

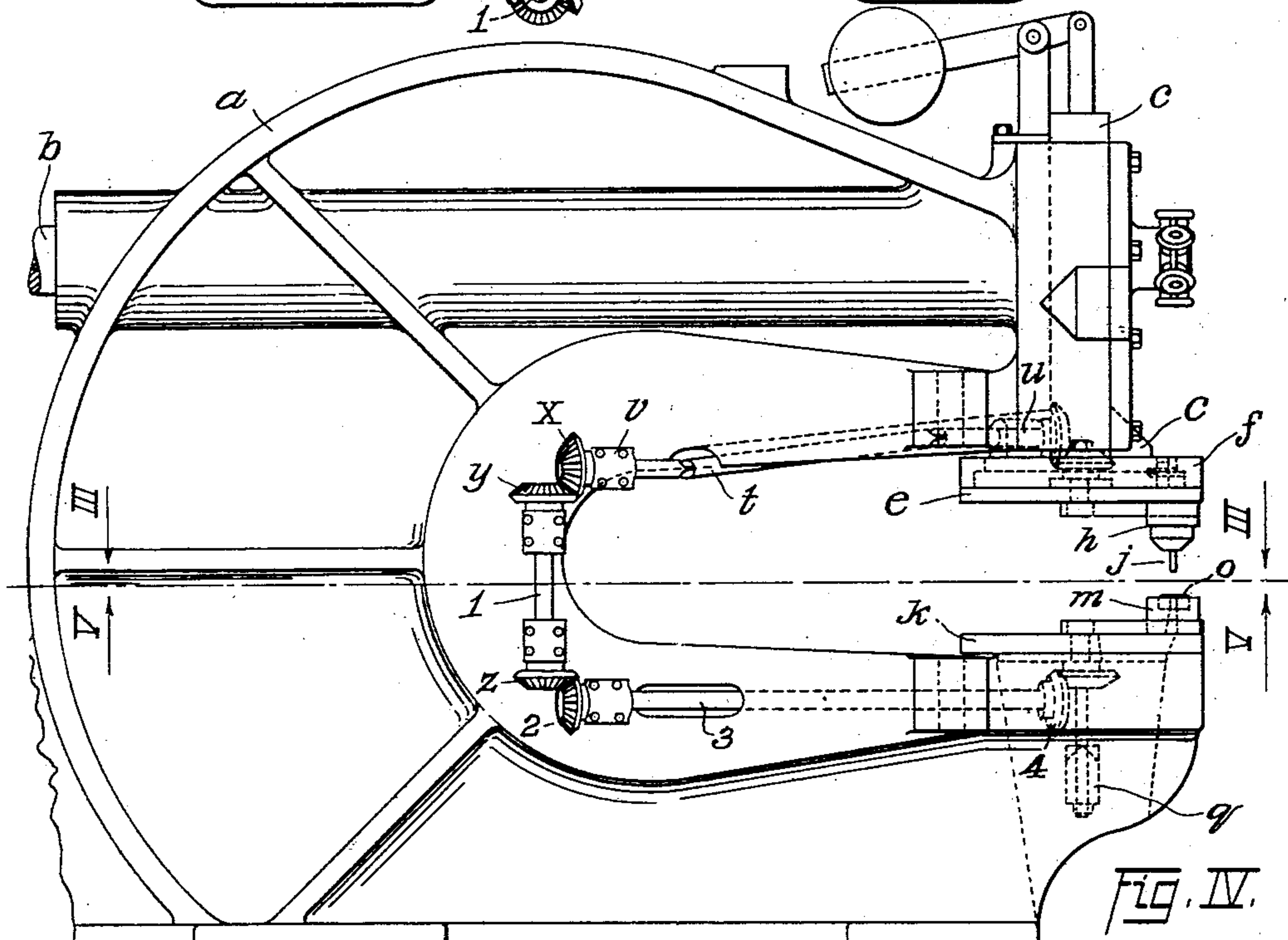
