

No. 677,644.

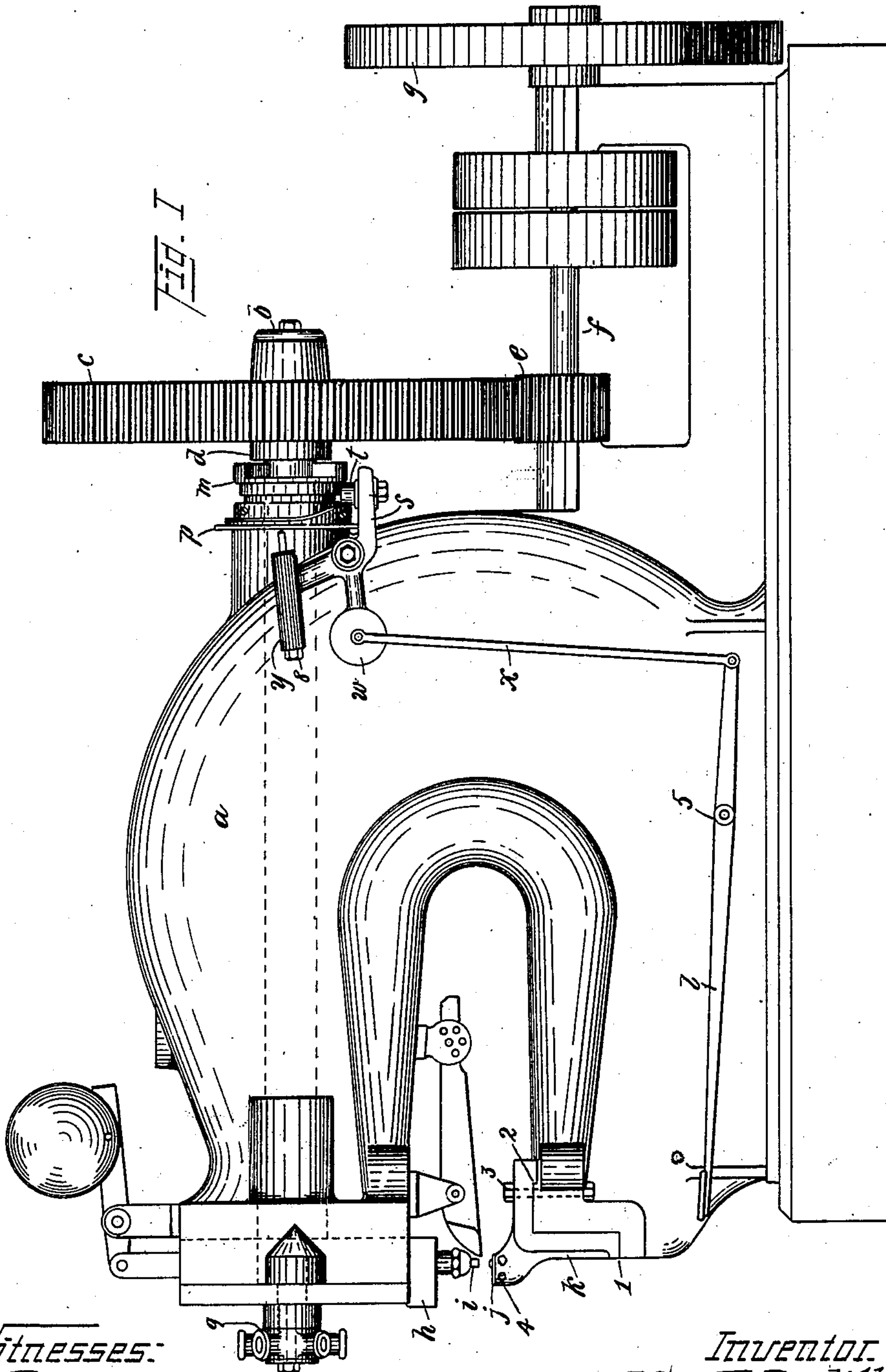
Patented July 2, 1901.

