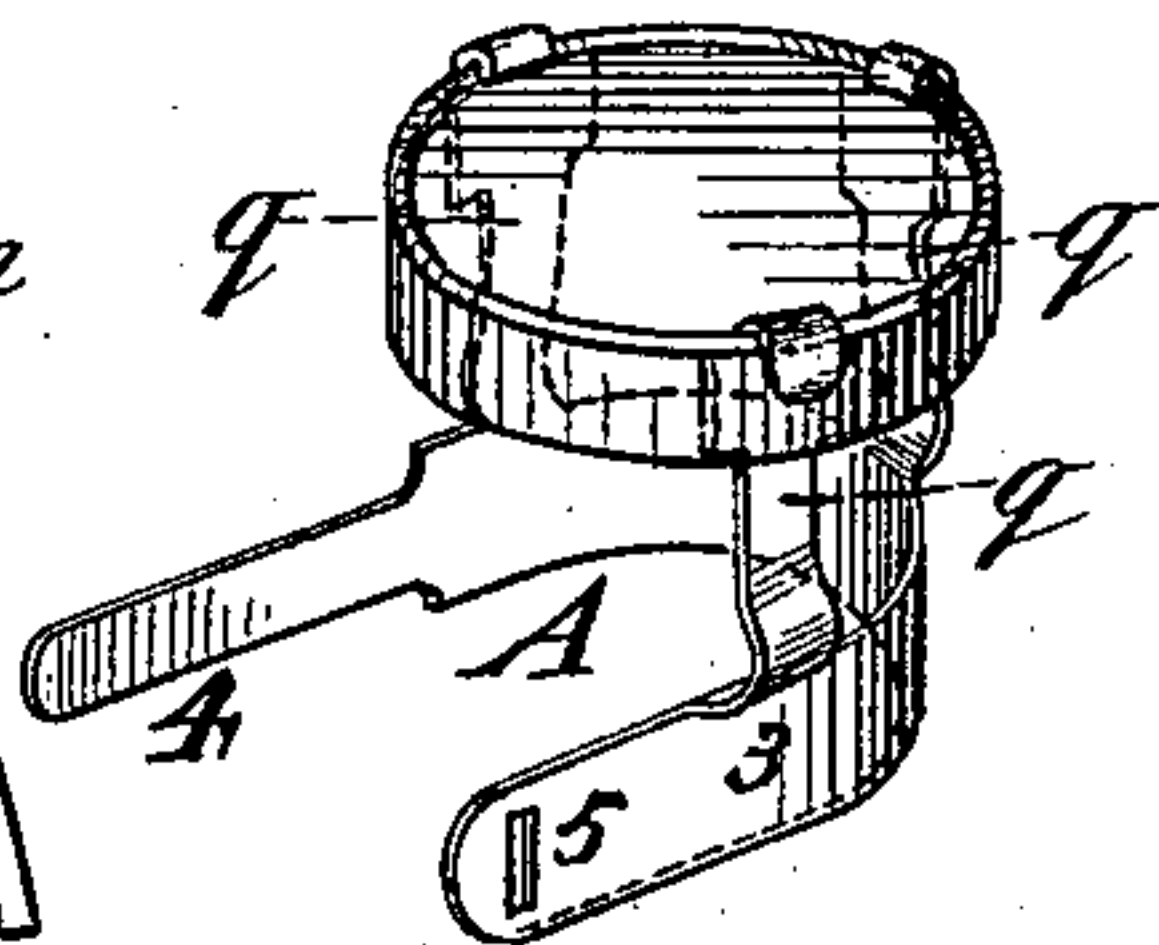
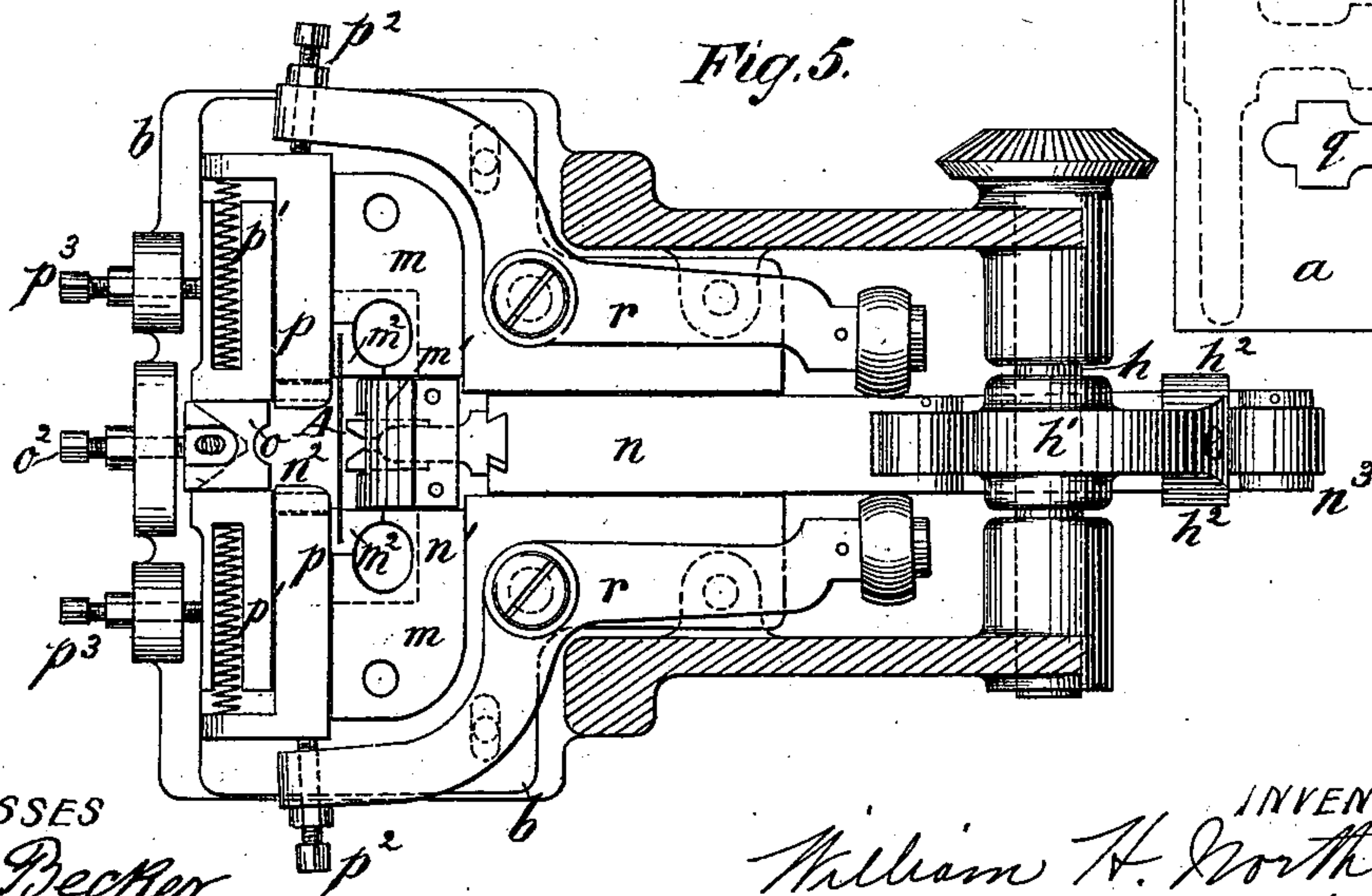