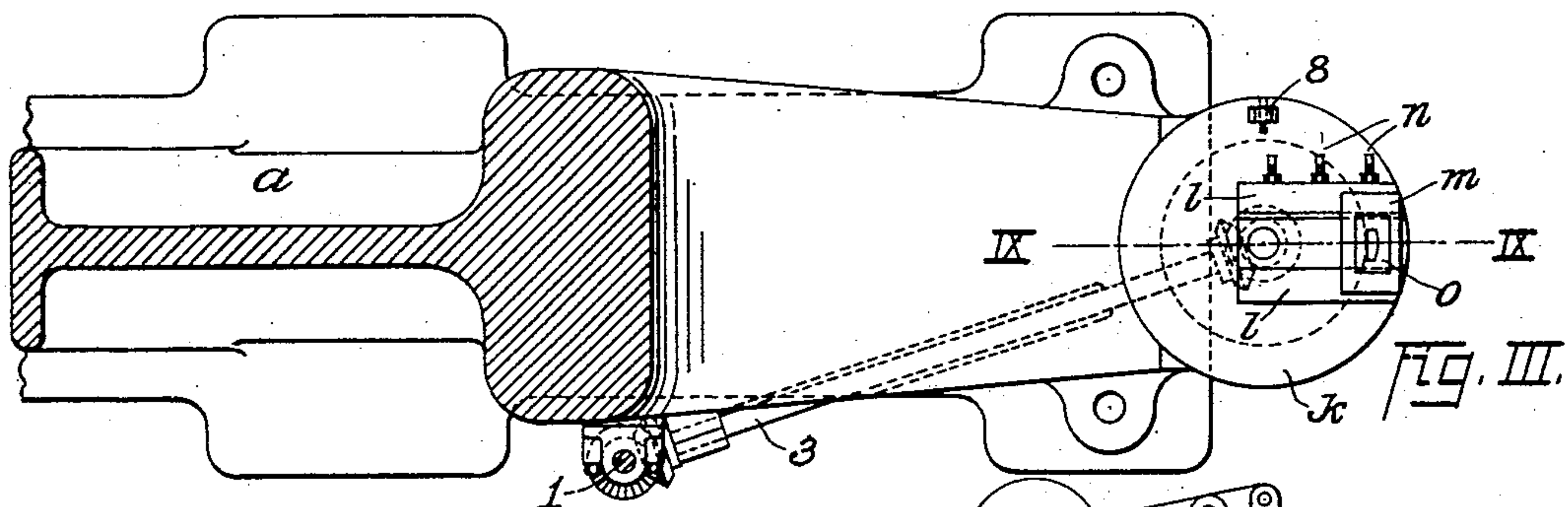
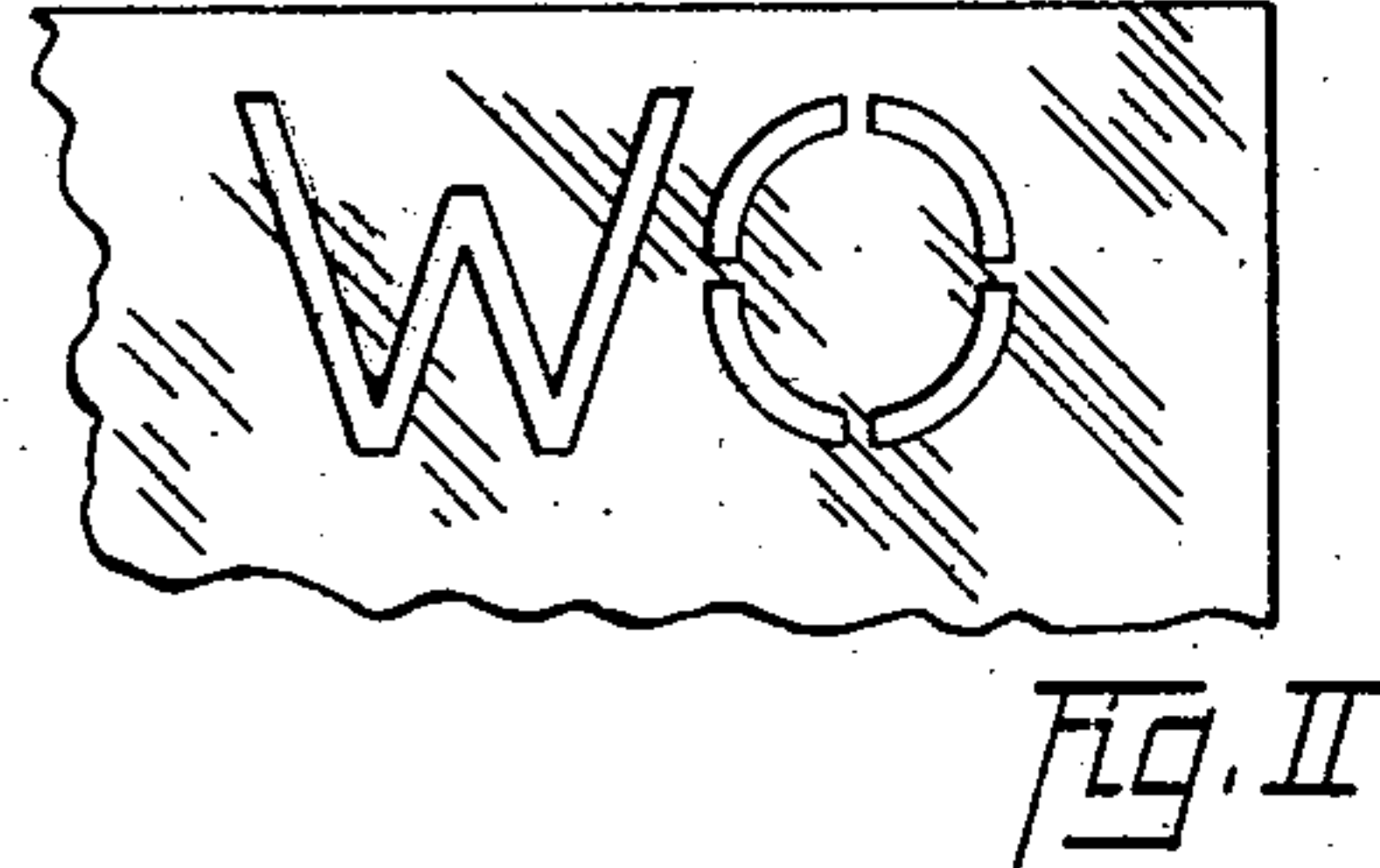
