

(No Model.)

2 Sheets—Sheet 1.

A. M. SOUTHARD.
HAND ROCK DRILL.

No. 585,795.

Patented July 6, 1897.

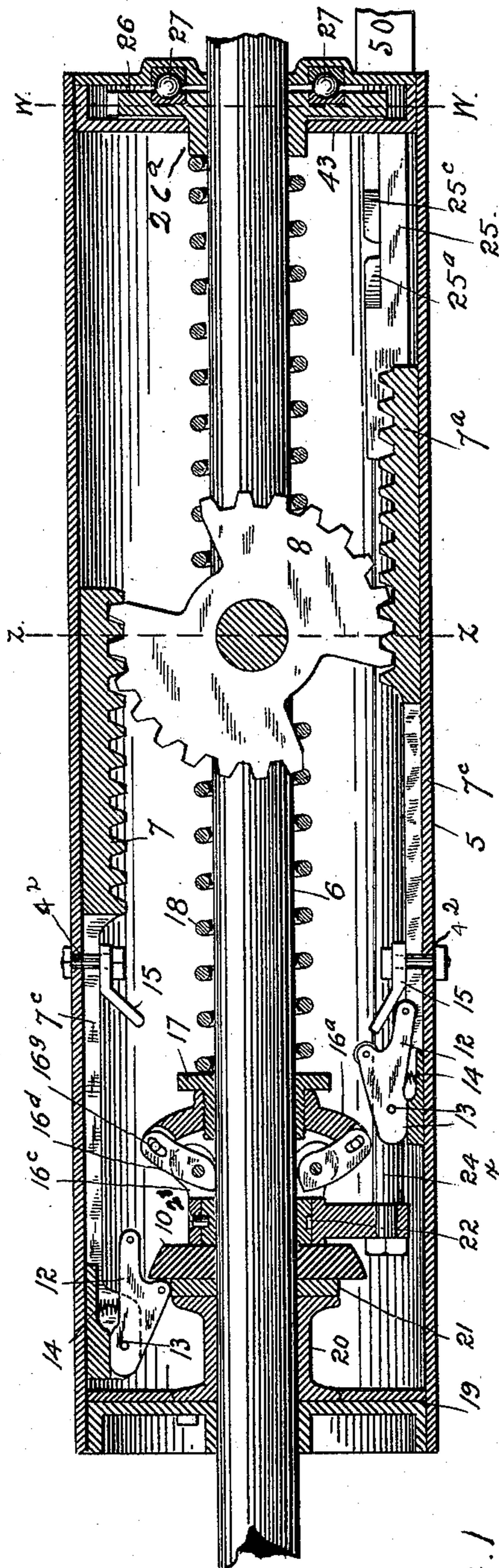


FIG. 1