Fig. 5.

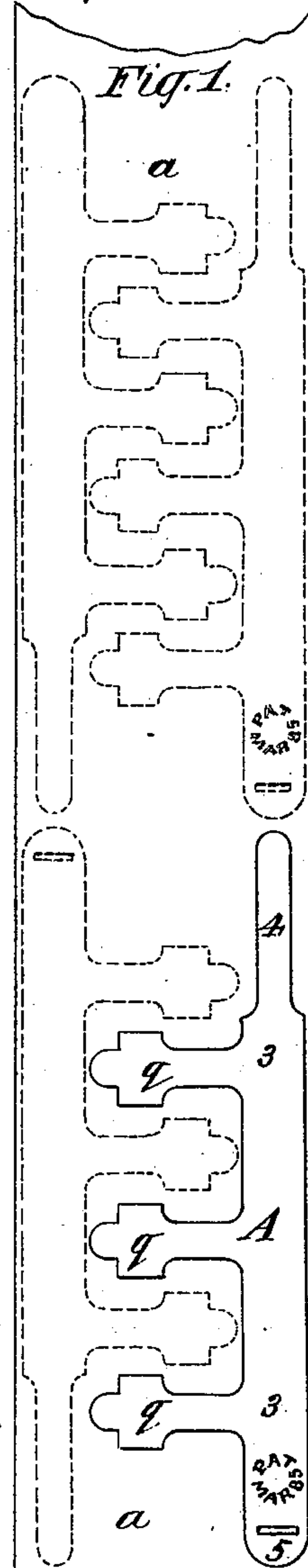


WITNESSES

John Becker
Geo. E. Gavin

INVENTOR

William H. Northall
by Chas. M. Higgins
Attorney



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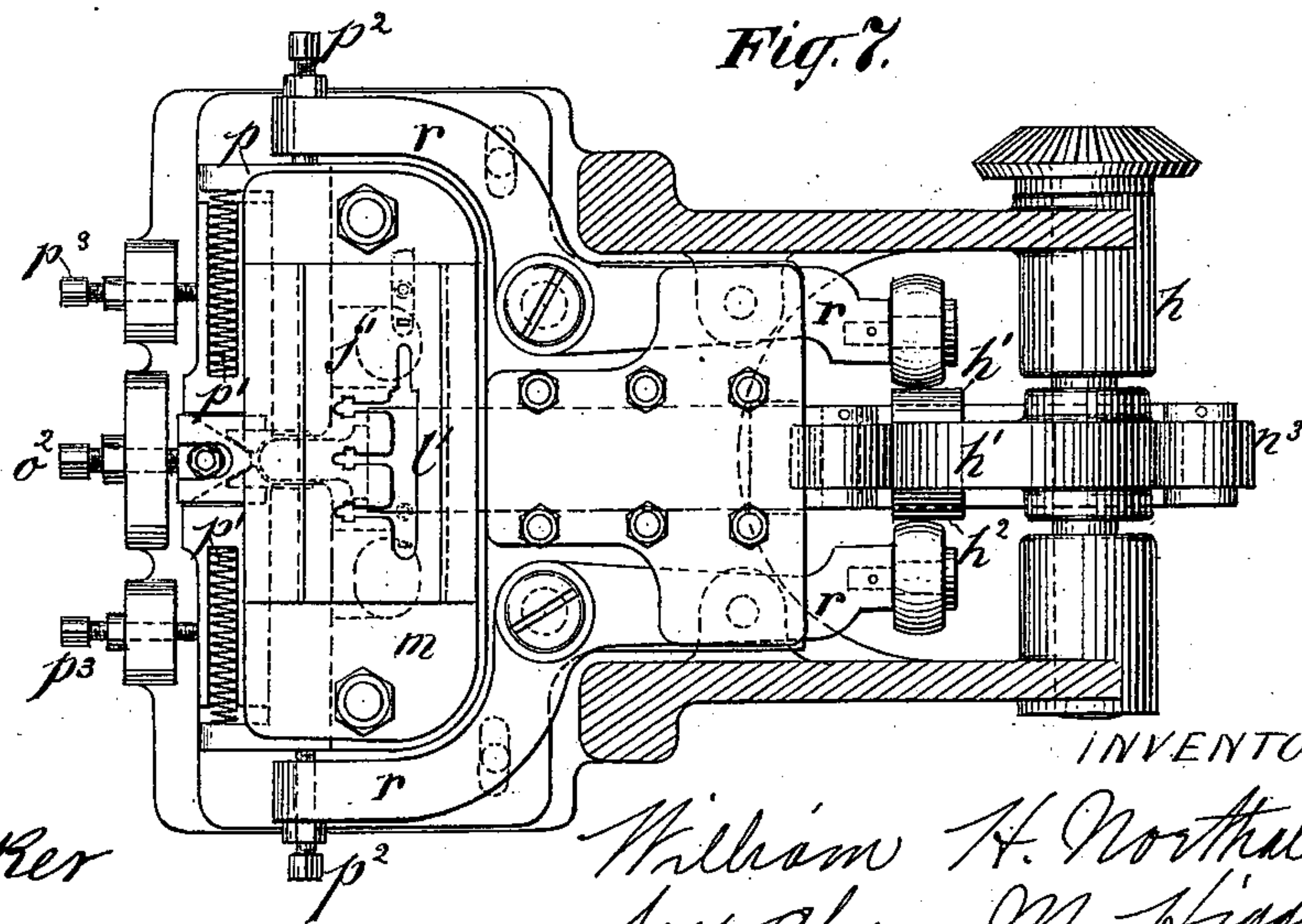
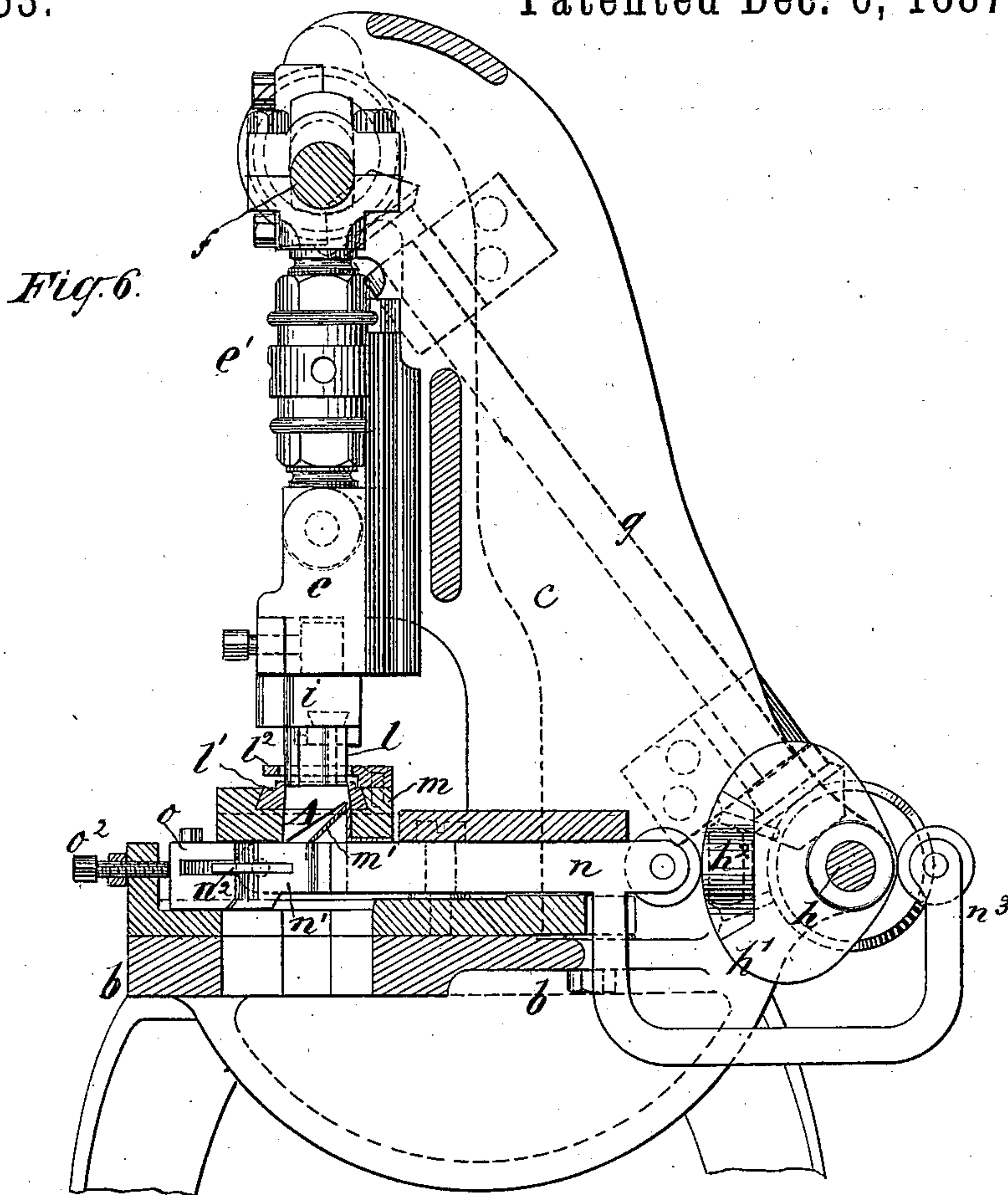
3 Sheets—Sheet 2.

