

No. 693,557.

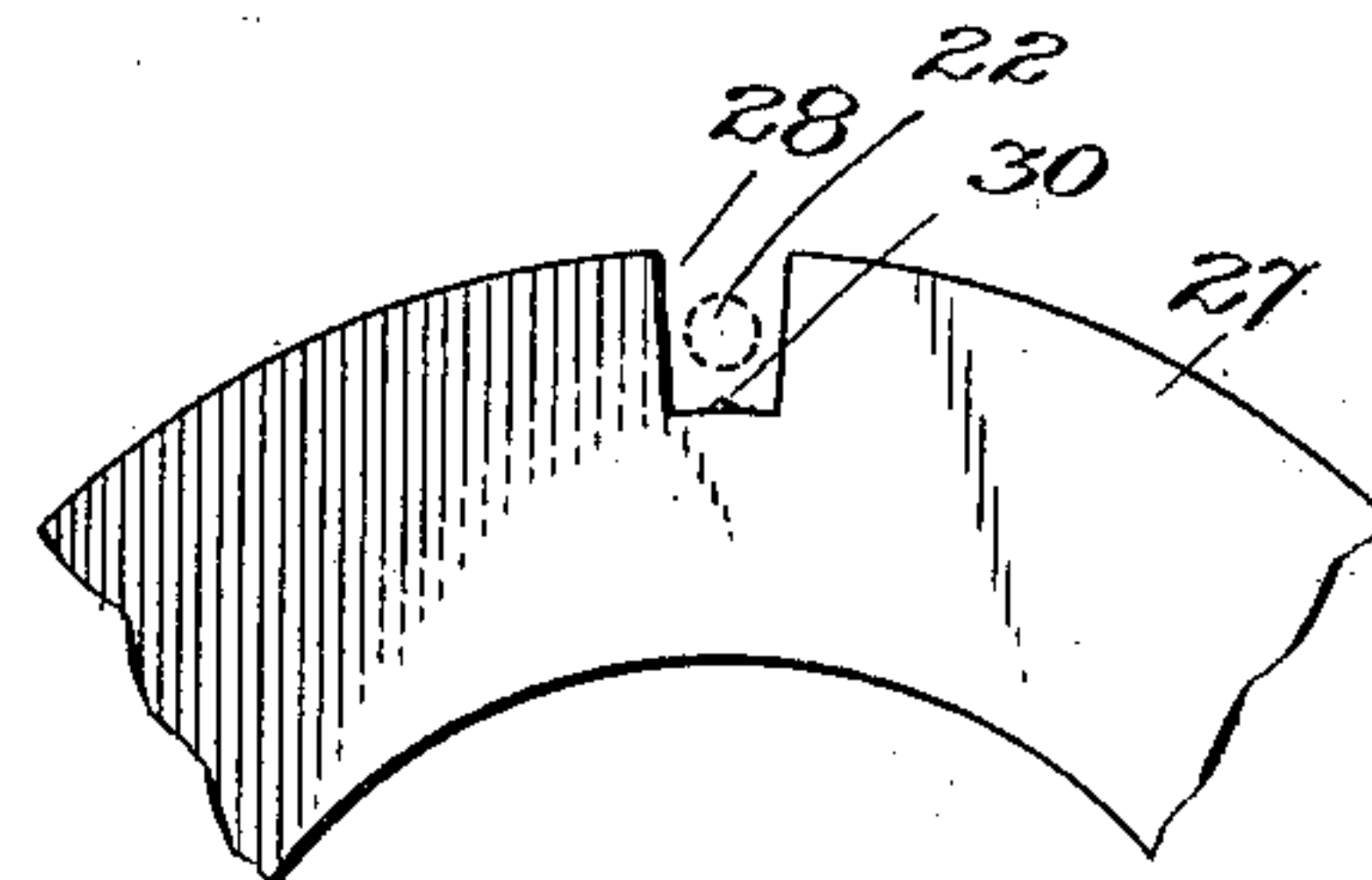
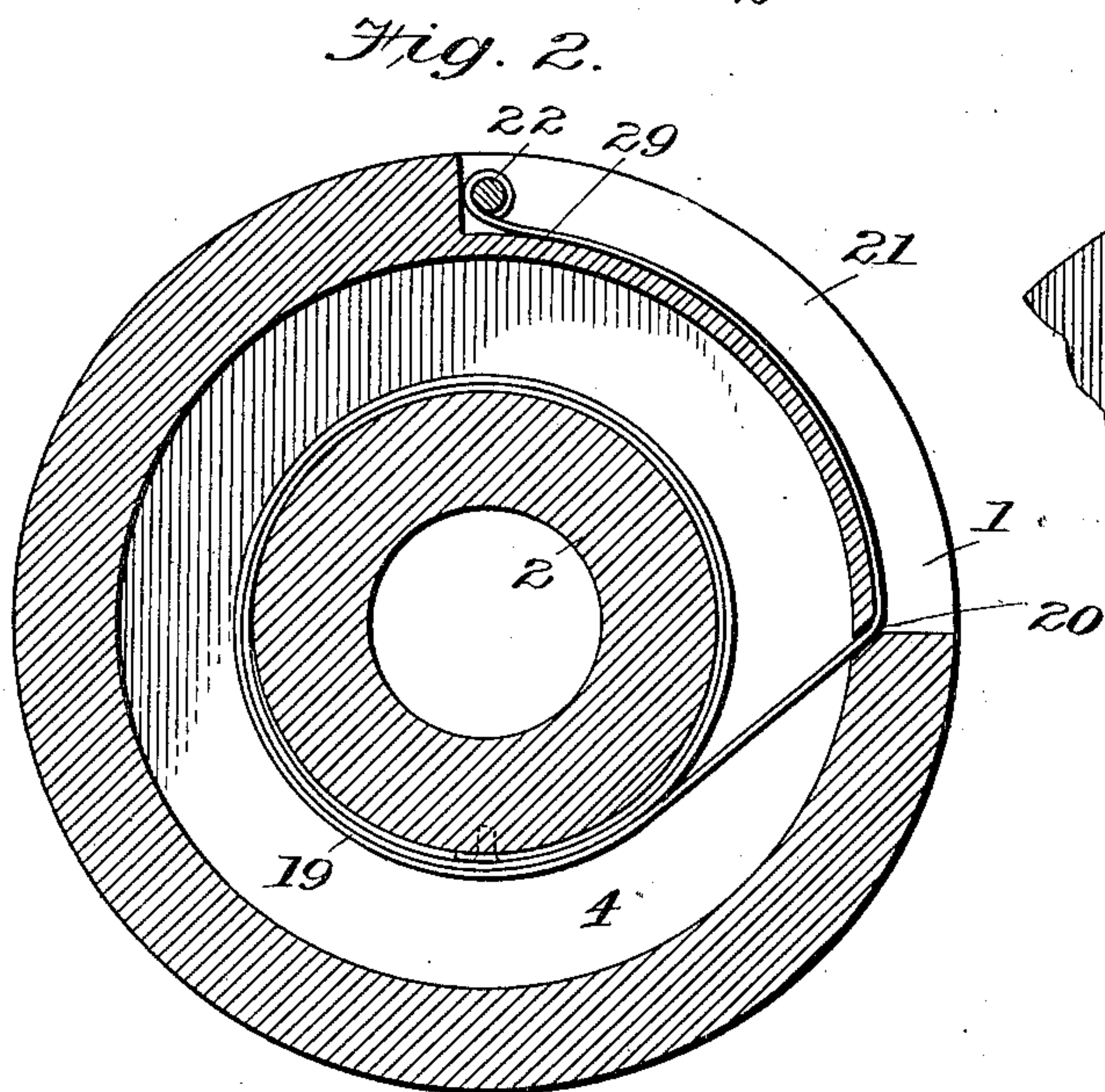
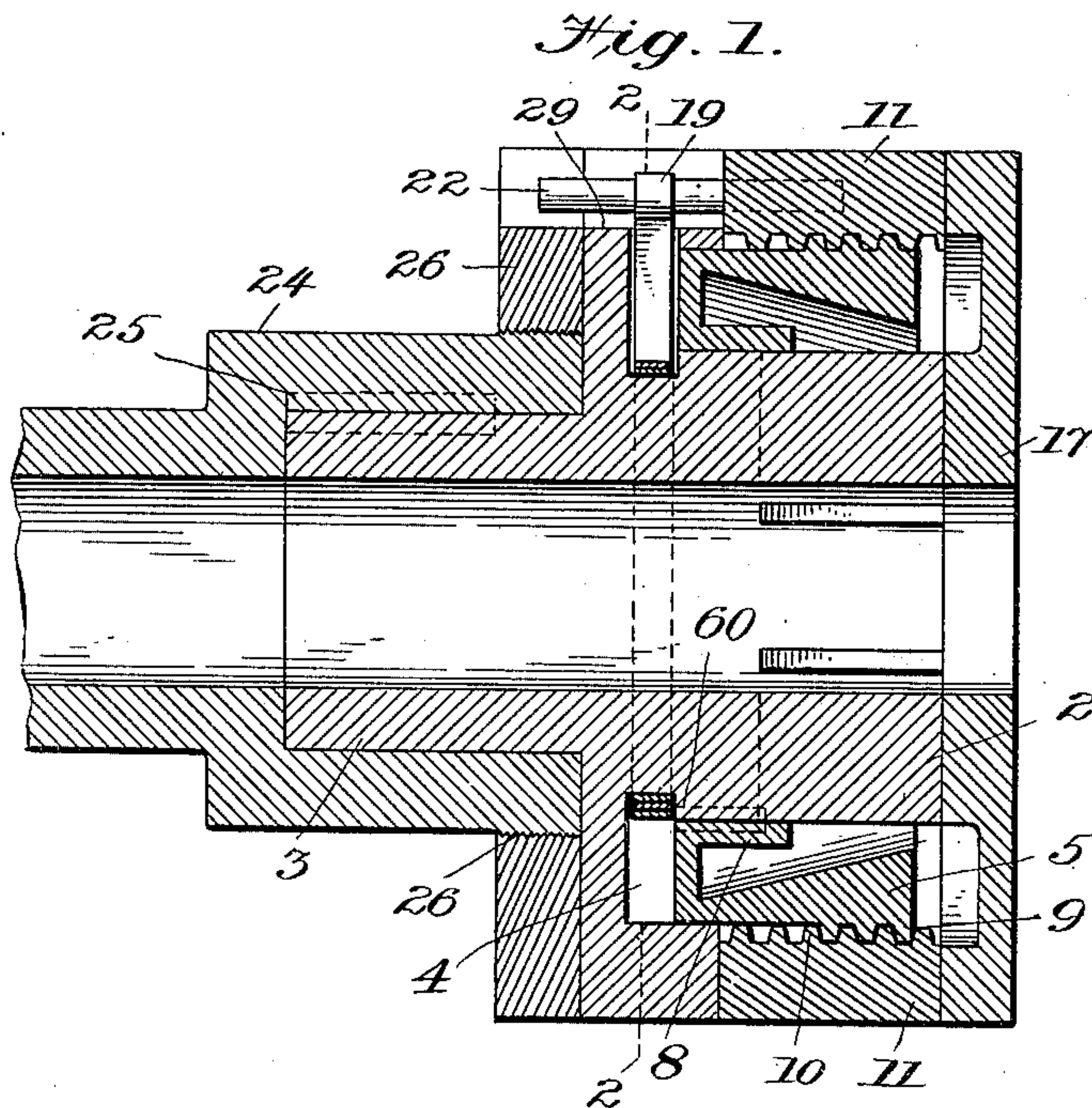
Patented Feb. 18, 1902.