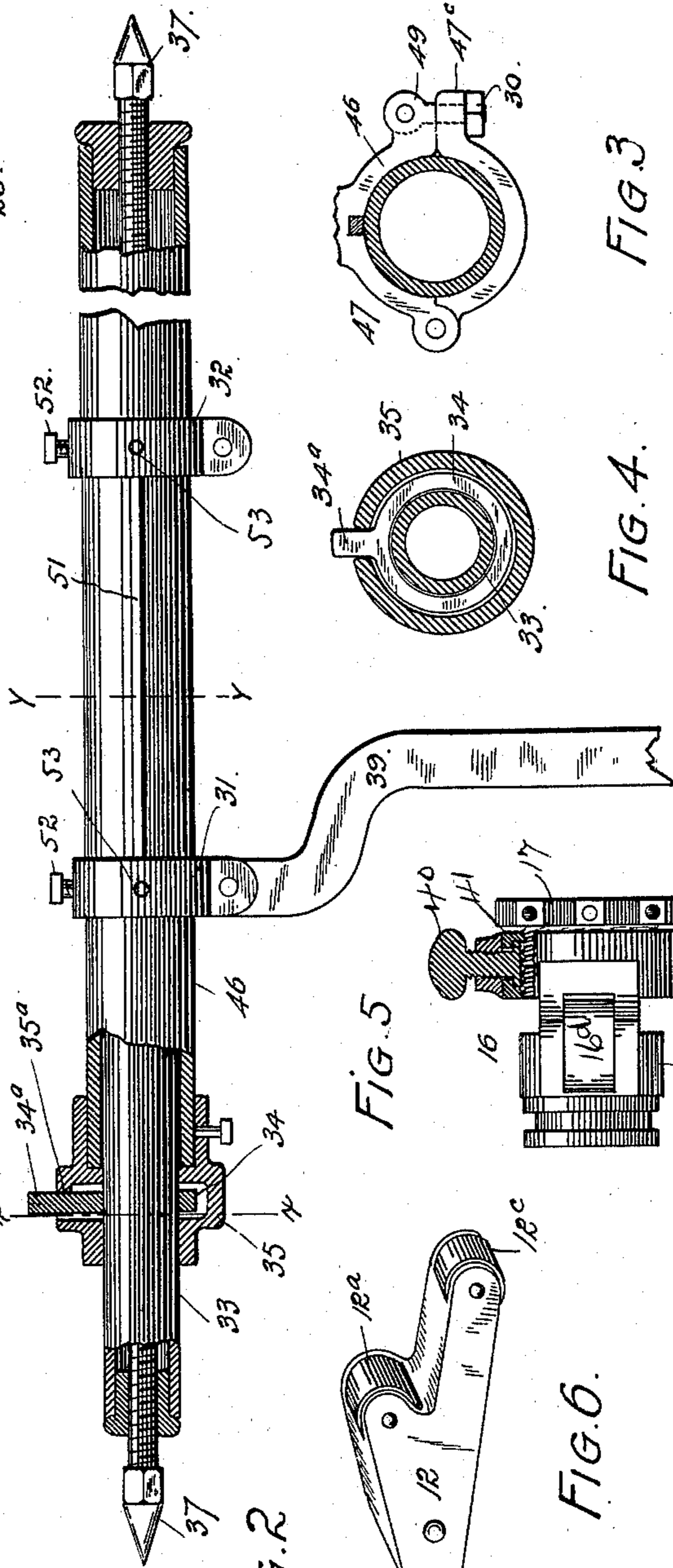


FIG. 2

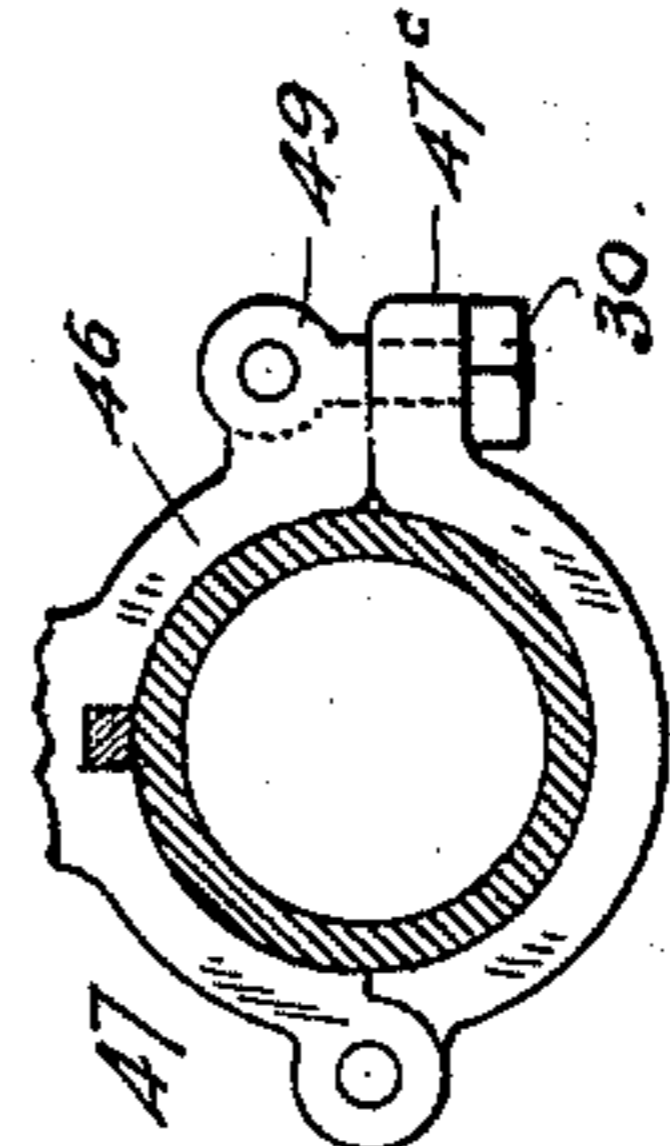


FIG. 3

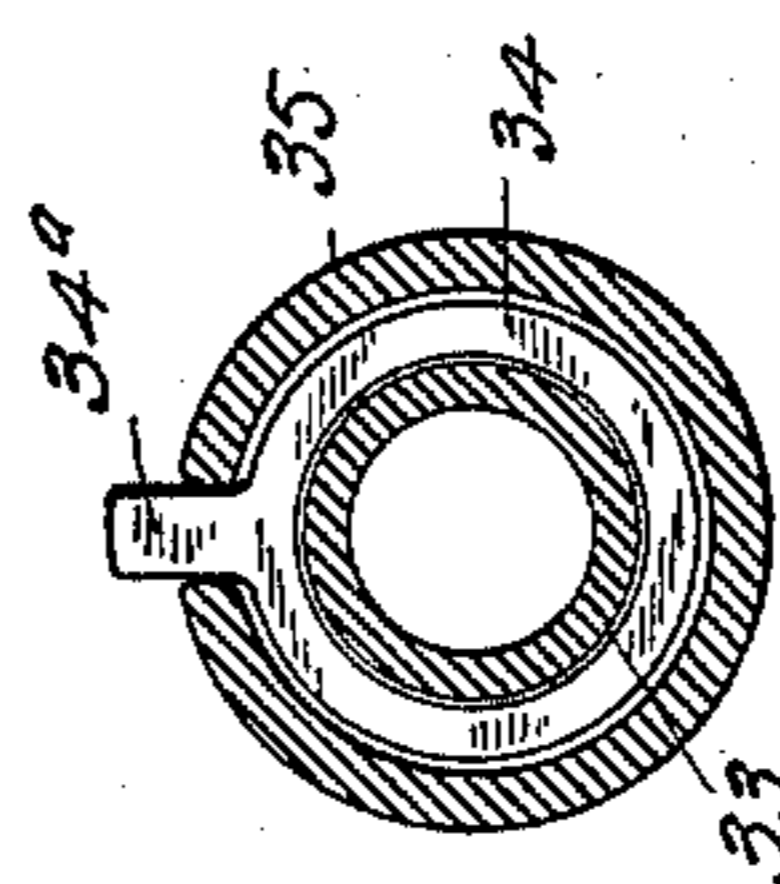


FIG. 4

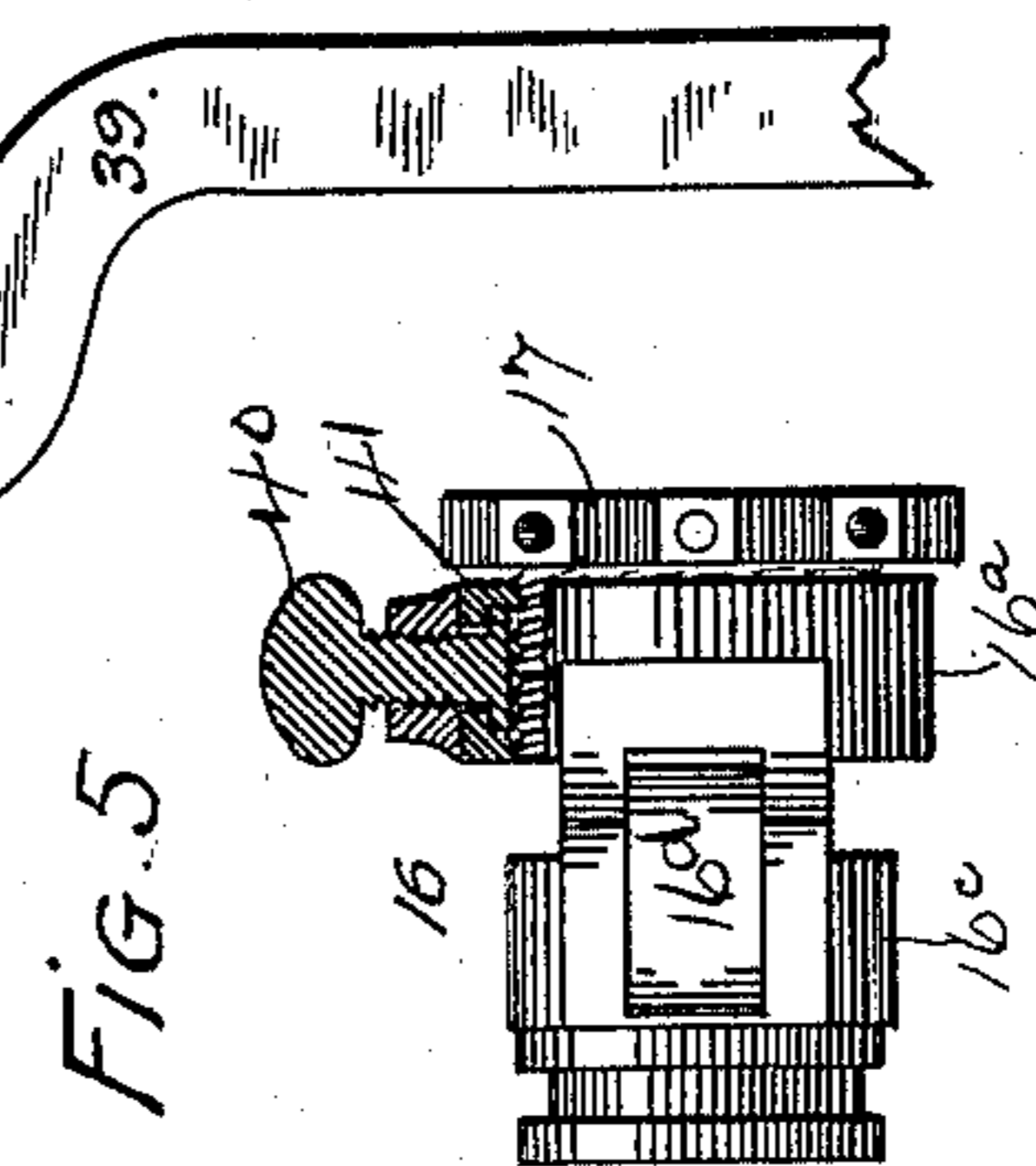