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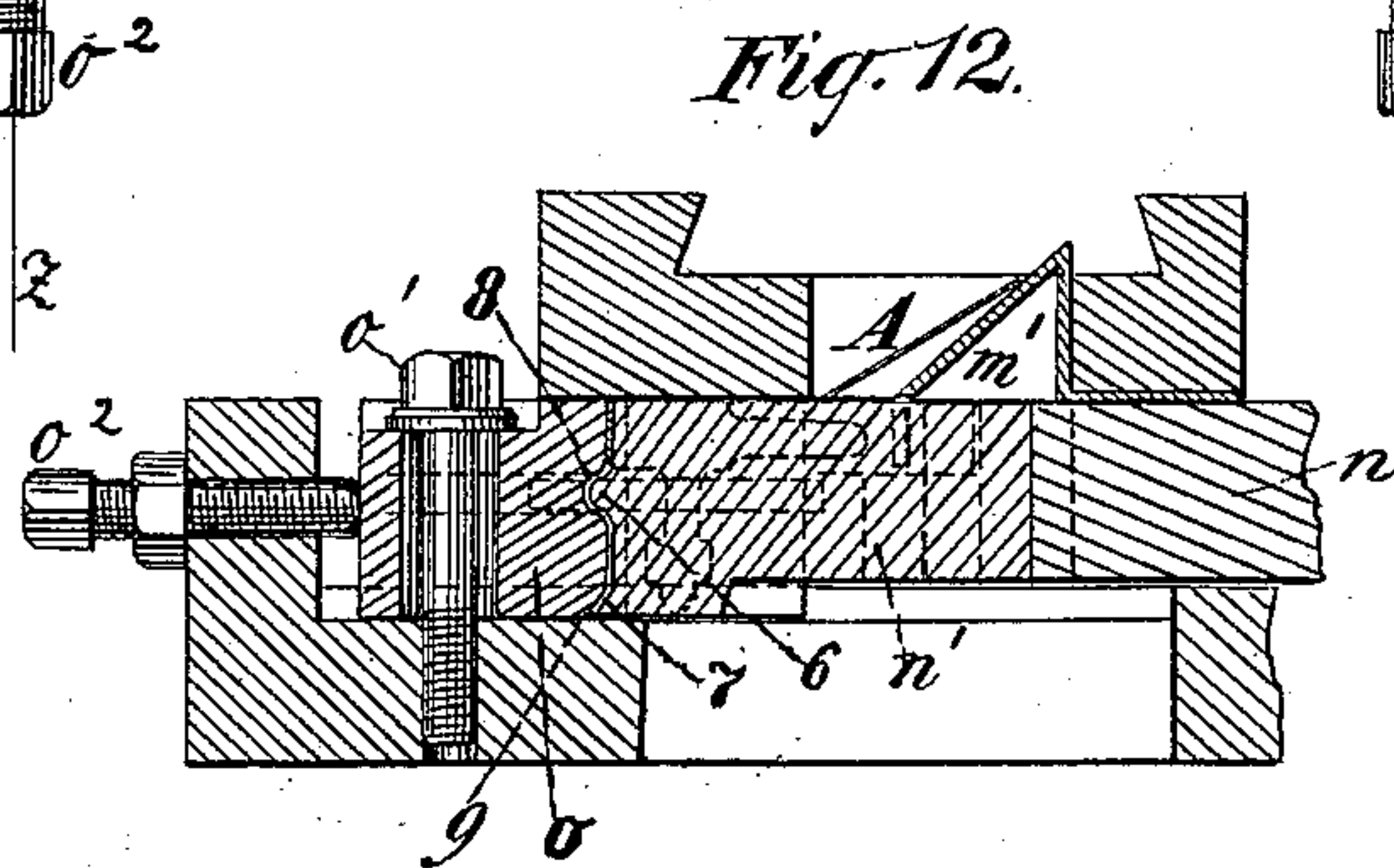