J. F. DOOLITTLE.
PUNCHING AND SHEARING MACHINE.

(Application filed Dec. 14, 1900.)

(No Model.)

4 Sheets—Sheet 1.



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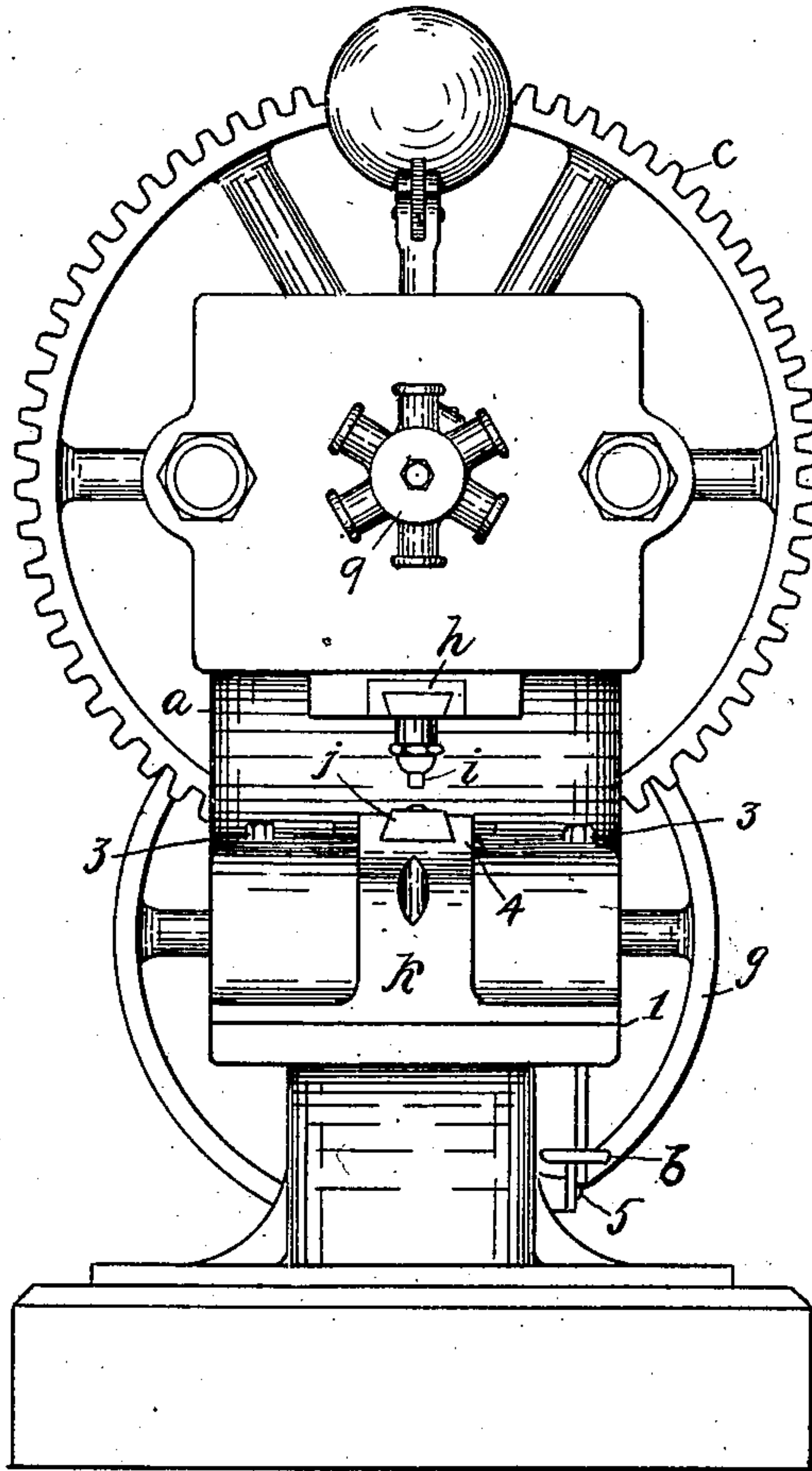