FIG. 5

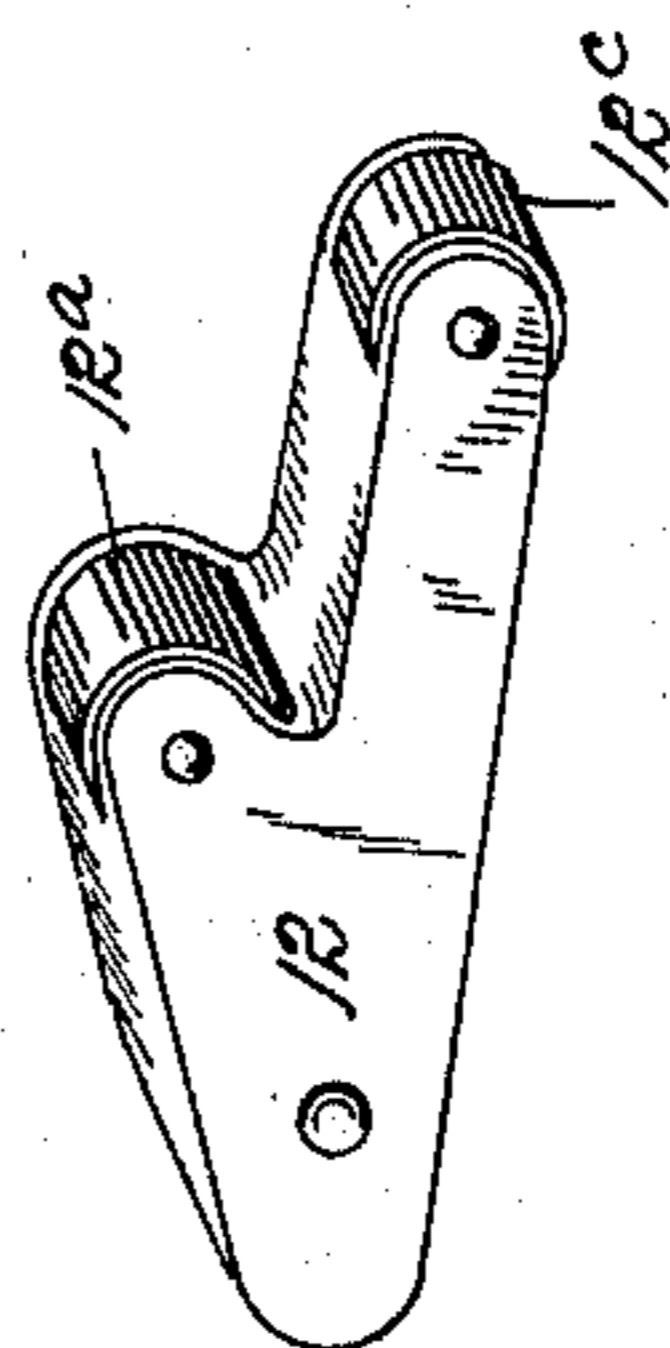


FIG. 6

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(No Model.)

2 Sheets—Sheet 2.