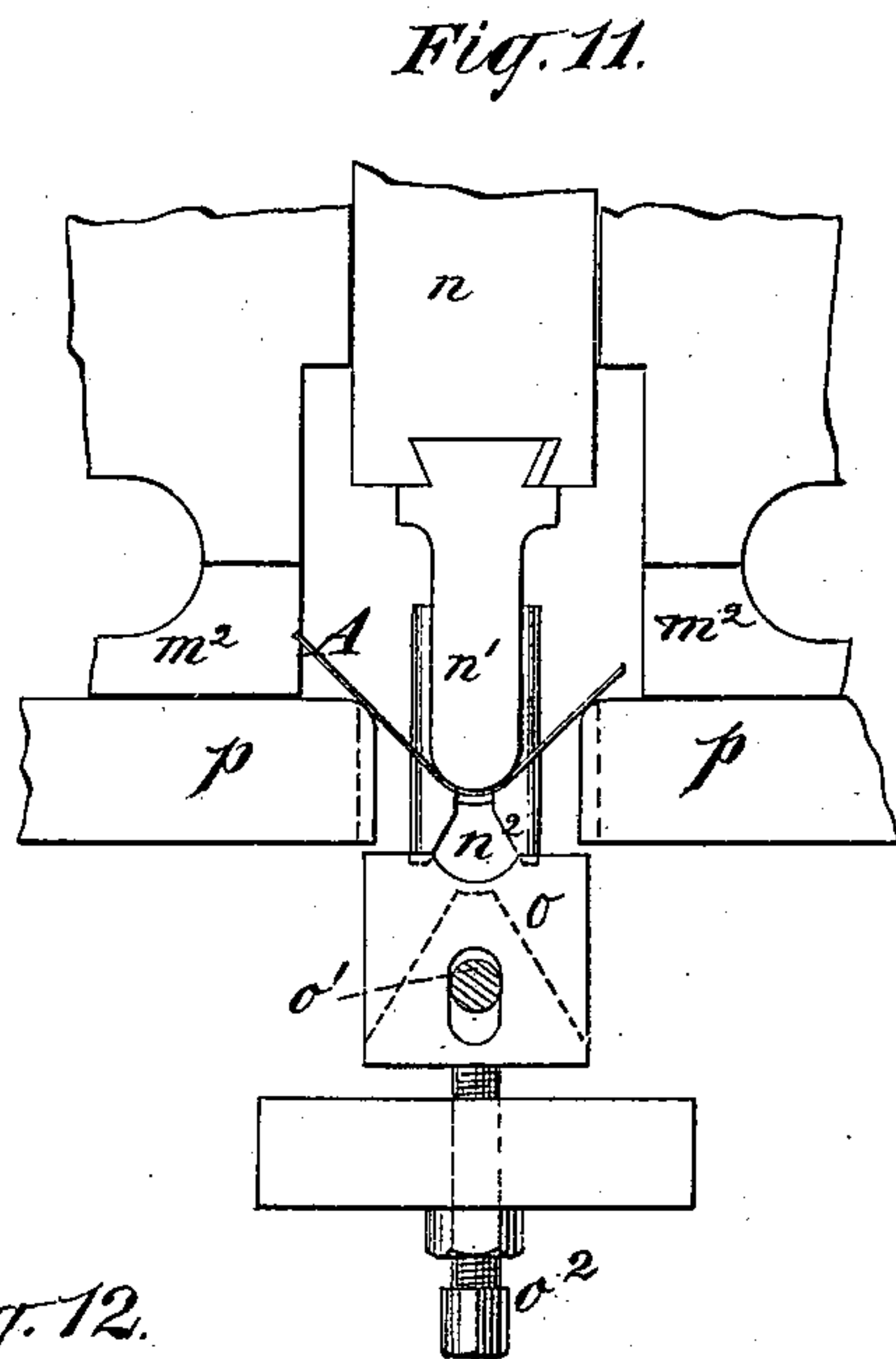
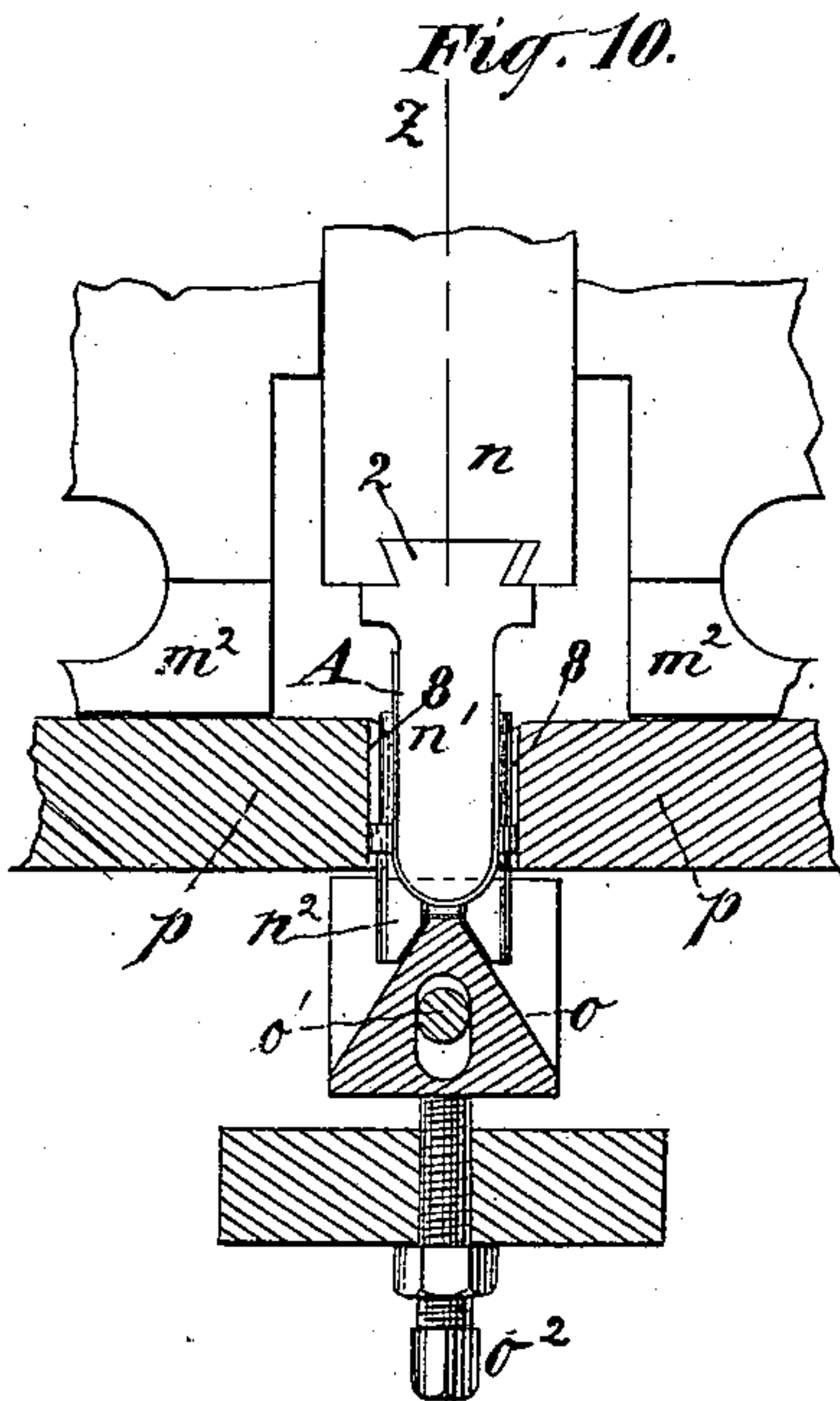
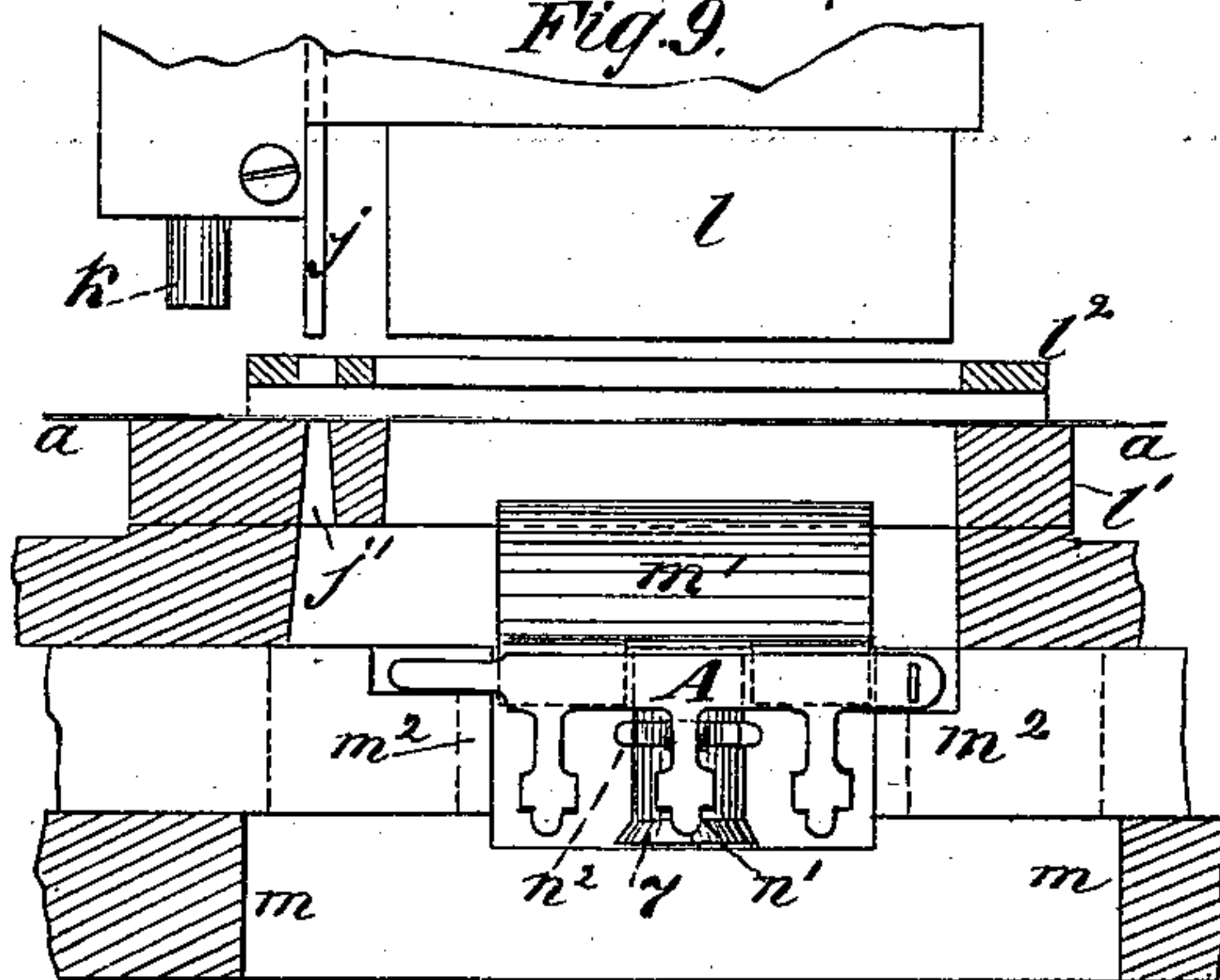