Fig. II

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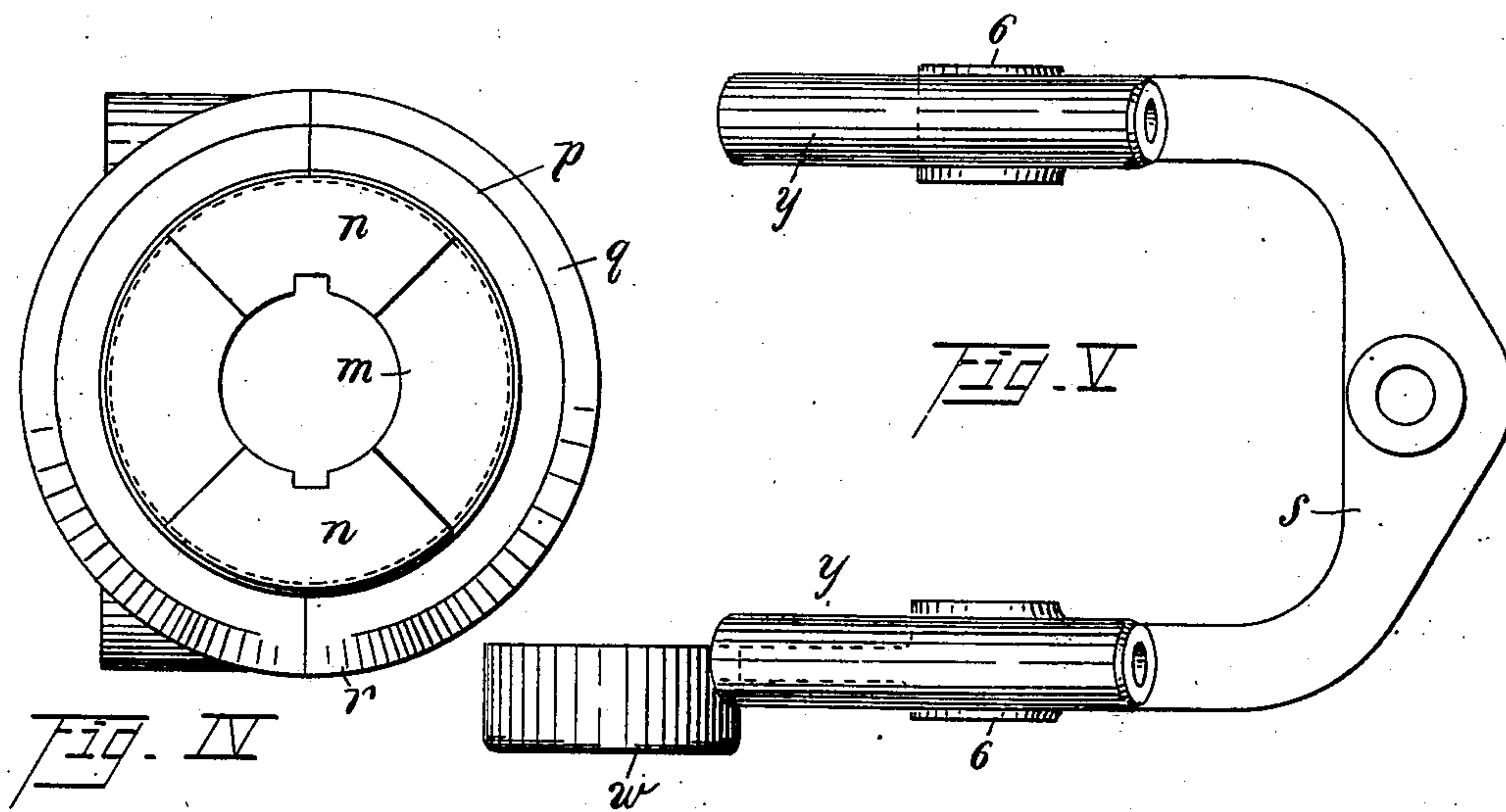