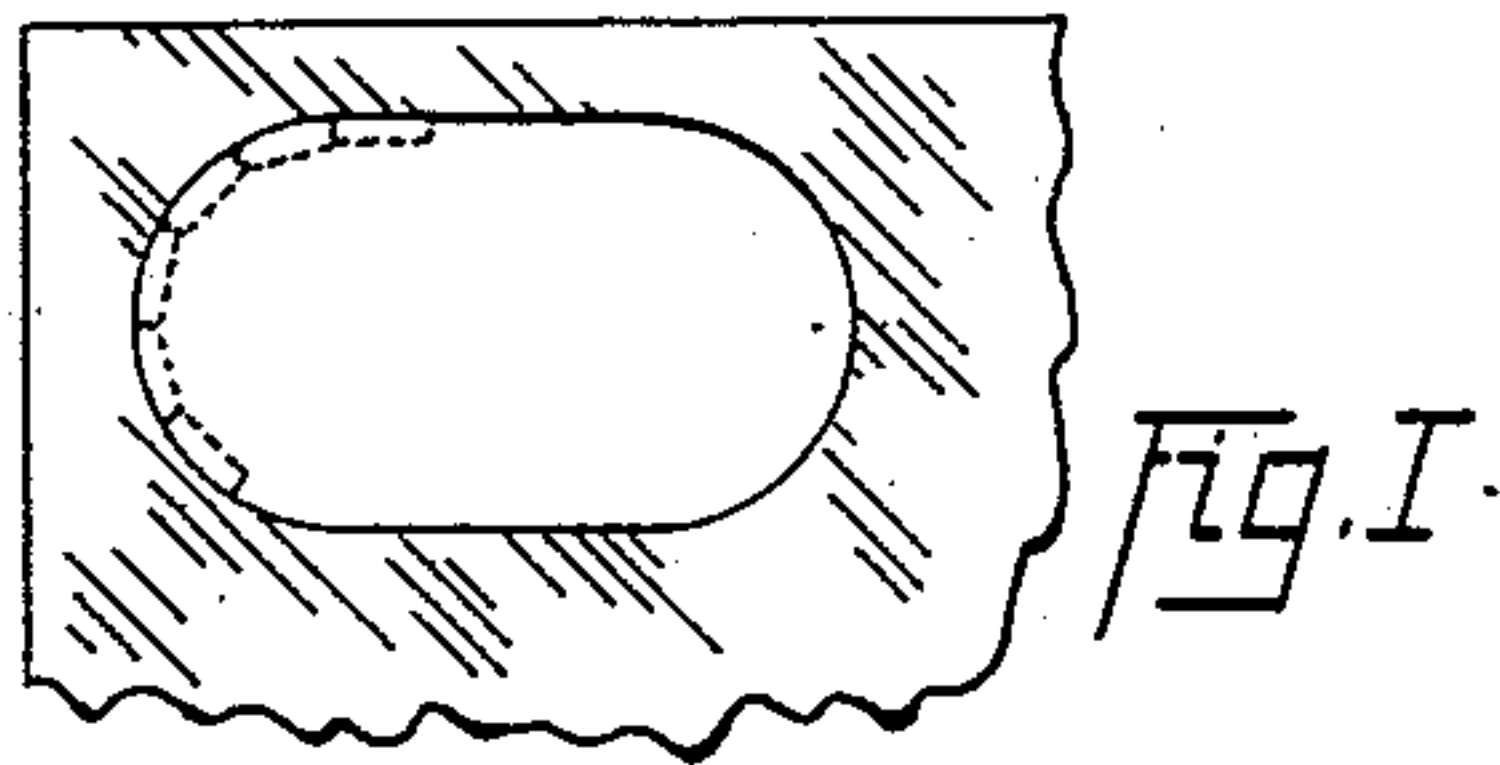
No. 751,723.