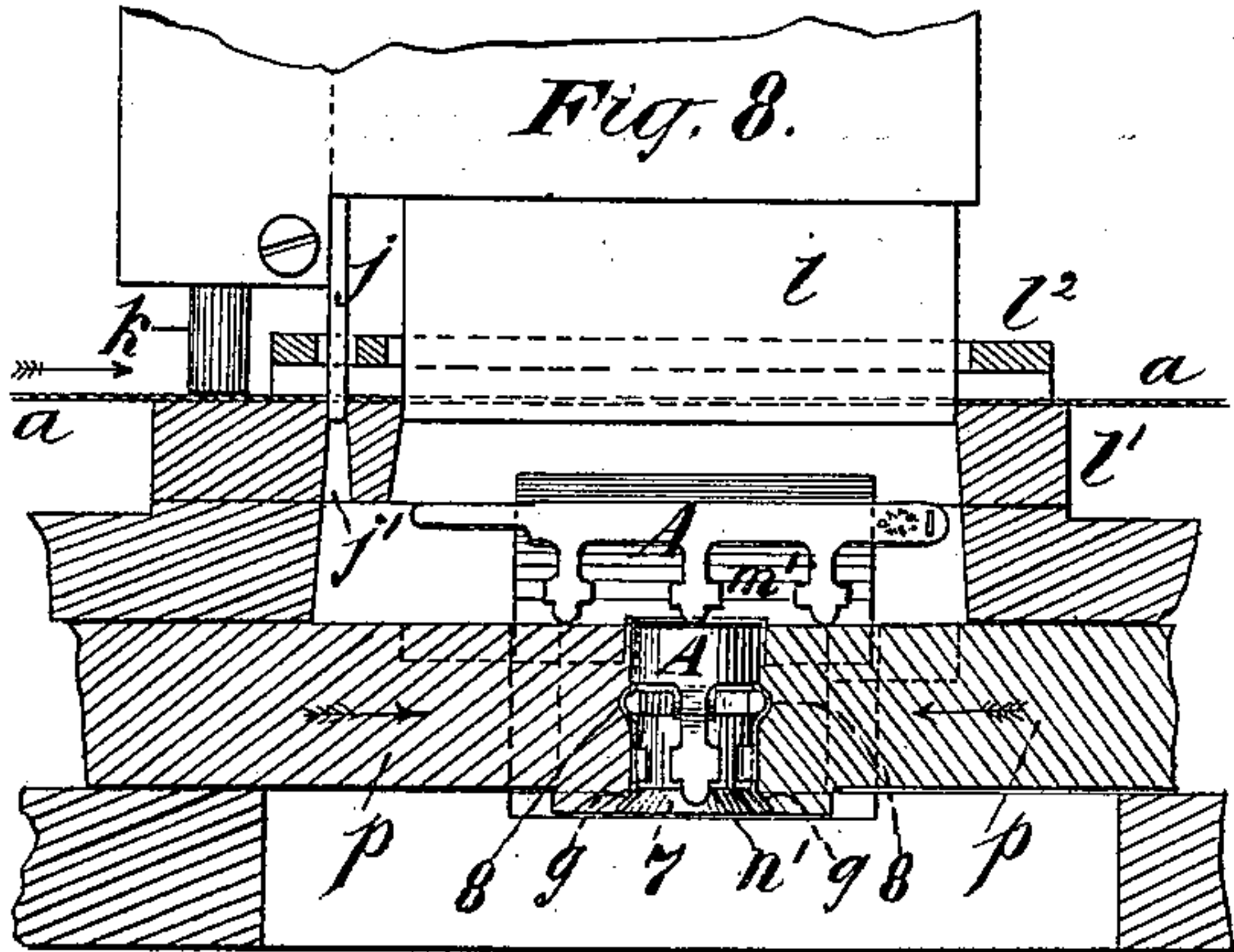
William H. Northall
by Chas. M. Hippind
Attorney.