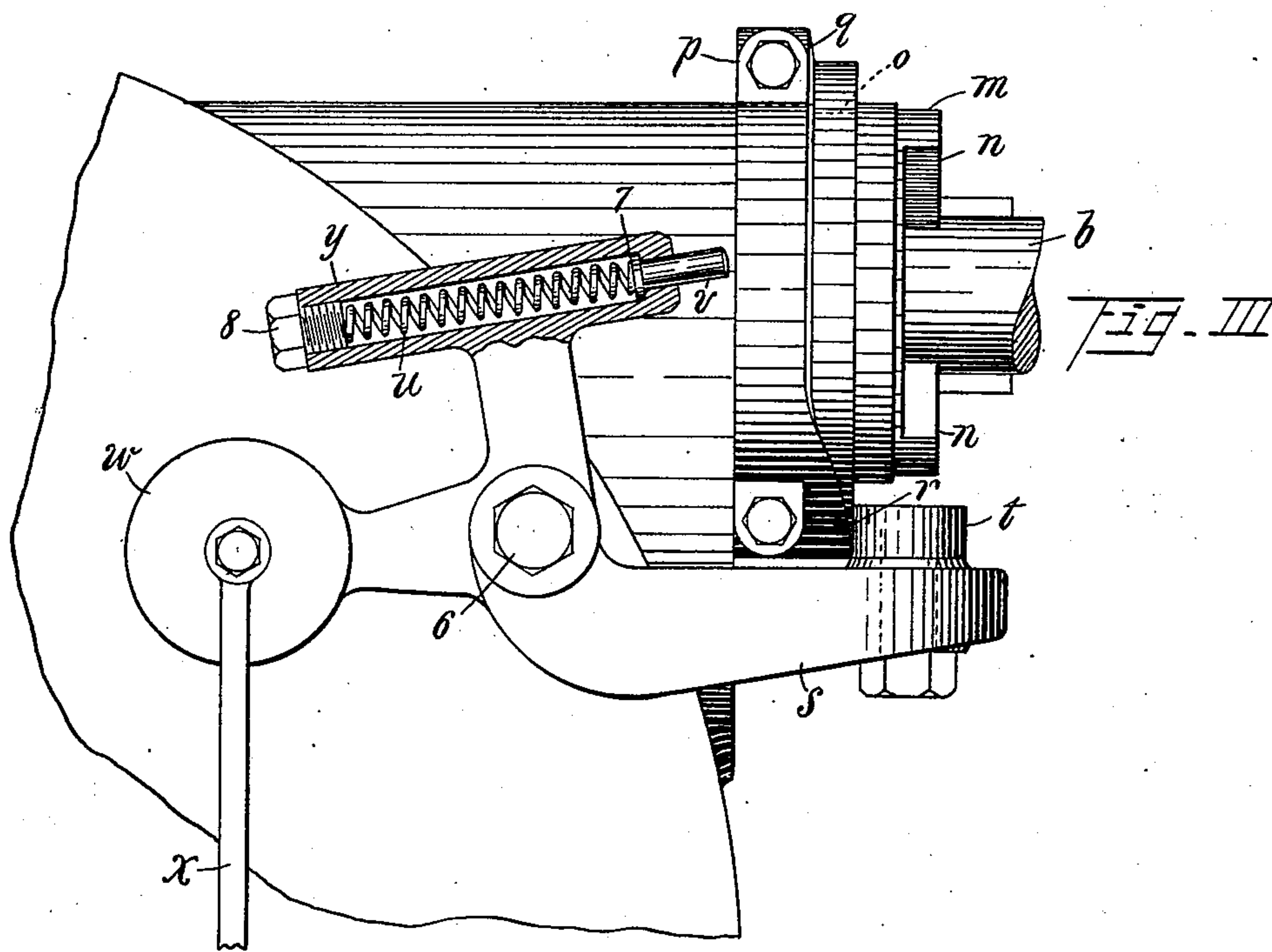
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4 Sheets—Sheet 3.