PATENTED FEB. 9, 1904.

J. F. DOOLITTLE.  
UNIVERSAL SLOTTING PUNCH.  
APPLICATION FILED JUNE 18, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

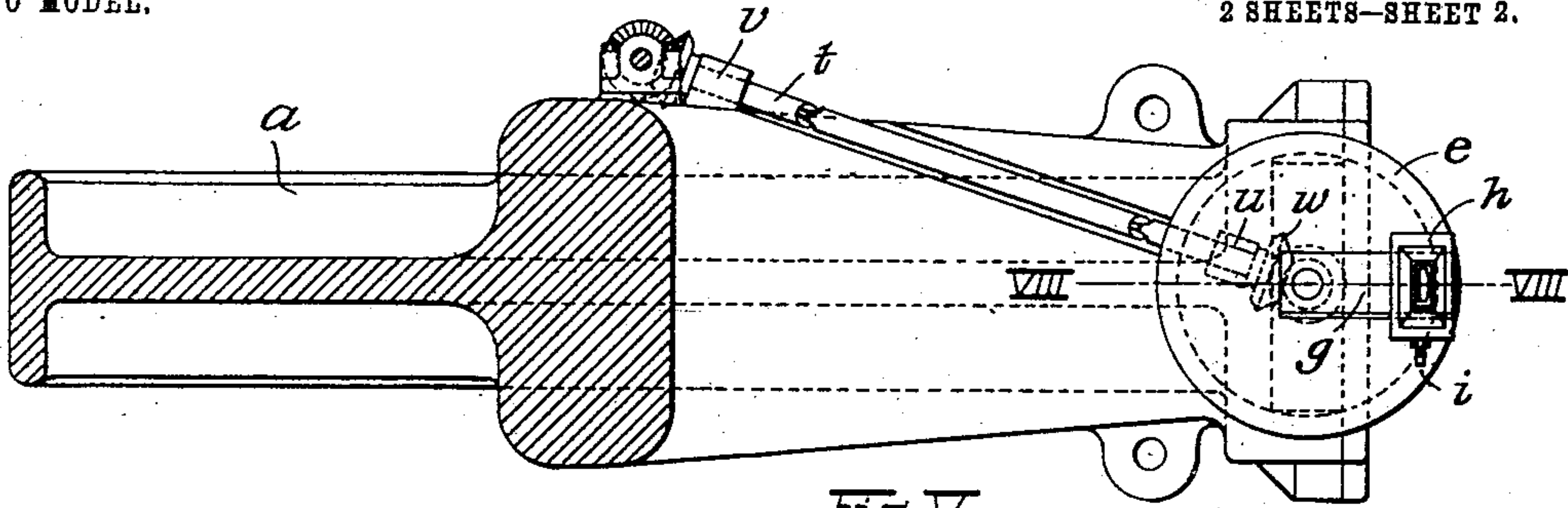


Fig. V.

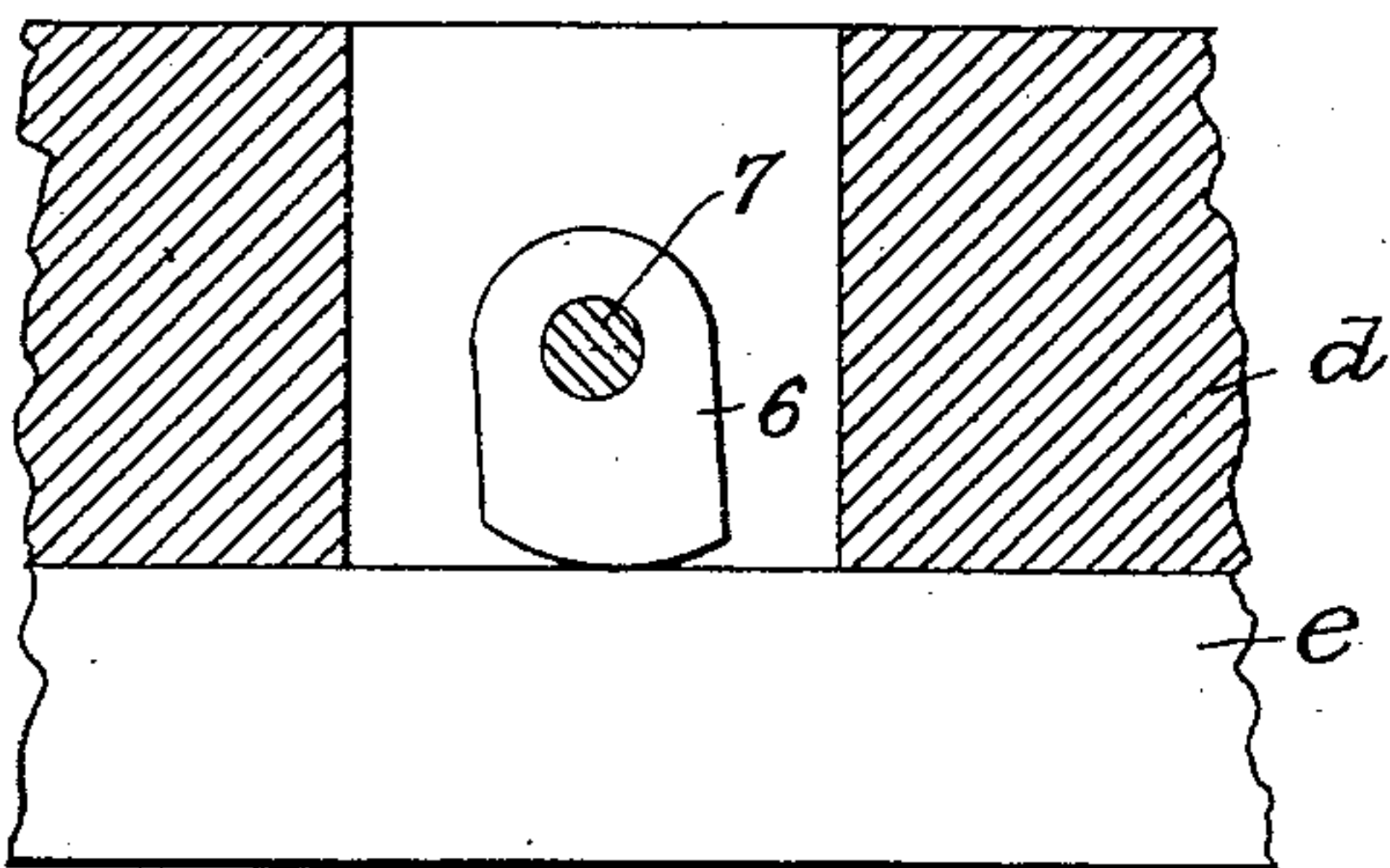


Fig. VII.