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HAND ROCK DRILL.

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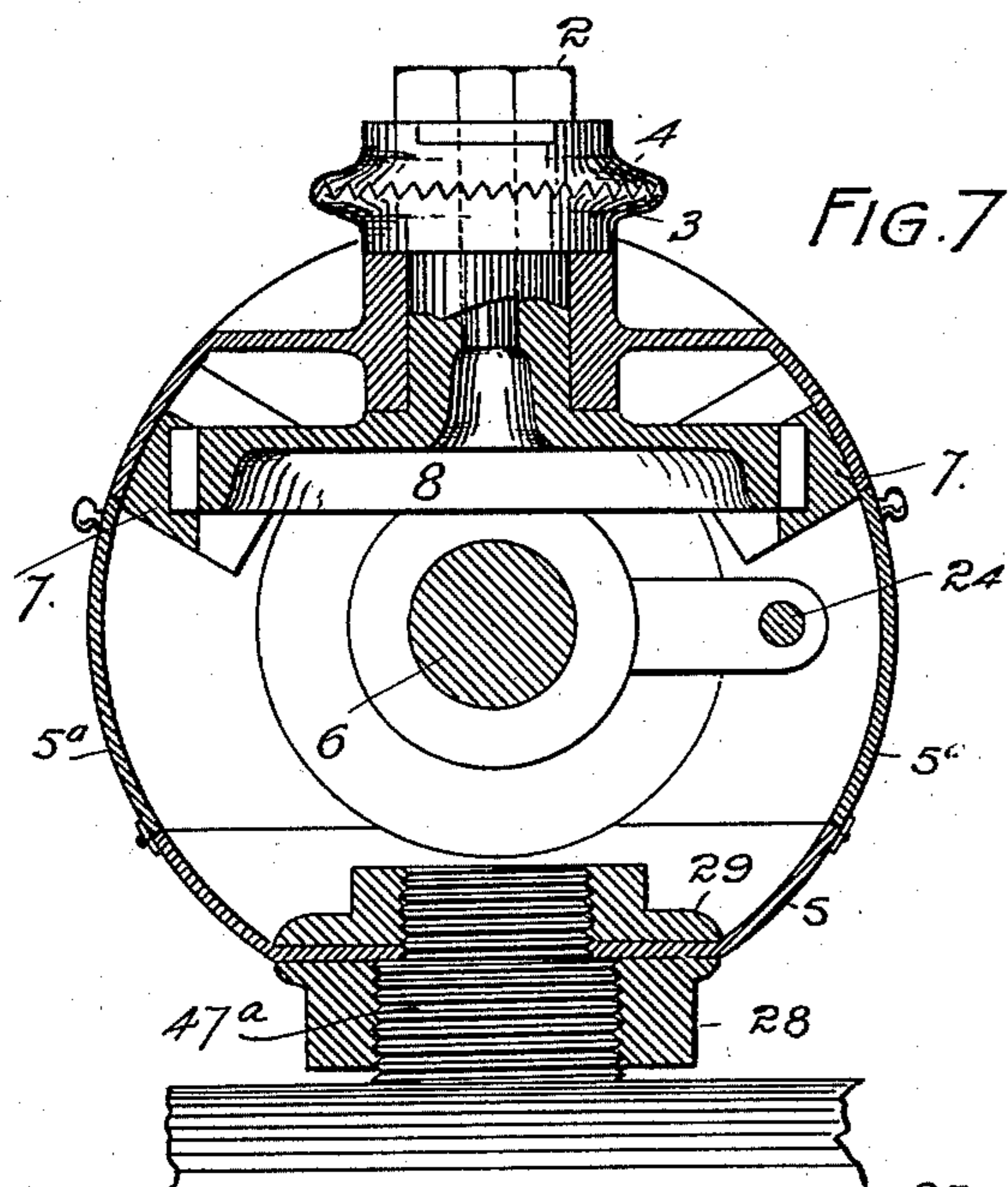