P. F. MAINES.
SCREW CUTTING DIE HEAD.

(Application filed Apr. 23, 1901.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:
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4 Sheets—Sheet 2.

Fig. 3.

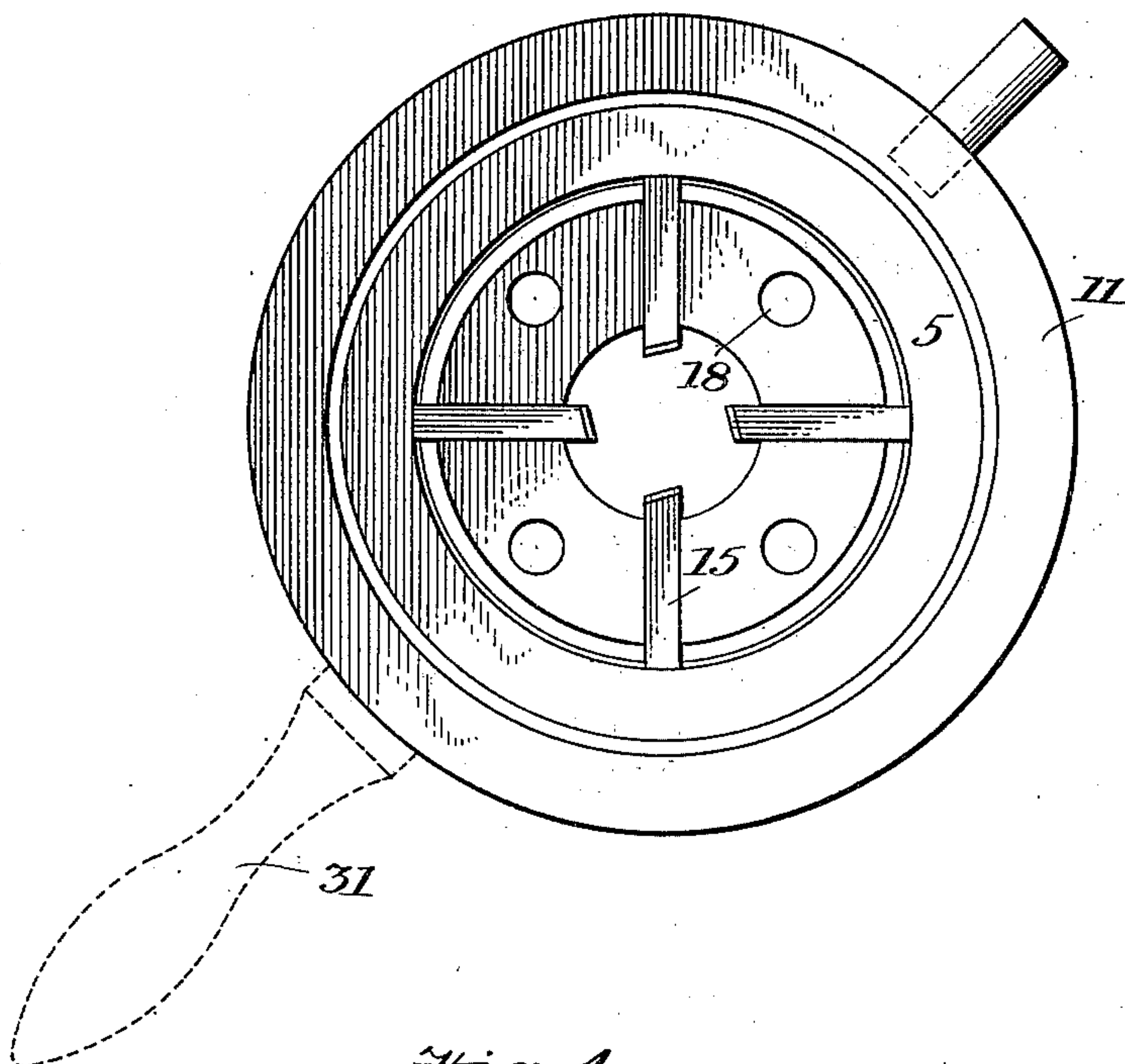


Fig. 4.

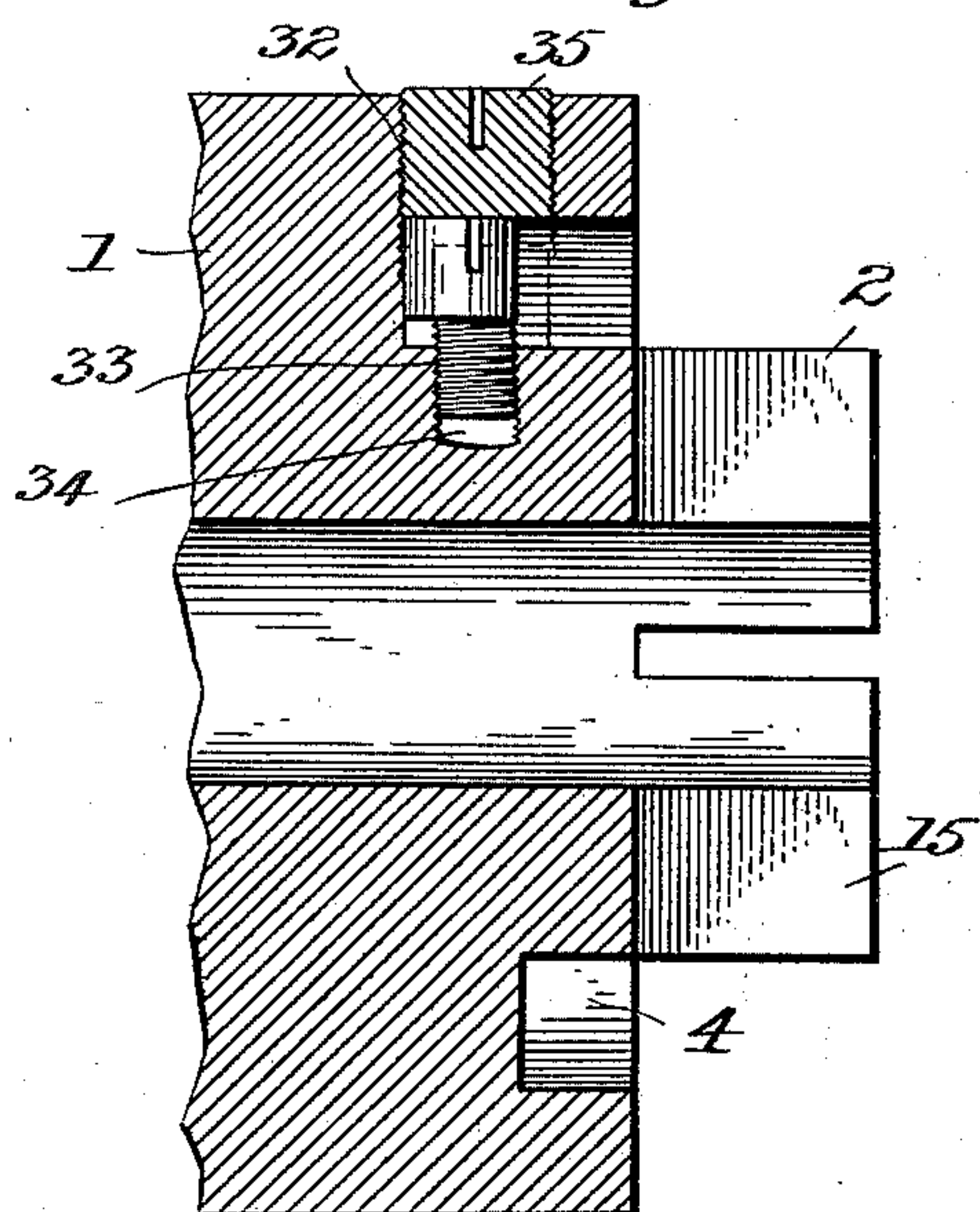
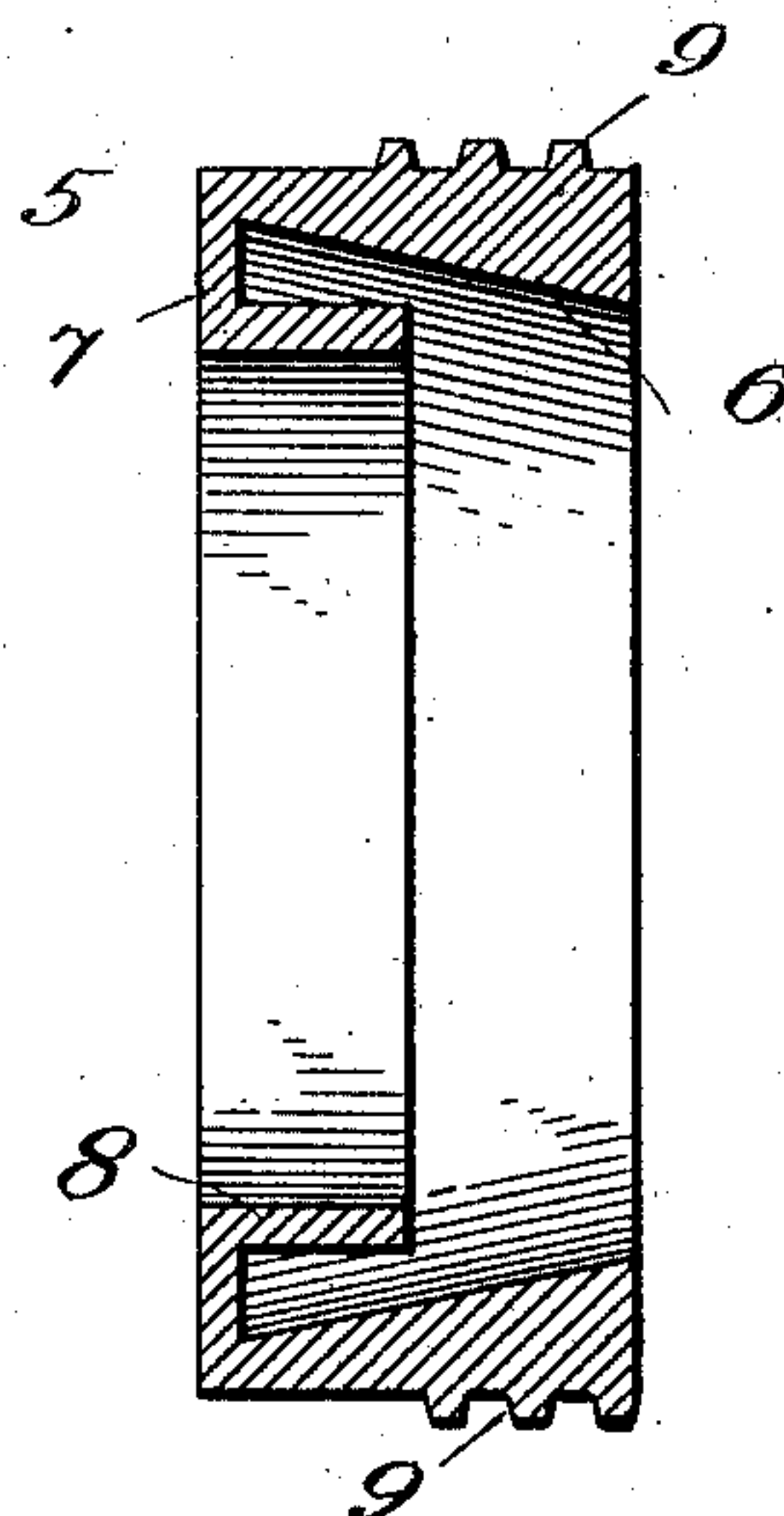