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INVENTOR

William H. Northall
by Chas. M. Higgins.
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM H. NORTHALL, OF EVANSVILLE, INDIANA, ASSIGNOR TO THE
BERNARDIN BOTTLE CAP COMPANY, OF SAME PLACE.

MACHINE FOR FORMING SHEET-METAL BOTTLE-CAPS.

SPECIFICATION forming part of Letters Patent No. 374,553, dated December 6, 1887.

Application filed February 7, 1887. Serial No. 236,838. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. NORTHALL, of Evansville, Vanderburg county, Indiana, (assignor to the BERNARDIN BOTTLE CAP COMPANY, of same place), have invented certain new and useful Improvements in Cutting, Stamping, and Bending Presses for Making Bottle-Caps, of which the following is a specification.

My invention relates to the manufacture of sheet-metal bottle-caps of that class which consists of a neck-band adapted to buckle around the neck of the bottle, and formed with projections, prongs, or arms, which are secured to a cap which fits over the cork, and thus holds it securely in the bottle.

My present machine is designed to manufacture the pronged neck-band only, being adapted to cut the same from the sheet, stamp it, and bend or curve it into finished form to receive the cap, which is put on by a separate machine.

The object of my invention is to provide an automatic die-press or machine which will perform all the operations necessary to form said neck-bands successively and in rapid manner; and it consists in the combination, with a die-press, of dies to effect the cutting and stamping of the neck-band, with simultaneously-acting bending-dies, which receive the cut blanks as fast as they are delivered from the cutting-dies and bend the same into proper form, together with operating mechanism and various auxiliaries, as hereinafter fully set forth and claimed.