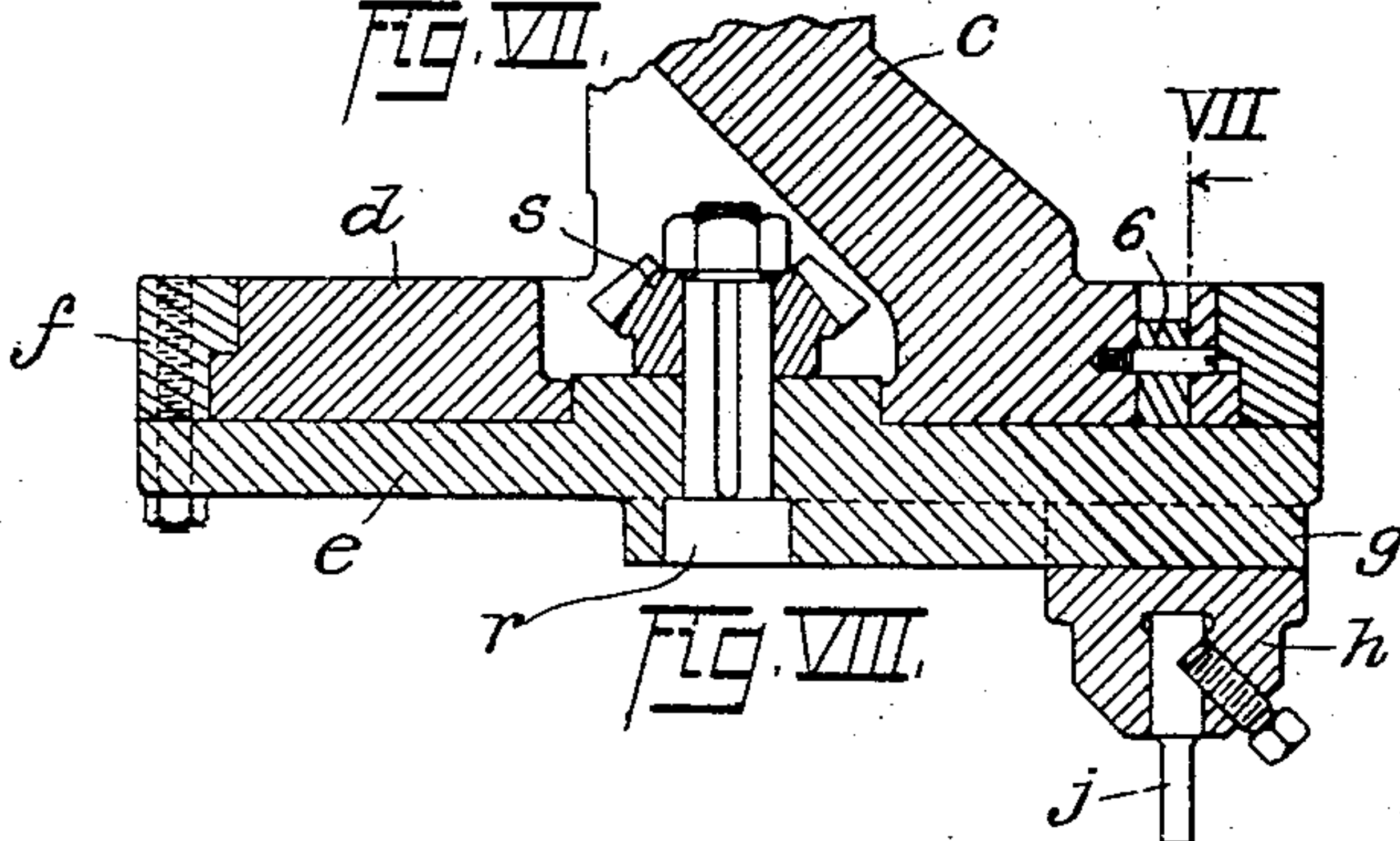


Fig. VIII.