Fig. 5.



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4 Sheets—Sheet 3.

Fig. 7.

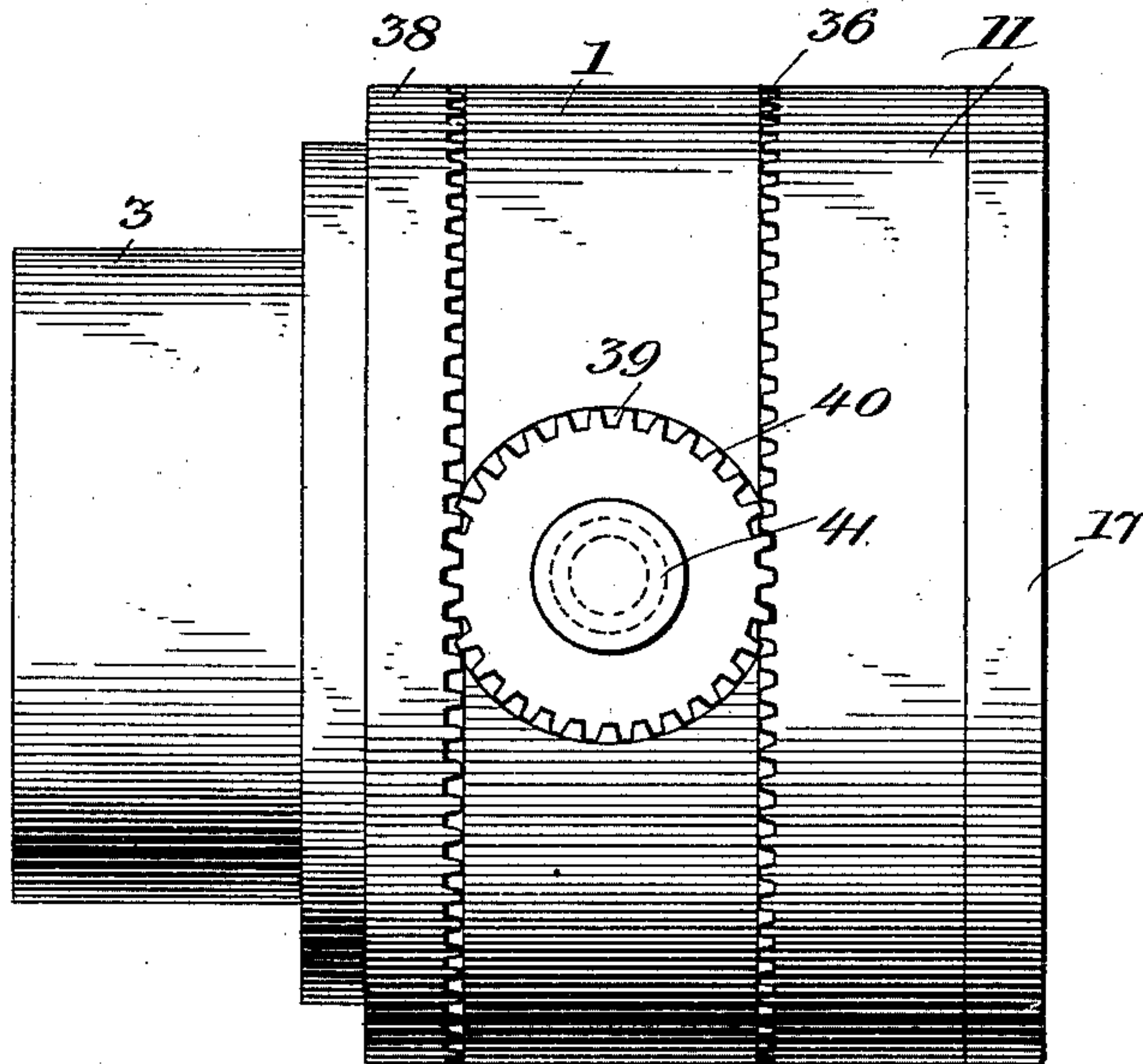
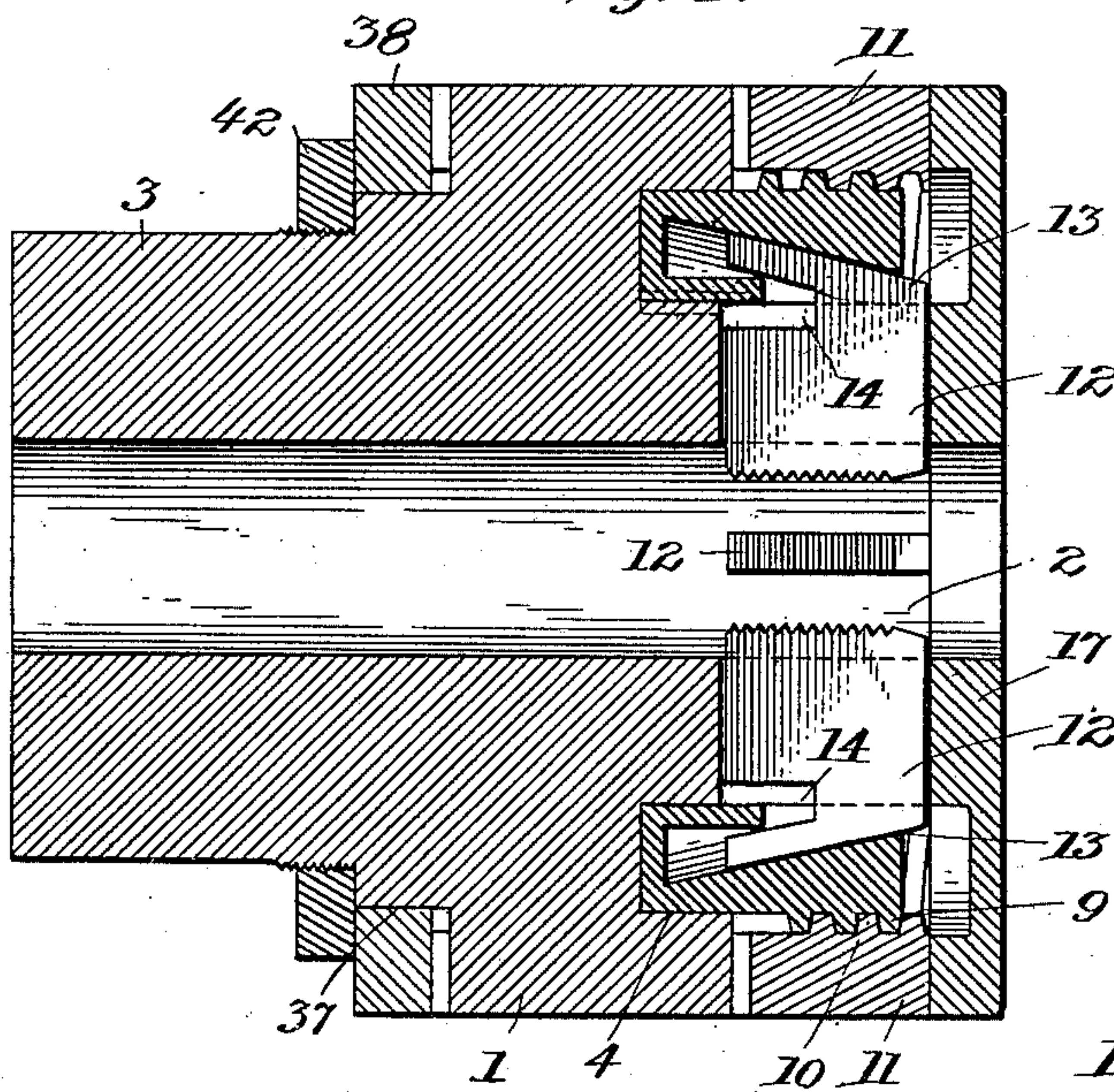