FIG. 7

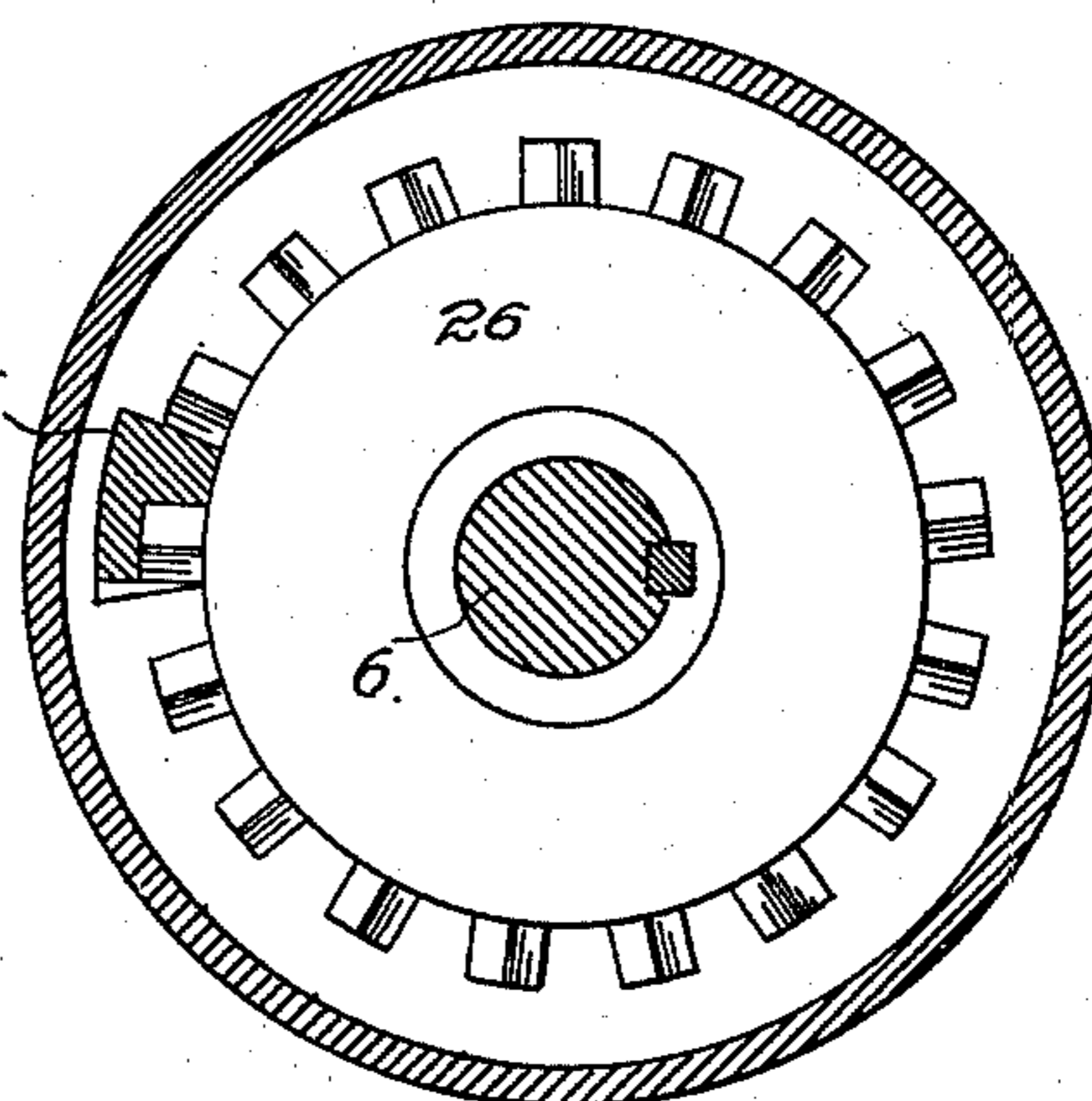


FIG. 8.

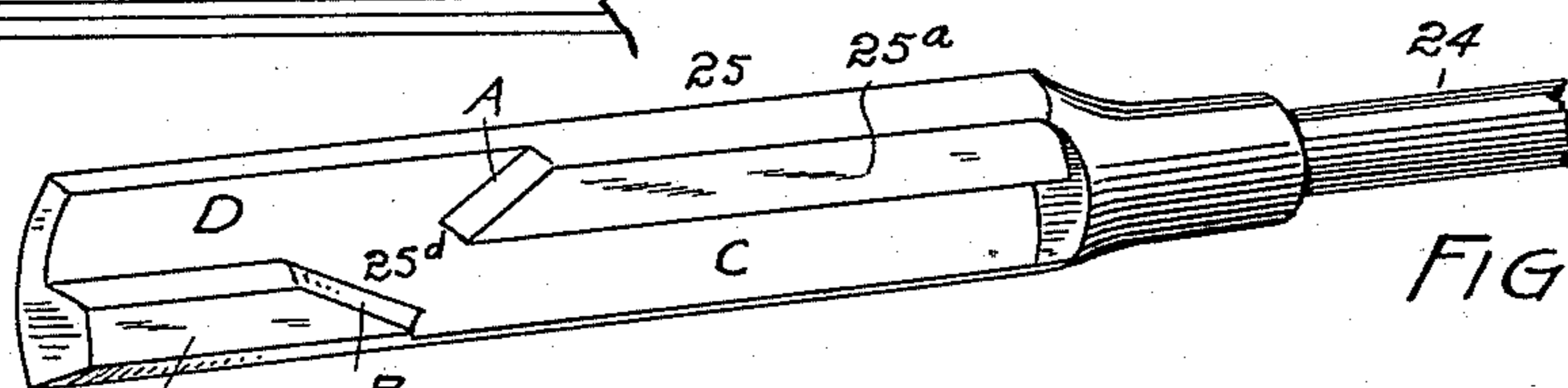


FIG. 9



FIG. 10.