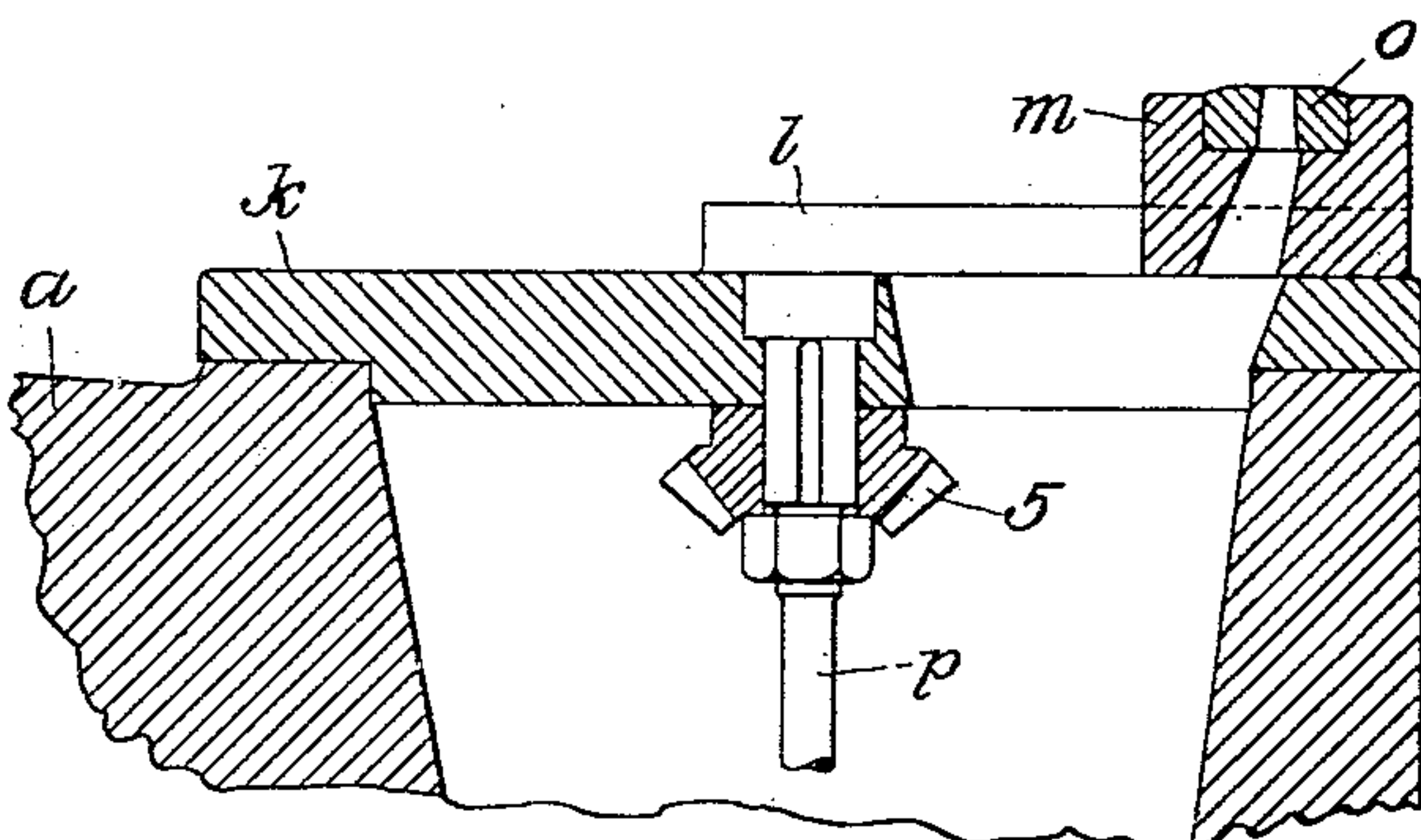


Fig. IX.

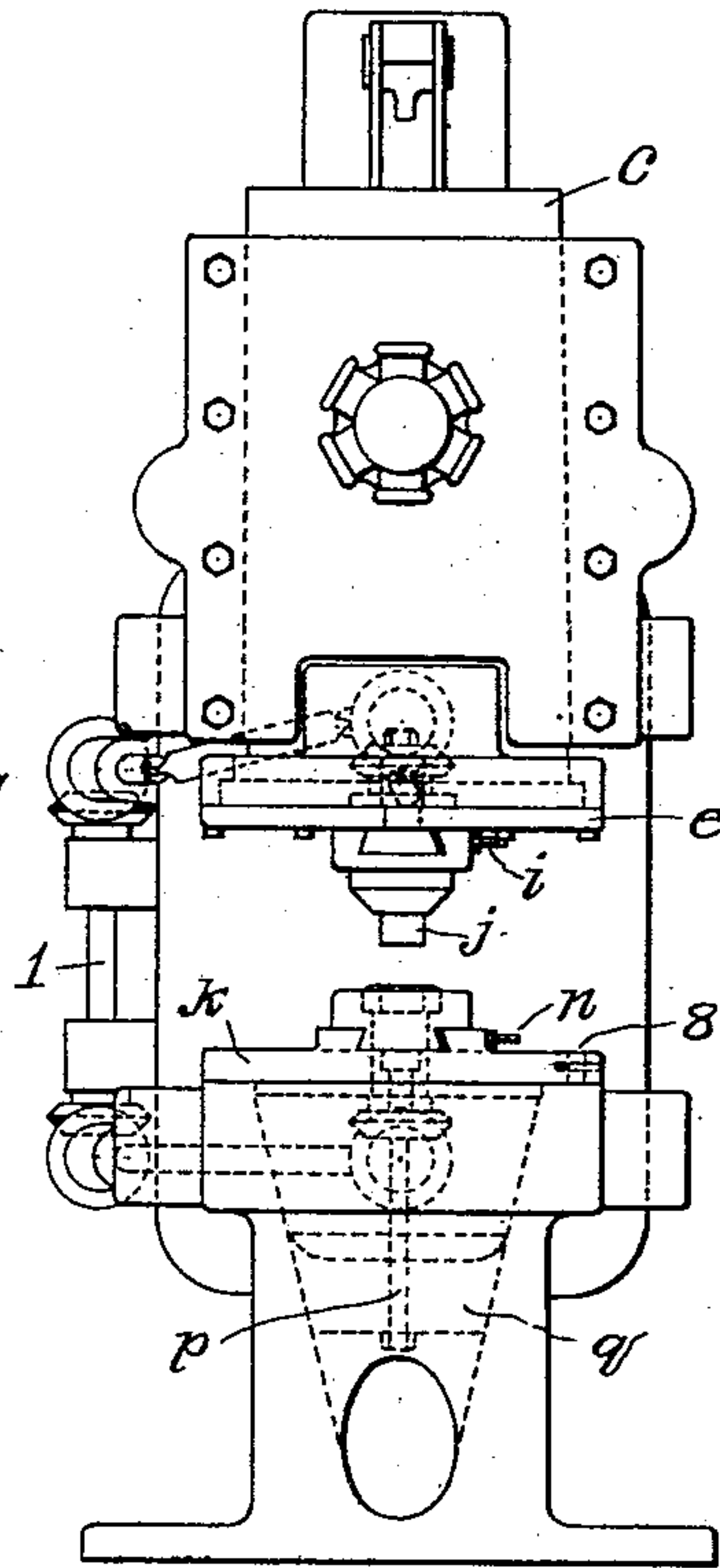


Fig. VI.