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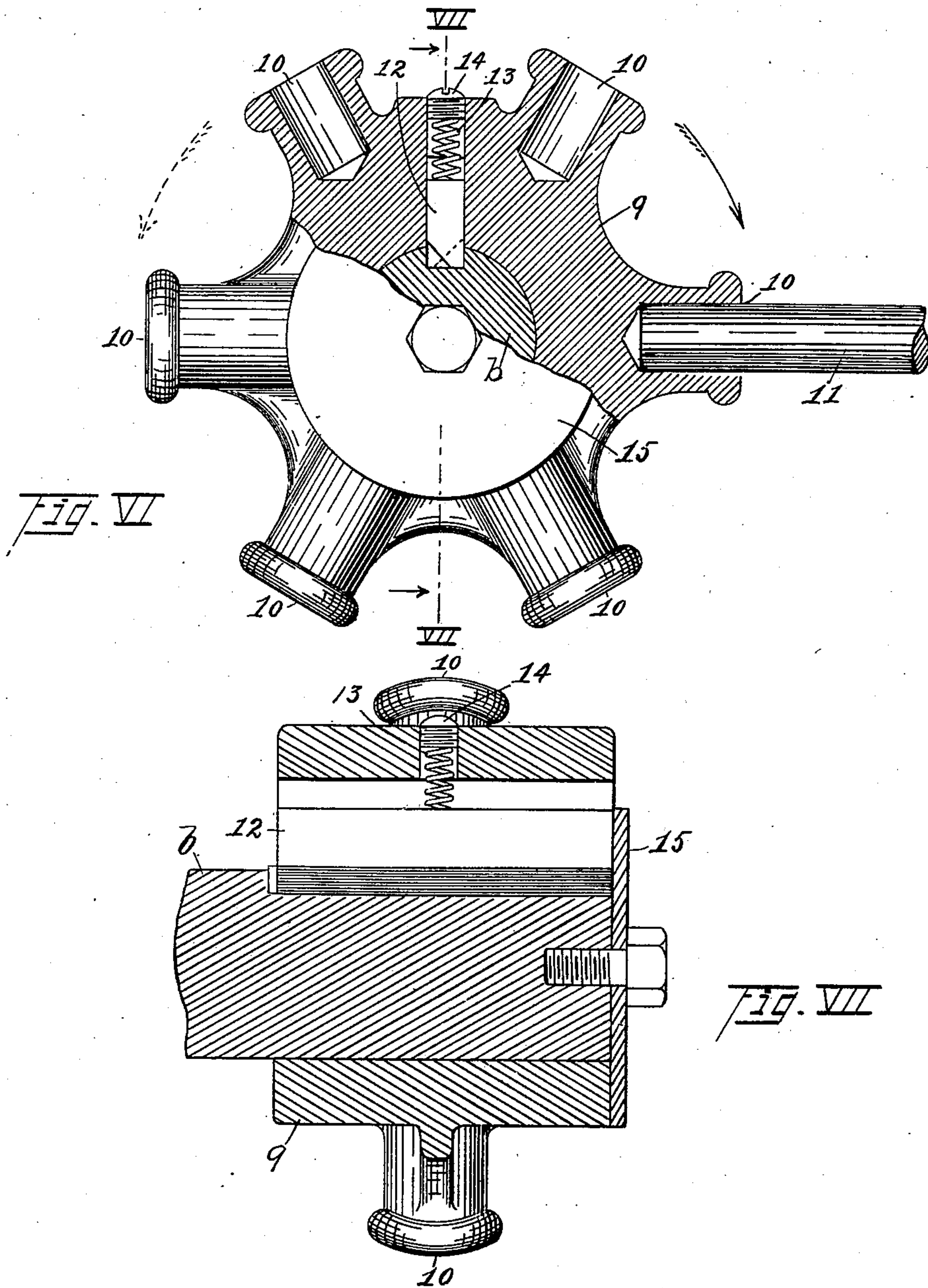
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