Fig. 8.



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4 Sheets—Sheet 4.

Fig. 9.

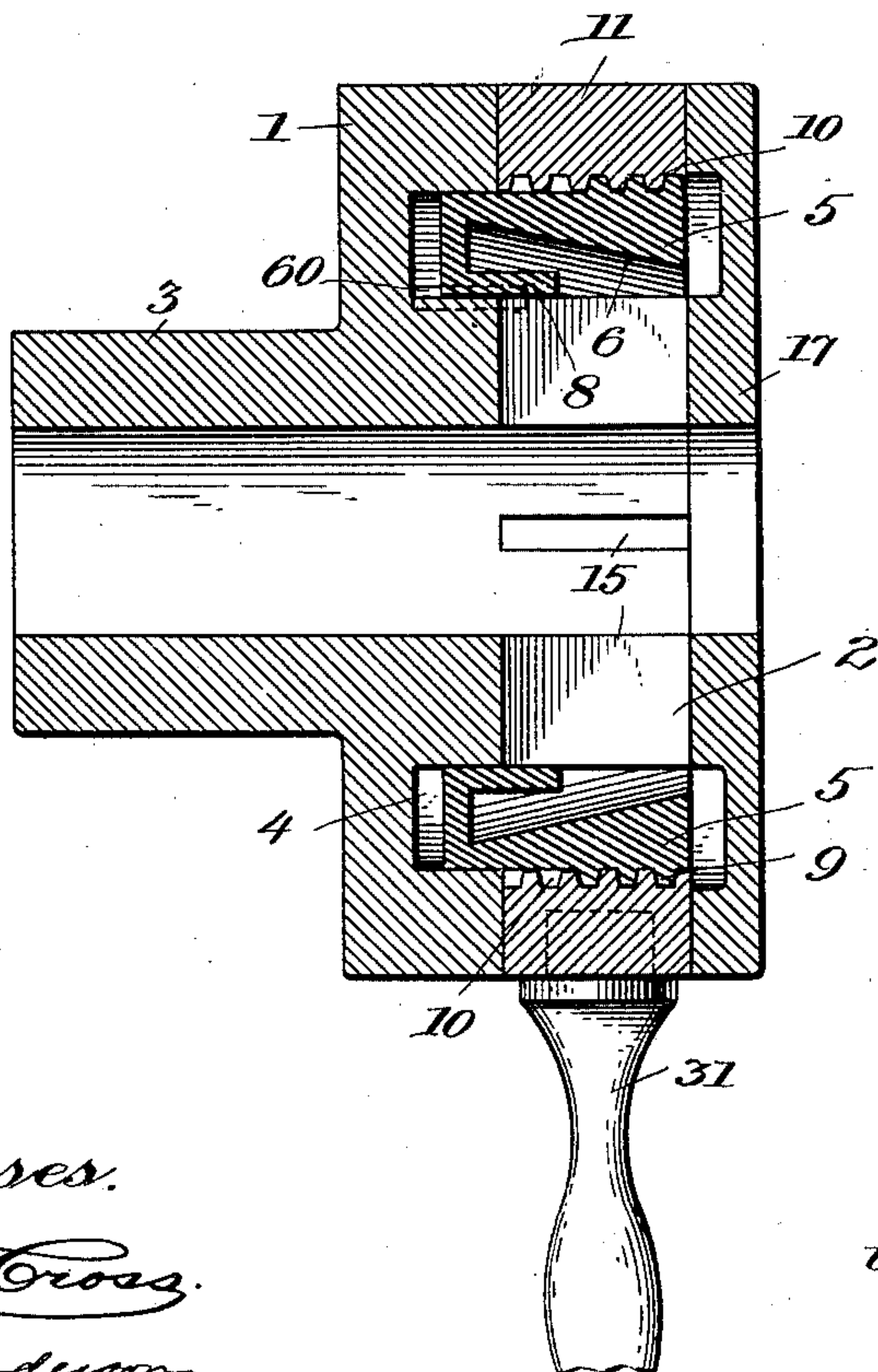
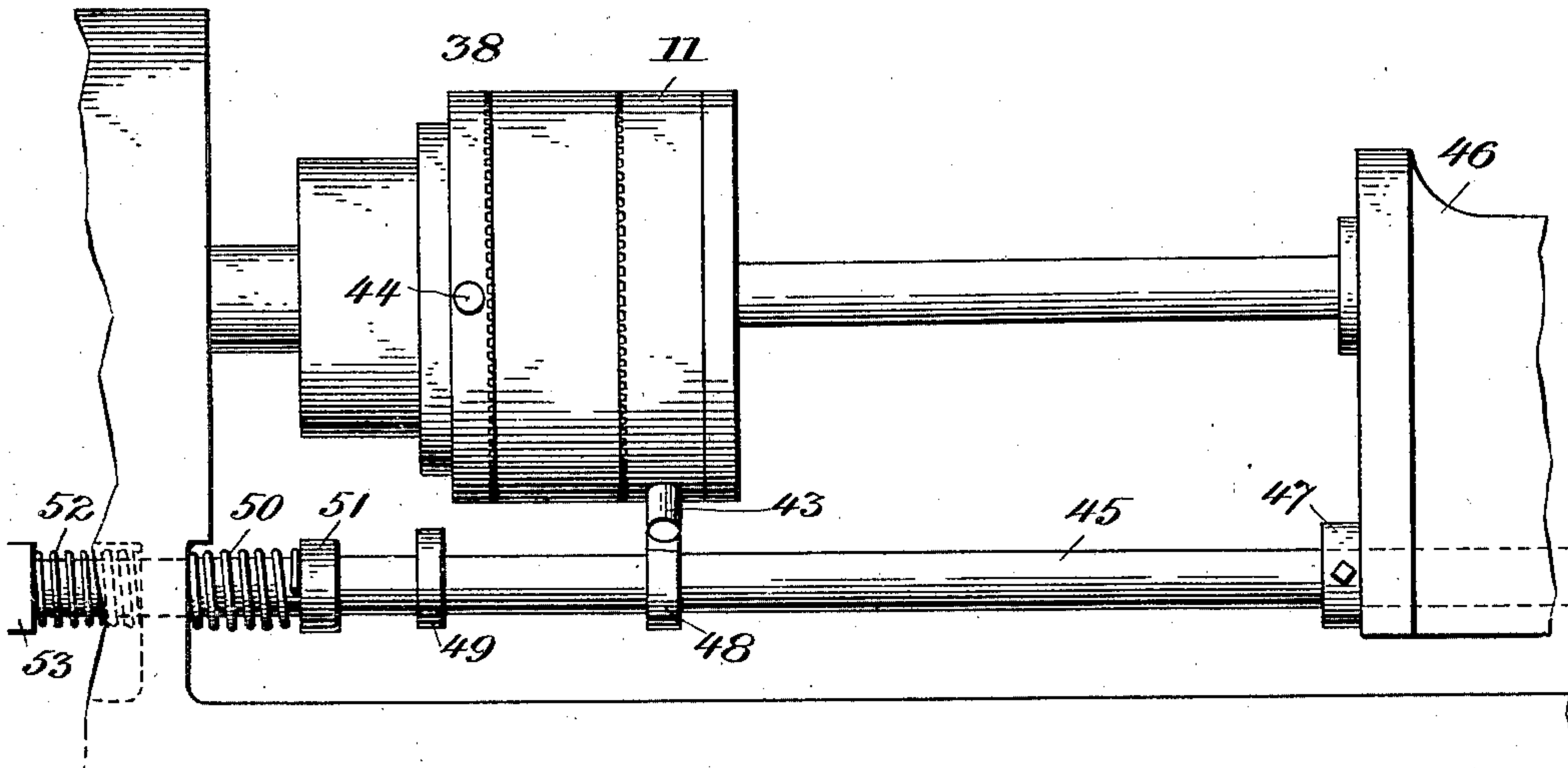