In the drawings annexed, Figure 1 represents a strip of sheet metal from which the blanks are cut, in which the full and dotted lines show the form of the blanks and the order in which they are cut from the strip. Fig. 2 is a perspective view showing the blank bent up into proper shape for the bottle-cap, this being the finished product of the machine. Fig. 3 shows a perspective view of the finished bottle-cap, the band shown in Fig. 2 having been tipped with a rimmed cap by a separate machine, which forms the subject of a separate application. Fig. 4 gives a front elevation of my improved machine or press, shown in section at the dies. Fig. 5 is a sectional plan above the die-tables, with the cutting-die re-

moved. Fig. 6 is a sectional side elevation. Fig. 7 is a plan above the cutting-die. Figs. 8 and 9 show enlarged fragmentary vertical sections of the cutting and bending dies, showing two stages of action on the blanks, and Figs. 10 and 11 give plan views of the same parts in corresponding stages. Fig. 12 is a longitudinal section of Fig. 10 on line *z z*.

Referring to Fig. 1, *a* indicates the metal strip or sheet from which the blanks are cut, and *A* at the lower end indicates one blank cut out of the same. This blank consists, as shown, of a neck-band, 3, having a buckling-tongue, 4, at one end, and a slot, 5, at the other end, into which the tongue buckles to secure the band around the bottle-neck, while from one side of the band three arms or prongs, *q*, project, having T-shaped tips, as shown. This band, after being cut and stamped, is curved or bent up into the form shown in Fig. 2, adapted to encircle the bottle-neck, and is finally provided with a rimmed cap clinched on the top of the arms, as seen in Fig. 3, thus forming the complete cap ready to be put upon the bottle. The present machines, however, produce the article only as far as Fig. 2, it being then passed to a second machine for the capping operation, which is not here illustrated, as it forms no part of the present invention.

Referring to Fig. 1, the dotted lines upon the sheet *a* show how the successive blanks are cut so as to economize metal, the arms of the band cut from one side of the sheet inter-meshing in position with the arms of the band cut from the opposite side of the sheet, thus reducing waste to a minimum.

Referring again to the drawings, Figs. 4, 5, 6, and 7 show general views of the improved machine or press for producing the neck-bands as they appear in Fig. 2. The press is an ordinary form of die-press in which my improvements are embodied.

b indicates the die-table or bed of the press, from which the upright overhanging arm or arms *c* arise, and between which is guided the sliding cross-head *e*, connected, as usual, by the connecting-rod *e'* to the crank *f'* on the main shaft *f*, mounted on the top of the arms *c*, and to which shaft the power is imparted, as usual. This shaft is connected by bevel-gearing to an

inclined connecting-shaft, *g*, at the side of the press, which in turn gears with a horizontal cam-shaft, *h*, at the back of the press, and from which cam-shaft all the movements for bending the blanks are produced, while the cutting and stamping of the blank are performed by the reciprocation of the cross-head direct from the main or crank shaft.

Referring to Figs. 4 and 6, *i* indicates the upper die-holder connected to the cross-head *e*, and to this die-holder are suitably secured the plunger or male part *l* of the cutting-die, the slitting-punch *j*, and the lettering-stamp *k*. The cutting-plunger *l* is of course shaped to cut out the neck-band or blank A, as seen in Fig. 1, and operates in register with the female die *l'*, which is secured to the top of the lower die-holder, *m*, on the table *b*, as best seen in Fig. 7, and which has an opening therein corresponding to the shape of the blank and to the shape of the punch *l*, as shown.

The slitting-punch *i* operates, in conjunction with a slot, *j'*, in the die *l'*, to form the buckling-slot 5 in the blank, as seen in Figs. 1 and 3, and the lettering-punch *k* comes down on the metal of the blank above the die *l'* to stamp the letters thereon, as shown in Fig. 1.

Referring to Fig. 4, the metal sheet *a* is fed to the right, and it may now be noted that the cutting-punch *l*, slitter *j*, and stamp *k* all act simultaneously with one stroke of the cross-head, but on successive blanks—that is, the cutting-punch *l* acts in advance of the parts *j k*, so as to cut out the blank which was slit and stamped by the previous action of the parts *j k*, while at the same time the parts *j k* act on the end of the next succeeding blank. By this means simplicity of dies and mechanism and accuracy and great rapidity of action are secured.

A stripper-plate, *l'*, frees the cut blank at the upstroke and causes the blank to fall through the opening in the die *l'* onto an inclined rest or shelf, *m'*, in the lower die holder, *m*. Now below said rest *m'* in the lower die-holder is arranged a central sliding bender or forming-die, *n*, acting in conjunction with a central abutting block or anvil, *o*, and two lateral sliding benders or dies, *p p*. These parts are best shown in Figs. 5, 6, 8, 9, 10, 11, and 12, being the parts which bend up the blank, after being dropped from the cutting-die, into the form shown in Fig. 2.

The central bender or slide, *n*, carries at the front end a hardened tip, *n'*, of suitably-rounded form, to correspond to the shape to be imparted to the blank, as seen in Figs. 6, 8, 10, 11, and 12, and also two flaring jaws or centering-fingers, *n''*, affixed rigidly on the tip, and this bending-slide *n* is actuated by the main cam *h'* on the cam-shaft *h*. Two side cams, *h''*, on the main cam *h'* act on two elbow-levers, *r r*, which are pivoted on the lower die-holder, *m*, and actuate the two lateral slides or benders *p p*, as well shown in Figs. 5 and 7. A bent arm, *n'''*, extending from the central bend-

ing slide, engages the opposite edge of the main cam *h'*, as seen in Figs. 5, 6, and 7, so as to insure a positive return as well as advance movement of the said slide. The return movement of the lateral slides *p p* and the levers *r r* is, however, produced by the springs *p'*, as will be understood from Figs. 5 and 7.