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

PUNCHING AND SHEARING MACHINE.

SPECIFICATION forming part of Letters Patent No. 677,644, dated July 2, 1901.

Application filed December 14, 1900. Serial No. 39,869. (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 Punching and Shearing Machines, of which the following is a specification.

My invention relates to power-driven machines in which punches and dies or shear-blades may be fixed for the purpose of punching or shearing plates and structural shapes of metal, &c.

The object of the invention is to provide improvements in such machines by means of which they can be more positively and easily controlled, friction between the moving parts eliminated, danger to the life and limb of the operator avoided, architectural and other shapes of an angular section may be operated upon, and the construction of the machine simplified and conveniently arranged, together with such minor objects as will become apparent from the following detailed description and be set forth in the claims.

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

Figure I is a side elevation, and Fig. II is a front view, of the machine. Fig. III is a side view, partly in section, of the clutch and its operating mechanism. Fig. IV is an end view of the sliding jaws and operating-ring of the clutch. Fig. V is a plan view of the swinging clutch-operating yoke. Fig. VI is a front elevation of the safety hand-turning hub, and Fig. VII is a section of the same on line VII VII of Fig. VI.

The reference-letter *a* indicates the frame of a punching and shearing machine of the usual style, with a main shaft *b* journaled horizontally in the upper part of said frame and having a gear-wheel *c* journaled loosely on the rear end thereof and provided with clutch-jaws at *d* on the forward end of its hub. The said wheel is driven by a pinion *e* on a driving-shaft *f*, journaled in an extension of the lower part of the frame and provided with a fly-wheel *g* and pulleys or

other means for driving it. The main shaft *b* extends through the front of the machine and operates the vertically - reciprocating slide-block *h* by means of a crank or eccentric formed on the shaft, as is commonly employed in machines of this class and well understood by those familiar with the art. The bottom of said slide-block is provided with suitable means for holding a punch *i*, which is opposed to and registers with a die set in a holder *j*, held in a block *k*, fastened to the bed of the machine. It is obvious that shear-blades may be substituted in such machines for the punch and die, respectively, by employing suitable holders therefor, one of which is carried by the slide-block *h* and the other fastened to the bed of the machine.

The block *k* is an angle-plate fitted to the front of the bed of the machine, with its lower edge resting upon a shoulder at 1 and its horizontal leg having a recess formed in its under face, with a square shoulder at 2, which fits over a corresponding elevation on the bed. Bolts 3 3 serve to hold the said block to the bed, and the die or shear-blade holder is fastened in a bracket 4, projecting forward and upward from the angle-plate. By employing such a die-block the flanges of I and channel beams and other angular shapes may be readily punched or sheared, there being no obstruction under the die to interfere with the lower flanges of such beams or shapes.

In modern machines of this character it is usual to provide means for automatically stopping the punch at the upper end of its travel after it has made one complete reciprocation. Various devices have been employed for this purpose, most of which are either cumbersome or productive of an undesirable amount of friction. To accomplish this purpose, I employ a mechanism which may be operated in the usual manner by a foot-lever *l*, fulcrumed to the frame at 5. Fitted to slide upon the main shaft and rotated therewith by feather-keys is a clutch-sleeve *m*, provided on its rear end with jaws *n*, fitted to engage between the jaws *d* on the loose gear-wheel *c*. Clamped upon the clutch *m* is a ring *p*, Figs. III and IV, preferably made in halves bolted together and fitted

into a peripheral groove *o* in the clutch, as shown. A shoulder *q* is formed upon said ring, having a lateral incline or cam *r* in that part of its circumference which is directly under the shaft when the punch reaches the upper end of its travel. The cam *r* has its apex flush with the rear face of the ring and is usually made with a gentle slope on both sides, as shown, in order that the machine may be driven in either direction without replacing the ring. It is obvious that the ring *p* may be revolved upon the clutch *m* and clamped at any point, so as to stop the plunger *n* at any desired position.

Fulcrumed at 6 6 substantially on a level with the under side of said ring, preferably upon a bolt passing through the frame, is a swinging yoke *s*, shaped like two elbow-levers, with their horizontal arms joined together and carrying a roller *t*, journaled upon a suitable pin midway of the yoke in such a position that its periphery bears normally against the rear end of the ring *p*. The upright arms of said yoke are provided with spring-barrels *y*, standing at right angles thereto—one on each side of the main shaft—in which are coiled springs *u* in compression, with their rear ends bearing, respectively, against the heads 7 of thrust-pins *v*, fitted to slide through the ends of said barrels. The forward ends of said springs bear against plugs 8, screw-threaded into the forward ends of the respective barrels. One side of the yoke *s* carries a horizontal arm, on the end of which is a counterweight *w*, which is connected by the rod *x* to the foot-lever *l*.