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# UNITED STATES PATENT OFFICE.

JOHN F. DOOLITTLE, OF CLEVELAND, OHIO, ASSIGNOR TO THE CLEVELAND PUNCH AND SHEAR WORKS COMPANY, OF CLEVELAND, OHIO, A CORPORATION.

## UNIVERSAL SLOTTING-PUNCH.

SPECIFICATION forming part of Letters Patent No. 751,723, dated February 9, 1904.

Application filed June 18, 1903. Serial No. 161,966. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN F. DOOLITTLE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Universal Slotting-Punches, of which the following is a specification.

This invention relates to punching-machines, and particularly to machines employed for punching out slots and apertures of regular or irregular configuration from sheets of metal.

The object of the present invention is to produce a machine capable of punching either curved or straight slots in metal plates and which will punch circular slots without the necessity of shifting the position of the plates operated upon.

A further object is to provide means, in connection with a punching-machine of the usual type, for revolving a die in unison with its punch, so that said punch and die will register accurately with each other at any point in the circumference of the circle in which they have been set.

Minor objects will become apparent from the description and be set forth in the claims.

To these ends my invention consists in the novel features and combinations hereinafter described and claimed, an embodiment thereof being illustrated in the accompanying drawings, in which—

Figures I and II show plates having curved and straight apertures which may be punched therein by the mechanism herein described. Fig. III is a sectional plan view taken on line III III of Fig. IV. Fig. IV is a side elevation of a punching-machine equipped with my universal slotting mechanism. Fig. V is a section on line V V of Fig. IV, showing the under side of the upper part of the machine. Fig. VI is a front elevation of the machine. Fig. VII is a section taken on line VII VII of Fig. VIII. Fig. VIII is a section on line VIII VIII of Fig. V. Fig. IX is a section on line IX IX of Fig. III.

The reference-letter *a* indicates the frame of a punching-machine having a shaft at *b*,

which is rotated by the usual or any suitable means, and which shaft extends through the front of the frame to operate a vertically-reciprocating slide block or plunger *c* by means of the usual crank or eccentric formed in the shaft and operatively connected with said plunger. The bottom of the plunger *c* is provided with a circular head *d*, having a shoulder turned upon its periphery and a central bore, as plainly shown in Fig. VIII. Fitted to rotate upon the under face of said plunger-head is a punch-holder disk *e*, having a hub projecting into the central bore of said head and provided with a ring *f*, bolted firmly to said disk and rotatably fitting the periphery of the plunger-head. Said ring *f* is preferably made in halves for convenience in assembling the parts together. The disk *e* carries upon its under face a bevel-edged radial guide *g*, upon which a punch-holder *h* is fitted to slide and provided with the usual gib and clamping-screw *i*, and a punch *j* is mounted in said holder. In line with said plunger-head upon the bed of the machine is rotatably mounted a circular die-block holder *k*, having bevel-edged and radial guides *l* upon its upper face, upon which a die-block *m* is fitted to slide, and provided with a gib and set-screws *n* for clamping it in position. A die *o*, corresponding to the punch *j*, is fitted in the upper face of said die-block. The die-block holder *k* is provided with a circular shoulder upon its under face, projecting into a corresponding aperture in the bed of the machine, and an axial bolt *p*, headed in and keyed to the holder *k*, extends down through a rib *q* in the machine-bed, having a nut thereunder which serves to keep the holder *k* in place.

I will now proceed to describe the means through which the die *o* is rotated and kept in accurate registry with the punch *j*. An axial bolt *r*, headed in the disk *e*, carries a miter gear-wheel *s*, said bolt being keyed to both the said gear-wheel and disk and serving to hold them rigidly together. A shaft *t*, provided with universal joints, as shown, is rotatably mounted in a bearing *u* upon the plunger *c* at its forward end and extending



diagonally backward through a groove in the overhanging frame has its rear bearing *v* upon the side of the machine-frame. Said shaft carries a miter gear-wheel upon each end, the wheel at *w* meshing loosely with the wheel *s* and the wheel *x* engaging with a wheel *y* upon the upper end of a vertical shaft 1, mounted in bearings upon the side of the machine-frame at the rear of the throat thereof.

10 The miter gear-wheel *z* upon the lower end of the shaft 1 meshes with a similar wheel 2 upon the rear end of a lower diagonal shaft 3, which latter extends through and has suitable bearings in the bed-frame of the machine and

15 carries a miter gear-wheel 4 upon its forward end in mesh with a similar gear-wheel 5 upon the bolt *p*. The gear-wheel 5 is rigidly secured to both the die-block holder *k* and the bolt *p* by a suitable nut and key. This arrangement is adjusted and set so that when

20 the punch-holder and its disk *e* are revolved until the slack of the gearing is taken up, thereby revolving the die-block holder *k*, the punch *j* will register accurately with the die

25 *o*. To prevent said punch and die from swinging out of line with each other, the slack or backlash of the above-described gearing is taken up between the punch-holder disk and the plunger by means of a friction-pawl

30 6, depending from and hinged loosely to the plunger-head by a pin 7. The swinging end of said pawl is rounded eccentrically, so that in bearing upon the upper face of the disk *e* it permits of said disk rotating freely in one

35 direction, but prevents its rotating in the opposite direction, all as plainly shown in Figs. VII and VIII. A friction-pawl 8 similar to the pawl 6 is hinged in the die-block holder *k* and bears against the upper face of the bed

40 of the machine, as shown in Figs. III and VI, and so disposed that it permits free rotation of the holder *k* in the same direction as the disk *e*. Thus the slack of the gearing is constantly taken up and backward rotation of the

45 punch and die prevented by the said friction-pawls, and therefore the punch having been set to register with the die it will register therewith at any point in the circle of its revolution.