Now, referring to Figs. 6, 8, and 12, it will be noted that when the cutting-die *l* descends to cut a blank from the sheet the center slide, *n*, will be forced forward, so as to bring the forming-tip *n'* against the anvil-block *o* at the same time that the lateral benders *p p* are forced against the sides of the forming-tip *n'*, thus bending or curving around the blank which was previously cut and dropped from the cutting-dies. Now, when the bending-dies are thus forced together to bend the blank, as seen in Figs. 8, 10, and 12, the action of the cutting-dies will at the same instant have cut a second blank, which second blank will be dropped onto the shelf or stop *m'*, as seen in Fig. 1, with the prongs of the blank resting on the converged bending-dies, as seen in Figs. 8, 6, and 12, which converged dies will therefore prevent further descent of the cut blank. As soon, however, as the bending-dies are diverged or separated, as seen in Figs. 5 and 9, the cut blank will fall down within the grasp of the diverged dies in the path of the same, as well shown in Figs. 9 and 5, where the blank will now hang down edgewise, with each end supported trunnion-like upon a ledge, *m''*, in the middle of the die-holder between the tip *n'* of the center slide and the ends of the lateral slides *p p*, as clearly illustrated in said Figs. 9 and 5. Now, as the cutting-die descends to cut another blank, the center slide is advanced forward and the flaring guiding-jaws *n''* will pass on each side of the center prong of the blank and center it accurately upon the bending-tip *n'*, which, continuing to move forward, will thus bend the blank between the lateral slides *p* into a curved V form, as well shown in Fig. 11. At this stage the lateral slides *p p* are now forced in against the center slide, while the center slide advances against the anvil-block *o*, and at the same instant the lateral slides are pressed firmly against the center tip, *n'*, as shown in Figs. 10, 8, and 6, thereby accurately bending the blank into the desired form.

It will be seen that the center tip, *n'*, has a bead or projection, 6, and a beveled edge, 7, which fit the recesses 8 9 in the anvil-block *o*, and which thus form the curve in the center prong of the blank where it joins the neck-band, and also turns the tip of the prong outward, as shown in Figs. 1, 2, and 3. The faces of the lateral benders *p* have similar recesses, 8, and a reverse beveled edge, 9, (see Fig. 8,) which produce the same curve and bend in the outer prongs, as will be readily understood from Figs. 8, 9, 10, and 2.

It will be seen, on reference to Figs. 9 and 10, that the sides of the flaring jaws *n''* are

rounded on the edges to match the recesses 8 on the lateral slides *p*, and that the two outer prongs of the blank are bent or curved between the round edges of the said jaws and the recesses in the slides *p*, as well shown in Figs. 9 and 10. It will be also noted, on reference to Fig. 10, that the anvil-block is beveled off to allow the flaring ends of the guiding-jaws *n*² to approach without touching, while the tip *n'* forces the blank against the anvil-block, as will be understood from Figs. 10, 11, and 12. After thus bending the blank into form the return motion of the parts separates the bending-dies, and the bent blank falls off the tip *n'* through the opening in the die-table, as shown best in Figs. 1 and 6, and is received in a suitable receptacle below. If the jarring action in the separation of the die does not shake off the blank, then it becomes thrown off positively by the back motion of the center slide, which will force the ends of the neck-band against the downwardly-turned ends of the shelf *m'*, which lie in the path of the neck-band, as shown by dotted lines in Figs. 9 and 12. The machine will now have finished its operations and the removed blank will now appear, as in Fig. 2, bent into perfect form and ready to receive the cap to complete the article, as seen in Fig. 3.

It will now be seen, on reference to Figs. 10, 11, and 12, that the anvil-block *o* has ample means of adjustment relatively to the forming-tip *n'* in the screws *o'* and *o*². The lateral slides *p p* have also suitable means of adjustment in the screws *p*² and *p*³, as seen in Figs. 5 and 7.

Referring to Fig. 4, the stamping or lettering punch *k* has suitable means of adjustment in the screw *k'*, as will be understood.

It may now be appreciated that the several combined devices of the machine act to cut and form the blanks very rapidly and accurately and with little waste, and thus enable bottle-caps of improved form to be produced quite cheaply. The operations for cutting and forming are both successive and simultaneous in the one machine, requiring but the service of one attendant, which is thus a great improvement over machines which separately cut and separately form and require two or more attendants, as heretofore.

It will be readily understood that my invention is not confined to the particular operative mechanical connections between the different dies and the driving-shafts shown, as these may be varied without departing from the essence of my invention. For instance, the cams *h' h*², levers *r*, and connections *g* and *e'* might be varied considerably without departing from the main features of my invention.

For some purposes the anvil-block *o* and the punches *k* and *j* might not be necessary.

What I claim as my invention is—

1. The combination, with the cutting-dies *l l'*, of the bending-dies *n n' p p* and operative connecting mechanism, arranged and operating substantially as herein set forth.

2. The combination of the central bending-die, *n n'*, the centering-guides *n*², carried by said central die, and the lateral dies *p p*, between which the central die is projected, arranged and operating substantially as shown and described.

3. The combination, with the central bending-die, *n n'*, and its centering-guides *n*², of the lateral dies *p p* and anvil-block *o*, arranged and operating substantially as shown and described.

4. The combination, with the cutting-dies *l l'* and the rest *m'*, of the series of converging dies *p p n'*, substantially as described.

5. The combination, with cutting-dies *l l'*, a cross-head, *i*, carrying the movable cutting-die, and a driving-shaft, *f*, from which said cross-head is reciprocated, of a cam-shaft, *h*, operatively connected with said driving-shaft, and a series of converging bending-dies arranged below the delivery-throat of the cutting-dies and operatively connected with the cams on said cam-shaft, substantially as shown and described.

6. The combination, with the crank-shaft *f*, cross-head *e* and connection *e'*, and cutting-dies *l l'*, of the cam-shaft *h*, connected with the crank-shaft, and bending-dies *n n' p p*, arranged below the delivery-throat of the cutting-dies, and operative connections between said cam-shaft and bending-dies, substantially as shown and described.

7. The combination, with the crank-shaft *f* and cross-head *i*, connected therewith, and cutting-dies *l l'*, actuated from the cross-head, of the cam-shaft *h*, driven from shaft *f*, cams *h' h*² on said shaft, with levers *r r*, and dies *p p* and *n n'*, operated by said cams, substantially as shown and described.

8. The combination of the punches *k j l* and dies *j' l'* with the convergent bending-dies *n n'* and *p p*, arranged and operating substantially as shown and described.

9. In a machine for bending blanks such as described, the combination, with the central bender, *n'*, having the bead or projections 6 and inclines 7, of the lateral benders *p p*, having corresponding recesses and inclines, substantially as and for the purpose set forth.

10. In combination with cutting-dies *l l'*, with a ledge, *m*², in the delivery-throat thereof, adapted to support the cut blank, trunnion-like, a slide, *n*, carrying flaring guide *n*², operating below said ledge, substantially as and for the purpose set forth.

WILLIAM H. NORTHALL.

Witnesses:

PHIL P. PUDEK,
C. H. S. BENNETT.