The above-described mechanism rests normally in the position shown in Fig. III, the roller *t* being held against the rear face of the ring *p* by the counterweight *w* and the pins *v* being out of contact with the said ring. Thus in turning the machine by hand the clutch and starting mechanism offers no appreciable frictional resistance. The driving-shaft *f* and gear-wheel *c* being in motion, the machine is started by depressing the foot-lever *l*, which swings the roller *t* below the ring *p* and at the same time brings the pins *v* against the forward face of the ring, the pins sliding into the barrels against their springs and remaining in that position until the jaws *d* come opposite to the spaces between the jaws *n*, whereupon said pins are projected outward, sliding the clutch *m* into engagement with the opposing jaws *d*, the clutch-ring coming to rest somewhat beyond the ends of the pins *v*, so that while the operator continues to depress the foot-lever the machine will continue to revolve, its moving parts having no contact with the starting device, and therefore generating no unnecessary friction; but when the foot-lever is released the roller *t* swings up against the shoulder *q* of the clutch-ring upon which it revolves until the cam *r* engages said roller, which forces the clutch forward, disengaging the jaws, whereupon the machine stops and

the roller takes its original position against the face of the ring. It is evident that the machine cannot make more than one revolution after the foot-lever is released.

In machines of this class it is usual to extend the main shaft through the front of the machine and secure thereon a hand-wheel or, in large machines, as herein shown, a hub similar to that shown at 9, having sockets 10 formed in its periphery to receive a bar 11, Fig. VI, for turning the machine by hand in order to set the dies or to locate the work, &c. In machines fitted with such bar-receiving hubs rigidly secured to the shaft many serious accidents have occurred, and operators have been killed by neglecting to remove the bar before depressing the lever to start the machine. An operator being absorbed in his work is very apt to forget to remove the bar, and having applied power to the machine the bar swings downward, crushing some part of the interfering body of the workman, or, striking the article upon which work is being done, damages the machine. For the purpose of protecting the operator and the machine I fit the said hub 9 loosely upon the end of the shaft *b*, as shown in Figs. VI and VII, and instead of the ordinary rigid key a latch-key 12, fitted to slide in a deep keyway in the hub, projects into and engages normally with the forward side of an ordinary square keyway in the shaft, the machine being set to rotate the shaft in the direction indicated by the arrow. The rear projecting edge of said key 12 is beveled, as shown, and a light spring 13 in compression between the said key and a plug 14 serves to keep the key against the shaft. It is evident that the plug 14 may be dispensed with, if desired, and the spring placed in a socket opening into the hub-keyway. A cap or disk 15, bolted, as shown, or otherwise removably secured to the end of the shaft, keeps the hub in place, the rear end of said hub bearing against the face of the machine, as shown in Fig. I. It will be readily understood that with this device the shaft may be rotated in a forward direction by the hand-bar 11, and when power is applied to the machine the hub will normally rotate with the shaft; but should the bar be left in one of the sockets 10 and in its revolution strike the body of a man or any stationary object the beveled edge of the sliding key 12 would ride over the rear edge of the shaft-keyway, compressing the spring into its socket, and thereby permitting the hub to cease revolving with the shaft, so that no damage can occur to the machine, and while a workman might receive a slight bruise from the bar he cannot be crushed thereby. When it is desired to rotate the shaft in the opposite direction, as indicated by the dotted arrow, the latch-key 12 is simply taken out and turned end for end, whereupon its beveled edge will take the position shown by the dotted line in Fig. VI.