50 It will now be readily understood that with punches and dies of the proper contour such apertures as those shown in Figs. I and II, as well as straight or curved openings of almost any configuration which may be desired, may

55 be punched in plates by employing the mechanism herein described. In the operation of punching a circular slot it is only necessary to set the punch and die to the radius of the required circle, and after each stroke of the

60 punch the latter may be revolved ahead by hand a suitable distance to make the next stroke effective, and so on until the circular slot is completed, such consecutive punchings being indicated by the dotted lines in Fig. I.

65 In punching straight slots it is necessary to

move the plate along, the punch being held from rotating.

Modifications and changes may be made in the details of the mechanism herein disclosed without departing from the spirit of my invention provided the principles of construction set forth, respectively, in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a punching-machine, a reciprocating plunger, a punch carried thereon arranged to be revolved about or upon an axis parallel with the line of travel of said plunger, a revoluble die corresponding to said punch, and suitable mechanism for revolving said die in unison with said punch, substantially as set forth.

2. In a punching-machine, a reciprocating plunger, a rotatable plate mounted upon the end of said plunger, a punch carried by said plate, a die corresponding to said punch, and suitable means for revolving said die in unison with said punch, substantially as set forth.

3. In a punching-machine, a reciprocating plunger, a rotatable punch-plate mounted upon the end of said plunger, a punch carried by said plate, a rotatable die-plate mounted upon the bed of the machine, a die carried by said die-plate, and suitable means for revolving said die-plate to correspond with said punch-plate, substantially as set forth.

4. In a punching-machine, a reciprocating plunger, a punch carried thereon arranged to be revolved about or upon an axis parallel with the line of travel of said plunger, a revoluble die corresponding to said punch, suitable mechanism for revolving said die with said punch, and means adapted to take up the slack of said mechanism to secure accurate registry of said punch and die, substantially as set forth.

5. In a machine for punching plates, a reciprocating plunger, a punch carried thereon arranged to be revolved about or upon an axis parallel with the line of travel of said plunger, a revoluble die corresponding to said punch, suitable shafts and gearing for revolving said die with said punch disposed about the throat of the machine so that the latter is not obstructed thereby, substantially as set forth.

6. In a machine for punching plates, a reciprocating plunger, a punch carried thereon arranged to be revolved about or upon an axis parallel with the line of travel of said plunger, a revoluble die corresponding to said punch, suitable shafts and gearing for revolving said die with said punch disposed about the throat of the machine so that the latter is not obstructed thereby, and friction-pawls adapted to take up the slack of said gearing between said punch and die, substantially as set forth.

7. In a machine for punching plates, a reciprocating plunger, a rotatable punch-plate



mounted upon the end of said plunger, a radially-adjustable punch carried by said plate, a rotatable die-plate mounted upon the bed of the machine, a radially-adjustable die upon said die-plate, suitable shafts and gearing operatively connecting said punch-plate with said die-plate, said shafts being disposed about the throat of the machine so that the latter is not obstructed thereby, substantially as set forth.

8. In a machine for punching plates, a reciprocating plunger, a rotatable punch-plate mounted upon the end of said plunger, a radially-adjustable punch carried by said plate, a rotatable die-plate mounted upon the bed of the machine, a radially-adjustable die upon said die-plate, suitable shafts and gearing operatively connecting said punch-plate with said die-plate, said shafts being disposed about the throat of the machine so that the latter is not obstructed thereby, and friction-pawls adapted to hold said punch-plate and die-plate respectively against backward revolution, substantially as set forth.

9. In a machine for punching plates, a reciprocating plunger having a rotatable punch-plate upon its lower end, a gear-wheel fixed to the axis of said punch-plate, a rotatable die-plate suitably mounted beneath and in line with said punch-plate, a gear-wheel fixed to the axis of said die-plate, a universally-jointed shaft having its forward bearing in said plun-

ger and provided with a gear-wheel meshing with said punch-plate gear, a vertical shaft geared to said universal shaft, and a horizontal shaft geared at one end to said vertical shaft and to said die-plate gear at its forward end, substantially as set forth.

10. In a machine for punching plates, a reciprocating plunger having a rotatable punch-plate upon its lower end, a gear-wheel fixed to the axis of said punch-plate, a rotatable die-plate suitably mounted beneath and in line with said punch-plate, a gear-wheel fixed to the axis of said die-plate, a universally-jointed shaft having its forward bearing in said plunger and provided with a gear-wheel meshing with said punch-plate gear, a vertical shaft geared to said universal shaft, a horizontal shaft geared at one end to said vertical shaft and to said die-plate gear at its forward end, and friction-pawls adapted to operate upon said punch-plate and die-plate respectively to take up the slack of said gearing and prevent backward rotation of said plates, substantially as set forth.

In testimony whereof I affix my signature, in the presence of two subscribing witnesses, at Cleveland, Ohio, June 16, 1903.

JOHN F. DOOLITTLE.

Witnesses:

JNO. T. SULLIVAN,  
JOHN F. STRAUSS.