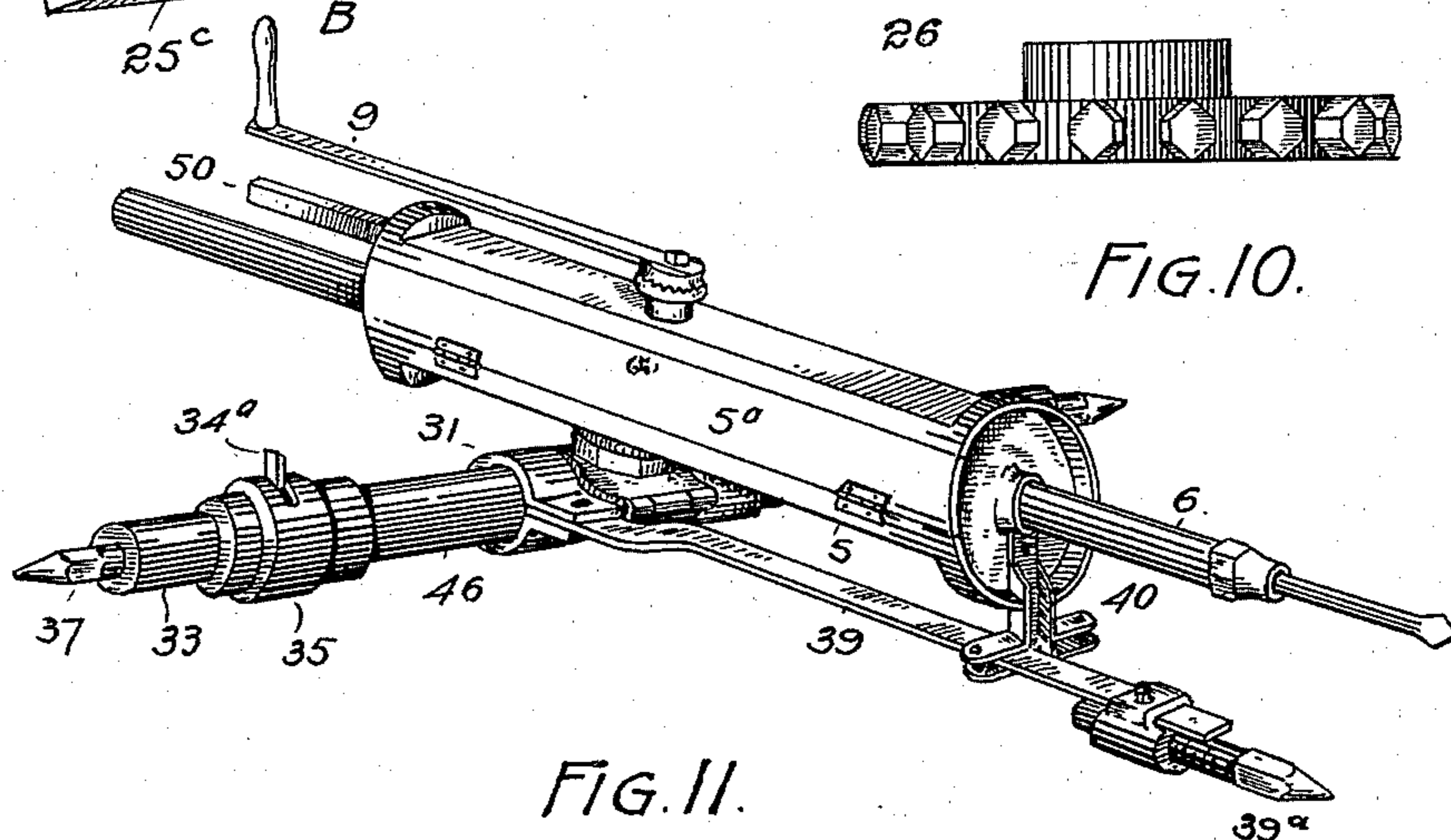


FIG. 11.

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UNITED STATES PATENT OFFICE.

ABRAHAM M. SOUTHARD, OF DENVER, COLORADO.

HAND ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 585,795, dated July 6, 1897.

Application filed December 11, 1896. Serial No. 615,397. (No model.)

To all whom it may concern:

Be it known that I, ABRAHAM M. SOUTHARD, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Hand Rock-Drills; and I do 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 the figures and letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in hand rock-drills; and it consists of the features, arrangements, and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a vertical longitudinal section taken through the casing, the inclosed mechanism being shown partly in section. Fig. 2 illustrates, partly in section, the means for supporting the drill within the shaft or tunnel. Fig. 3 is a section taken on the line *yy*, Fig. 2. Fig. 4 is a section taken on the line *xx*, Fig. 2. Fig. 5 is a side view of the clamp which engages the drill-shaft. Fig. 6 is a detail view in perspective of one of the dogs employed in drawing back the drill-shaft after each forward stroke. Fig. 7 is a vertical cross-section taken on the line *zz*, Fig. 1. Fig. 8 is a similar section taken on the line *ww*, Fig. 1. Fig. 9 is a detail view in perspective, illustrating the device for imparting the partial rotary movement to the drill-shaft between strokes. Fig. 10 is a detail view of the gear or cog-wheel which co-operates with the device shown in Fig. 9. Fig. 11 is a perspective view of the complete drill.

Similar reference-characters indicate corresponding parts in the views.

Let the numeral 5 designate the drill-casing, having closed ends or heads through which the reciprocating drill-shaft 6 passes. Inclosed within this casing and slidingly supported on opposite sides thereof are two cog-racks 7 and 7^a, respectively. These racks are engaged by a mutilated gear 8, journaled in the casing and operated by the hand-lever 9.

The drill-shaft is surrounded by a loose collar 10, whose edge is alternately engaged by

two dogs 12, mounted, respectively, on the two rack-bars 7 and 7^a. Each dog is pivoted on the forward extremity of a rack-bar, as shown at 13, and is normally forced inwardly or held in a position to engage the collar 10 by a spring 14. Each dog carries two anti-frictional rollers 12^a and 12^c. The roller 12^a engages the edge of the collar 10 as the rack is drawn backward and causes said collar to grip the shaft 6, which is moved backward with the rack. The shaft fits nicely within this gripping-collar, the latter being made to grip the shaft by applying pressure on one side only of its edge. Each roller 12^c engages an inclined stop 15, attached to the casing, and causes the dog to move outwardly sufficiently to release the collar 10 when the drill-shaft has reached its backward limit of movement.