Other modes of applying the principles of

my invention may be substituted for the modes herein explained. Change may therefore be made in the details of the mechanism disclosed, 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 machine of the class described, the combination with a shaft and a clutch thereon, of a yoke fulcrumed to the frame of the machine and means for swinging the same, spring thrust-pins carried by said yoke adapted to abut against the sliding member and force it into engagement with the driving member of said clutch, a roller journaled on said yoke, and circumferential shoulders on said sliding clutch member adapted to engage said roller by means of which said clutch member may be automatically disengaged and held apart from the driving member of said clutch, substantially as set forth.

2. In a punching and shearing machine, the combination with a main shaft and a clutch thereon, of a sliding member of said clutch provided with two circumferential shoulders the outer shoulder having a lateral cam with its apex flush with the inner shoulder, a counterweighted yoke fulcrumed to the frame of the machine forward of the under side of said sliding clutch member, a roller journaled on said yoke adapted to bear against said shoulders, spring thrust-pins carried by said yoke adapted to abut against the forward face of said sliding clutch member, and mechanism for swinging said yoke, substantially as set forth.

3. In a punching and shearing machine, the combination with a main shaft and a clutch thereon, of a sliding member of said clutch, a ring secured thereon provided with a circumferential shoulder having a lateral cam with its apex flush with the rear face of said ring, a counterweighted yoke fulcrumed to the frame of the machine forward of the under side of said sliding clutch member, a roller journaled on said yoke adapted to bear against either the shoulder or rear face of said ring, spring thrust-pins carried by said yoke adapted to abut against the forward face of said sliding clutch member, and mechanism for swinging said yoke, substantially as set forth.

4. In a punching and shearing machine, the combination with a main shaft and a clutch thereon, of a sliding member of said clutch provided with two circumferential shoulders, a lateral cam formed in the outer with its apex flush with the inner of said shoulders, a counterweighted yoke fulcrumed to the frame of the machine forward of the under side of said sliding clutch member, a roller journaled on said yoke midway of its connecting-arm adapted to bear against said shoulders, spring-barrels carried by the upright arms of said

yoke each containing a suitable spring, thrust-pins adapted to abut against the forward face of said sliding clutch member projecting through the rear ends of the respective barrels and having heads inside of the barrels engaging said springs, and mechanism for swinging said yoke, substantially as set forth.

5. In a machine of the class described, the combination with a shaft having a projecting end provided with a keyway, of means for rotating said shaft by hand comprising a suitable bar-receiving hub mounted loosely upon the projecting end of said shaft, a flat key fitted to slide in a keyway in said hub having a beveled edge to engage the keyway in said shaft and provided with a suitable spring to hold it against the shaft, and means for retaining said hub and key upon the shaft, substantially as set forth.

6. In a machine of the class described, the combination with a main shaft projecting through the front thereof and provided with a keyway, of a hub having sockets for hand-bars mounted loosely upon the projecting end of said shaft, a flat key fitted to slide in a deep keyway in said hub and provided with a beveled inner edge to engage the keyway in said shaft, a spring suitably set in said hub adapted to bear against the outer edge of said key, and means for retaining said hub and key upon the shaft, substantially as set forth.

7. In a machine of the class described, the combination with a reciprocating slide-block, a punch or shear-blade attached thereto and means for driving the same, of an angle-plate bolted to the bed of the machine having its lower edge supported by an offset in the bed and its horizontal wing provided with a recess in its under face fitting over a corresponding elevation on the bed, a bracket projecting forward and upward from said angle-plate, and means for securing a die or shear-blade holder in the upper face of said bracket, substantially as set forth.

8. In a machine of the class described, the combination of a slide-block carrying a punch or shear-blade, a shaft provided with a clutch for reciprocating the same, means for throwing said clutch into engagement with the driving mechanism and for automatically disengaging the said clutch when the said slide-block reaches the upper end of its stroke, and means on said shaft for rotating it by hand in one direction but riding loose on the shaft when revolved in the reverse direction, substantially as set forth.

In testimony whereof I affix my signature, in the presence of two subscribing witnesses, at Cleveland, Ohio, December 6, 1900.

JOHN F. DOOLITTLE.

Witnesses:

CHAS. E. THOMAS,
GEORGE B. RILEY.