Fig. 10.

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UNITED STATES PATENT OFFICE.

POTTER F. MAINES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY
DIRECT AND MESNE ASSIGNMENTS, OF TWO-THIRDS TO MEYER SCHAM-
BERG, OF PHILADELPHIA, PENNSYLVANIA.

SCREW-CUTTING DIE-HEAD.

SPECIFICATION forming part of Letters Patent No. 693,557, dated February 18, 1902.

Application filed April 23, 1901. Serial No. 57,049. (No model.)

To all whom it may concern:

Be it known that I, POTTER F. MAINES, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Screw-Cutting Die-Heads, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to certain improvements in screw-cutting die-heads, and particularly to opening dies which may be operated automatically or by hand.

The principal object of this invention is to provide a metal-working tool of the class described in which are combined the great essentials of durability, simplicity, ease of operation and adjustment, and extreme accuracy in thread-cutting.

A further object of the invention is to provide a die-head so constructed as to be opened or closed automatically to bring the chasers into contact with the work or to disengage them from the work, so that threads of any predetermined length may be cut at the will of the operator without stopping the machine.

Various other objects, uses, and advantages will be readily apparent on reference to the following description when taken in connection with the accompanying drawings.

The invention consists, primarily, in a stock or die-head having a series of radially-disposed slots into which the chasers or cutting-tools loosely fit, a laterally-movable die-ring to which each of the chasers is connected, adapted when moved in one direction to feed the chasers inwardly toward the work and when moved in the opposite direction to withdraw the said chasers away from the work, means for imparting this lateral movement in either direction to the die-ring, and mechanism for automatically operating this die-ring at predetermined times to open the dies.

The invention further consists in the construction, combination, and arrangement of the different parts, such as will be hereinafter fully described, and particularly pointed out in the claims made hereto.

Referring to the accompanying drawings,

Figure 1 is a sectional elevation of an automatic opening die constructed in accordance with this invention. Fig. 2 is a cross-sectional view taken about on the line 2 2 of Fig. 1. Fig. 3 is a front elevation of the die-head. Fig. 4 is a detail sectional elevation through the stock, illustrating a means for adjusting the throw of the chasers in closing, so as to accommodate different diameters of work. Fig. 5 is a sectional elevation of the die-ring. Fig. 6 is a detail view of a portion of the adjusting-ring shown in Fig. 1. Fig. 7 is a side elevation of a die-head, illustrating a slightly-modified form of mechanism for automatically opening and closing the dies. Fig. 8 is a central sectional elevation of the same, showing the chasers in operative position. Fig. 9 is a side elevation showing the automatic opening die applied to a bolt-cutting machine. Fig. 10 is a sectional elevation illustrating the device as a hand opening and closing die.

In carrying out my invention I provide a stock or head 1 having a die-holding section 2, which is smaller in diameter than the section 1, and a hub-section 3, adapted to the turret or other holder of a lathe, bolt-cutter, or automatic screw-machine. In the front face of the section 1 and adjacent to the die-holding section 2 is formed an annular groove or recess 4, into which fits one edge of a die-ring 5. This die-ring 5 is provided with an inclined or conically-arranged inner wall, as 6. The rear face of the die-ring is provided with a flange 7, which is bent at right angles, and terminates in an annular flange 8. This flange 8 is adapted to fit neatly around the die-holding section 2 when the parts are assembled, as clearly illustrated in the drawings. The outer circumference of the die-ring 5 is provided with a series of coarse threads 9, which are adapted to be engaged by the threads 10, formed on the interior of the ring 11.