Immediately in the rear of the collar 10 and also surrounding the drill-shaft is a clamp 16, composed of two members 16^a and 16^c, connected by gripping-dogs 16^d, whose extremities are pivoted on pins 16^e, passed through lugs on the clamp members. One extremity of each dog 16^d is provided with an elongated aperture to allow the members sufficient movement for clamping and releasing the drill-shaft. Into the clamp member 16^a, which is threaded for the purpose, is screwed a tension-nut 17, against which bears one extremity of the power-spring 18. This power-spring, acting on the clamp 16, causes the dogs 16^d to grip the drill-shaft 6. Hence as soon as the collar 10 is released by either dog 12 the power-spring, acting on the dog 16, drives the drill-shaft forward, forcing the bit or drilling-tool into the rock.

Attached to the front head 19 of the casing is a collar 20, surrounding the shaft 6. On this collar is mounted a cushion 21, composed of leather or other suitable material, against which the collar 10 strikes when it reaches its forward limit of movement. As soon as the collar 10 engages this cushion the clamp 16 stops and the momentum of the shaft carries the latter forward through the clamp 16 or causes the drill to feed forward into the rock, as may be required.

To the forward extremity of a rod 24, located within the casing, is attached a collar 22, surrounding the member 16^c of the clamp 16. This collar is connected with the clamp member by a set-screw 23, which projects into a

circumferential groove formed in the neck or reduced portion of the clamp part.

To the opposite or rear extremity of the rod 24 is attached the device 25, which protrudes through the rear head of the casing and engages cogs on the periphery of a wheel 26, incased within said head and provided with ball-bearings 27. This wheel is provided with a tongue which engages a longitudinal groove formed in the drill-shaft, whereby the latter is free to move longitudinally through the gear, while the gear and shaft must rotate together. As the drill-shaft is reciprocated the rod 24 is given a corresponding movement by virtue of the construction heretofore described.

The device 25 is provided with two tongues 25^a and 25^c, having beveled faces A and B, respectively. The tongue 25^a is located forward of the tongue 25^c and the two tongues are not in line with each other, one being located on the upper part of the body of the device and the other on the lower part thereof, the arrangement being such that the lower edge of the tongue 25^a is in the same plane as the upper edge of the tongue 25^c. The beveled extremities of these tongues are separated by a space 25^d. As the rod 24 moves forward the face B of the tongue 25^c engages a cog on the gear 26 and imparts a partial rotary movement to the gear and the shaft 6. Again, as the rod 24 moves backward the face A of the tongue 25^a is brought in contact with the same cog and another partial turn given the drill-shaft in the same direction, since the cog may be said to move upward as it engages each inclined face. As the rod 24 makes another reciprocation the next cog of the wheel engages the faces A and B in the same manner. Hence the necessary partial rotary movements between strokes are imparted to the drill-shaft during the operation of the machine.

It will be observed from an inspection of the drawings (see Fig. 9) that as the rod and the device E⁵ are making the forward movement one cog of the gear 26 is moving in the path C, below the tongue 25^a, until it reaches the face B of the tongue 25^c, when the cog travels upward on said face into the path D above the tongue 25^c. Again, as the device 25 moves in the opposite direction the same cog of the gear is in the path of the beveled face B and moves upward thereon to the top of the tongue 25^a.

The drill-casing is attached to a supporting-bar 46 by a hinged clamp 47, to one part of which is attached a threaded projection 47^a, passing through an opening in the casing. Screwed on this projection outside of the casing is a nut 28, while inside the casing another nut 29 is applied to the projection, which is made of two diameters for the respective nuts. The nut 29 is keyed on the projection after being screwed to position. When the outer nut is screwed tightly against the casing, the latter is prevented from turning on the pro-

jection 47^a. If it is desired to turn the casing, it is only necessary to loosen the nut 28 slightly, there being sufficient clearance between it and the shoulder of the clamp for the purpose, after which the casing may be turned at will.

The parts of the clamp 47 are fastened together opposite the hinge by means of a bolt 49, having one extremity pivoted or hinged on one of the clamp parts. This bolt engages an open slot formed in a lug 47^c on the other clamp part and is fastened by a nut 30, screwed on its threaded extremity to engage with said slotted lug. The clamp 47 is applied to the bar 46 between two collars 31 and 32. These collars are connected by a tongue or small bar of metal 51, whose extremities are made fast to the collars by rivets 53. The collars are fastened to the bar 46 by means of set-bolts 52. By loosening these bolts the collars may be turned on the bar to give the tongue 51 any desired position. The clamp 47 is provided with a groove which is engaged by the tongue 51. This tongue prevents the clamp from turning on the bar when the set-screws 52 are tightened, but by loosening these bolts and turning the collars the drill-casing and its shaft may be made to occupy a horizontal position, a vertical position, or any position intermediate the horizontal and vertical.

The length of the bar 46 is regulated by means of an extension-bar 33 telescoping in the bar 46 and controlled by a clamp or gripping-collar 34, inclosed by a sleeve 35, applied to one extremity of the bar 46. The collar 34 has a projection 34^a protruding from an opening in the sleeve 35. This sleeve has a lug 35^a, which engages the collar on one side near its edge, causing it to grip the bar 33 and prevent its inward movement.