The chasers 12 are provided on their outer edges with inclined walls, as 13, and adjacent to the said inclined wall is an inclined slot 14, extending from one side of the chaser, as illustrated in Fig. 8 of the drawings. The die-holding section 2 is provided with a series of radially-disposed slots 15 of a depth

equal to the length of the chasers and of a width sufficient to allow the chasers to fit and slide therein. The chasers 12 when in position neatly fit into the radial slots 15, and the inclined slots 14 engage the annular flange 8 of the ring-section 5, and the inclined ends 13 of said chasers fit snugly against the correspondingly-inclined wall 6 of the die-ring. After the chasers have been placed in position in the die-holding section and die-ring and the ring 11 screwed into position a covering-plate 17 is secured over the end of the die-head by means of suitable screws which engage the threaded apertures 18, provided in the die-holding section 2, which serves to hold the chasers against lateral movement. In the groove 4 around the circumference of the section 2 of the head is secured one end of a flat band-spring 19, the said spring when under tension being coiled around the section 2 and passing through a slot 20 to a recess 21, cut in the outer face of the head 1, and its free end is secured to a stud 22, which is rigidly secured in the ring 11, as illustrated in Figs. 1 and 2 of the drawings. A socket or holder 24, which is carried by the turret or lathe-carriage, fits over the hub-section 3 of the head and is keyed thereto by means of a spline 25. The exterior of the holder 24 is screw-threaded, as at 26, for the reception of an interiorly-threaded ring 27. This ring 27 is provided with a notch 28, into which extends the end of the stud-pin 22, thus holding the ring 11 in a predetermined position under the tension of the spring 19. The position of the ring 11 can be adjusted by regulating the position of the notch 28 by means of turning the ring 26. Graduations, which it has not been considered necessary to illustrate, are provided on the bottom wall 29 of the recess 21, which when registered with a pointer or zero-line 30, provided on the bottom of the recess 28, will enable the cutters or chasers to be minutely adjusted.

In operation, after the parts have been properly assembled and the chasers have been placed in position, the ring 11 is turned until the spring 19 is wound up, and the ring 26 is then adjusted with its notch 28 engaging the end of the pin 22, thus holding the ring 11 in its set position, and the device is ready to operate upon the rod or bolt to be threaded. The work revolves in this instance, and the carriage is fed along by the lead-screw of the lathe. When it is desired to stop the cutting operation of the dies, the lathe-carriage is stopped, and the chasers 12, being in contact with the revolving work, will cause the head 1 and its hub 3 to be withdrawn from the holder 24, thereby disengaging the pin 22 from the notch 28, and as soon as this pin 22 leaves the notch 28 the coiled spring 19, which is under tension, as before described, will immediately throw or turn the ring 11, which action by reason of the engagement of the threads 10 on the interior of said ring with the threads 9 on the exterior

of the die-ring will cause the said die-ring to move laterally, and by reason of the engagement of the chasers 12 with the inclined wall 6 of the said die-ring and the engagement of the flange 8 with the slot 14 in the chasers the said chasers will be drawn outwardly away from the work, and the die is opened and the cutting operation thus stopped. When it is desired again to start the cutting operation, the ring 11 is turned back by means of a suitable handle, as 31, which operation feeds the die-ring 5 in an opposite direction to that already described and throws the chasers inwardly into engagement with the work. The hub 3 is now securely held in the holder 24 by means of the spline 25, and the ring 26 is adjusted so that the notch 28 will hold the pin 22 in the desired position.

If it is not desired to open the dies automatically, the construction illustrated in Fig. 10 can be used. The principle of this construction is exactly the same as that already described, with the exception that the spring 19, stud 22, and recess 21 are not needed and are therefore omitted. The die-ring 11 is simply provided with the handle 31, and when the said ring 11 is turned in one direction the die-ring 5 will be moved laterally, in this instance to the left, which closes the dies and causes them to engage the work. By turning the ring 11 in an opposite direction by means of the handle 31 the die-ring 5 will be moved laterally toward the right and the dies opened and moved away from the work.

In Fig. 4 I have illustrated a means for adjusting the movement of the die-ring for regulating the radial movement of the chasers. This consists in providing an aperture 32, starting from the circumference of the die-head 1 and entering the vertical wall of the groove 4. A regulating-screw 33 is inserted through this aperture 32 and is threaded into an aperture 34, as illustrated. The head of the screw 33 is enlarged and made eccentric to the body of the screw, so that when the said screw is turned a portion of the head will enter into the groove 4 and limit the lateral movement of the die-ring 5 when it is moved in this direction to open the dies. After the screw 33 has been properly adjusted a plug 35 is screwed into the aperture 32 until it bears against the eccentric head of the said screw 33, thereby holding it firmly in its adjusted position.

In Figs. 7, 8, and 9 of the drawings I have shown a slight modification in the construction of the invention, such as is generally used when the same is applied to a bolt-cutting machine. In this construction the ring 11 is provided on its left-hand edge with gear-teeth 36, and the stock or head 1 is provided with a shoulder 37, which is adapted to receive a closing-ring 38. This ring 38 is provided on its right face with gear-teeth corresponding to the teeth 36. A gear 39 is mounted in a recess 40, cut in the die-head, the said gear meshing with the teeth 36 on

the ring 11 and the teeth on the ring 38. The gear 39 may be mounted on a stud-screw, such as 41, so as to be free to revolve when either the opening or the closing ring is turned. A jam-nut or ring 42 is threaded on the hub-section 3 and bears against the ring 38 for the purpose of holding it in position. The opening-ring 11 is provided with a projecting pin 43, (see Fig. 9,) and the closing-ring 38 is provided with a projecting pin 44. On the bed of the lathe is mounted a shaft 45, having one end projecting through the lathe-carriage, and on this shaft 45, in advance of the carriage 46, is an adjustable collar 47. A cam 48 is secured on said shaft to one side of the path of the pin 43, and a similar cam 49 is provided on said shaft a certain distance beyond the cam 48. By adjusting the position of the collar 47 the length of the thread to be cut can be regulated. In operation the die-head revolves on the lathe-spindle, and the carriage 46 carries the work and is fed by the lead-screw of the machine, and as the carriage moves forward it will strike against the collar 47 and move the shaft 45 longitudinally, thus bringing the cam 48 in the path of the revolving pin 43, carried by the opening-ring 11. As soon as this pin 43 strikes the cam 48 it turns the said ring 11 and moves the die-ring 5 toward the right, thereby opening the dies and withdrawing them from the work. A coiled spring 50 is provided around the shaft 45, which abuts at one end against the lathe-frame and at its other end against the collar 51, provided on the said shaft 45. A similar spring 52 is provided on this shaft 45, which abuts against the collar 53 at one end and the lathe-frame at its other end, so that as soon as the lathe-carriage 46 is moved back a certain distance the cam 49 will come in the path of the revolving pin 44, carried by the ring 38, and this ring will be revolved, which by reason of its engagement with the gear 39, which is in turn in engagement with the teeth 36 on the ring 11, turns the said ring 11 in an opposite direction to that already described, thereby feeding the die-ring laterally to the left, which action closes the dies and causes them to again engage the work.

In order to prevent the die-ring 5 from revolving when the outer ring 11 is turned, the same is keyed to the section 3 of the die-body by means of the spline 60. This leaves it free to move laterally, but prevents it from rotating.

When the parts are assembled, it will be seen that no openings are left in the bore of the die-head, so that it will be impossible for the metal shavings or oil to get into the working parts of the die and interfere with the accurate working of said parts. It will also be noted that the chasers or cutting-dies are held positively against movements without resorting to set-screws or any other unreliable means, and the accuracy of the thread-cutting is thus assured.

Having thus described my invention, what

I claim, and desire to secure by Letters Patent, is—

1. In a die-head, in combination with the stock and cutting-dies arranged therein, a laterally-movable die-ring keyed on said stock, an inner annular flange formed thereon, an inclined face on the inner diameter of the main body of the die-ring forming a circular groove between said flange and said inclined inner face, said flange adapted to engage inclined tongues formed in the cutting-dies, as and for the purpose substantially as described.

2. In a die-head, a laterally-movable die-ring adapted to be keyed upon the stock, the inner face of the ring having an inwardly-projecting flange forming an annular recess between the face of the inner flange and the inner face of the main body of the die-ring, the said inner face of the ring being inclined and diminishing in diameter from the base of the recess, said flange being adapted to engage inclined tongues formed in the cutting-dies of the die-head, substantially as described.

3. In a die-head, the combination with the stock, of a die-receiving section, a series of radially-disposed guide-slots provided therein, angularly-slotted cutting-dies adapted to said guide-slots, a die-ring keyed to said die-receiving section having an inclined inner wall adapted to bear against the inclined ends of the cutting-dies and an upwardly-extending annular flange formed in the die-ring adapted to engage the angular or inclined tongue formed in each of the cutting-dies, and an outer ring confined against the die-head having interior screw-threads adapted to engage screw-threads provided upon the outer periphery of the die-ring for imparting lateral movement to the die-ring in either direction, substantially as described.

4. In a die-head, a laterally-movable die-ring having an inwardly-projecting annular flange and positively-guided cutting-dies with angularly-disposed slots provided in said cutting-dies forming an inclined tongue in each of the cutting-dies adapted to the said flange of the die-ring for moving the dies in an outward direction, the inner surface of the main body of the said die-ring being inclined and adapted to bear against the inclined ends of the cutting-dies for moving the dies in the opposite direction, substantially as described.

5. In a die, the combination with the stock, of a die-receiving section having a series of radially-disposed guide-slots provided therein, cutting-dies adapted to said guide-slots having angularly-disposed slots provided in said cutting-dies, a die-ring keyed to said die-receiving section having an inclined inner wall adapted to bear against the inclined ends of the cutting-dies, and inwardly-extending annular flange formed in the die-ring adapted to engage the angular or inclined slots formed in the cutting-dies, a retaining-plate secured upon the die-receiving section, an outer ring

confined between the die-head and the said retaining-plate having screw-threads upon the inner surface of said ring adapted to engage with screw-threads provided upon the outer periphery of the die-ring for imparting lateral movement to the die-ring in either direction, and means for rotating said outer ring, substantially as described.

6. In a die-head, the combination with the stock, of a die-receiving section, a series of radially-disposed slots provided therein, cutting-dies adapted to said slots, a die-ring keyed on the die-holding section, an inclined interior wall formed in the said die-ring adapted to bear against the similarly-inclined walls of the cutting-die, an annular flange formed on one side of the die-ring and extending inwardly, an inclined slot formed in the cutting-die adapted to be engaged by the said annular flange, exterior threads formed on the die-ring, an outer ring having interior threads adapted to engage the threads of the die-ring and means for turning the said outer ring to feed the die-ring laterally in either direction, for the purpose described.

7. In an automatically-operated die-head, the combination with the stock, of cutting-dies arranged therein, a laterally-movable die-ring keyed on the said stock, a connection between the die-ring and each of the cutting-dies whereby upon the lateral movement of the die-ring the cutters are caused to open or close, screw-threads provided on the exterior of the die-ring, an outer ring having interior screw-threads adapted to engage the threads on the die-ring, an annular flange extending inwardly from one side of the die-ring adapted to engage a laterally-extending tongue provided in the cutting-dies, a spiral spring secured at one end to the stock and at its other end to the outer threaded ring, and means for holding the outer ring in a set position under tension until it is automatically released by the action of the lathe-carriage, substantially as described.

8. The combination with the die-head, of a die-holding section having radially-disposed slots provided therein, cutting-dies adapted to said slots, a die-ring keyed to the die-holding section, connections between the said die-ring and each of the cutting-dies whereby upon the lateral movement of the said die-ring the cutting-dies are either opened or closed, threads provided upon the exterior of the die-ring, an outer ring having interior threads adapted to engage the threads on the die-ring, a retaining-plate for holding the outer ring against lateral movement, an annular flange extending inwardly from one side of the die-ring adapted to engage a later-

ally-extending tongue provided in the cutting-dies, a spiral spring secured at one end to the stock and at its other end to the outer ring adapted to throw the said ring and open the dies, and means for adjusting the position of the said outer ring to regulate the movement of the cutting-dies, substantially as described.

9. The combination with the stock, of radially-disposed slots formed therein, cutting-dies adapted to said slots, a die-ring keyed to the die-holding section, connections between the said die-ring and each of the cutting-dies whereby upon the lateral movement of the said die-ring the cutting-dies are either opened or closed, threads formed on the exterior of the die-ring, an outer ring having interior threads adapted to engage the threads of the die-ring, a retaining-plate for holding the outer ring against lateral movement, a spiral spring secured at one end to the stock and at its other end to the outer ring, a recess provided in the surface of the stock-section adjacent to the outer ring, a pin secured to the outer ring and projecting through the recess and an adjusting-ring threaded on the lathe-carriage having a recess adapted to receive the end of the pin and hold it in a fixed position until the die-head is withdrawn from its holder, substantially as described.

10. In a die-head, the combination with the stock, of a die-receiving section, a series of radially-disposed guide-slots provided therein, angularly-slotted cutting-dies adapted to said guide-slots, a die-ring keyed to said die-receiving section having an inclined inner wall adapted to bear against the inclined ends of the cutting-dies and an inwardly-extending annular flange formed in the die-ring adapted to engage the angular or inclined tongue formed in each of the cutting-dies, and an outer ring confined against the die-head having interior screw-threads adapted to engage screw-threads provided upon the outer periphery of the die-ring for imparting lateral movement to the die-ring in either direction, a spiral spring secured at one end to the stock and at its other end to the outer threaded ring, and means for holding the outer ring in a set position under tension until it is automatically released by the action of the lathe-carriage, substantially as described.

In witness whereof I have hereunto set my hand this 12th day of April, A. D. 1901.

POTTER F. MAINES.

Witnesses:

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CHAS. K. BENNETT.