It will be readily seen that the collar does not resist the outward movement of the telescoping bar. The latter may be moved into the bar 46 at will when the collar 34 is held in such a position that it cannot grip the bar. The protruding part 34^a of the collar permits the necessary manipulation to accomplish this purpose. This support for the drill is provided with brads or sharpened extremities 37, adapted to readily enter the walls of the shaft or tunnel. The drill is further supported by an arm 39, hinged to the collar 31, and extending at any desired angle to the bar 46. This arm engages a depending bracket 40, attached to the forward extremity of the casing. This bracket is provided with slotted projections, which allow the arm to pass between them and support the drill when the arm is located on either side thereof. The outer extremity of this arm is provided with a brad 39^a, which engages the breast of the rock.

The casing of the drill is provided with hinged portions 5^a on each side, which allow access to the mechanism within.

In operating the drill the lever 9 is moved

back and forth, each movement giving the mutilated gear a partial turn. This lever may be adapted to occupy any desired position by means of a clutch composed of two members 3 and 4. The member 3 is fast on the journal of the gear, while the member 4 is apertured to slip over the protruding extremity of the gear's journal and contains a socket to receive the lever, which is slotted to allow the threaded extremity of the journal to protrude. The lever is fastened and the clutch members locked securely in place by a nut 2, screwed down upon the lever. As the gear 8 is turned the rack-bars 7 and 7^a are moved in opposite directions, since they are engaged by opposite segments of the gear. The rack-bar which is moving backward gives the drill-shaft a corresponding movement by virtue of the engagement of the dog 12 with the gripping-collar 10. As soon as this dog reaches its corresponding stop or trip 15 the dog is disengaged from the collar 10 and the recoil of the spring, acting on the clamp 16, drives the drill-shaft forward. The clamp 16 and the collar 10 move forward with the drill-shaft until the collar engages the cushion 21. The drill-shaft then feeds forward through the clamp by virtue of its own momentum.

The tension-nut, when properly adjusted, is locked by means of a set-screw 40, threaded to engage a threaded aperture in the member 16^a of the clamp 16. This screw is swiveled in a block 41, engaging a recess in said member and having its inner surface threaded to fit the threaded portion of the tension-nut. By turning this screw inwardly the block 41 is pressed tightly against the threads of the nut, whereby the latter is locked from movement until the screw is released or loosened.

The rack-bars 7 and 7^a are held in place by bolts 42, which pass through apertures in the casing 5 and engage slots 7^c, formed in the rack-bars. These bolts form guides for the bars and the stops 15 are attached to their inner extremities.

As the drill-shaft is reciprocated the rod 24 is correspondingly actuated, whereby the device 25 engages the gear 26 and imparts the necessary rotary movement to the shaft. The power-spring 18 engages a shoulder 26^a on the gear 26 and holds the latter in contact with the ball-bearings 27. The gear is not supposed to touch the inner plate 43 when the drill is in operation or when the power-spring is in place.

Whenever it is necessary to remove the drill-shaft from the hole in the rock for any purpose, as for cleaning out the hole, the clamp 47 is loosened sufficiently to allow the clamp to slide on the bar 46. The drill is then moved from the collar 31 toward the collar 32, thus placing it entirely out of the way and giving free access to the hole in the rock. When again ready to proceed with the work, the drill is moved on the bar 46 until the clamp 47 engages the collar 31, thus bring-

ing the drill-shaft directly in line with the hole.

The arm 39 is interchangeable and may be connected with either collar 31 or 32. In the foregoing description reference is made to Figs. 2 and 11, in which this arm is shown attached to the collar 31.

It must be observed that the mechanism for turning the drill-shaft imparts a uniform movement thereto at all times. Moreover, it is impossible for the shaft to turn in either direction except as it is actuated by this mechanism, since the tongues 25^a and 25^c fit nicely between the cogs of the wheel 26, the device 25 being accurately guided, whereby it can move only in a direct line. This device 25 passes through an opening in the rear end of the casing, its protruding portion being concealed by a case or cover 50.

Having thus described my invention, what I claim is—

1. In a rock-drill, the combination with a casing, a reciprocating shaft, and a power-spring, of a clamp mounted on the shaft and engaged by the power-spring, said clamp comprising members directly connected by gripping-dogs which are adapted to engage the shaft, one end of each dog having an elongated aperture where it is connected with the clamp member, the front end of the casing being provided with a suitable stop adapted to resist the movement of the clamp while the shaft feeds, the front end of the casing being provided with a suitable stop adapted to resist the movement of the clamp while the shaft feeds.

2. In a rock-drill, the combination with a casing, a reciprocating shaft and a power-spring, of a loose gripping-collar surrounding the shaft, racks slidingly mounted on the casing, spring-held dogs pivoted on the racks and adapted to engage the gripping-collar, means mounted on the casing for releasing the dogs when the shaft has reached its backward limit of movement, a clamp mounted on the shaft and engaged by the power-spring, said clamp comprising two members loosely connected by gripping-dogs which are adapted to engage the shaft, and a suitable stop attached to the front end of the casing and adapted to resist the movement of the clamp while the shaft feeds.

3. In a rock-drill, the combination with a casing, a reciprocating shaft, a power-spring and a mutilated gear, of two cogged racks slidingly mounted on the casing and engaged by opposite segments of the gear, a loose gripping-collar surrounding the shaft, spring-held dogs mounted on the racks and adapted to alternately engage the gripping-collar, trip-stops fast on the casing and engaging the dogs, a clamp mounted on the shaft immediately in the rear of the gripping-collar and comprising two members loosely connected by dogs which engage the reciprocating shaft, a tension-nut screwed into one member of the clamp and engaged by the

power-spring, and a cushioned stop attached to the front end of the casing against which the gripping-collar strikes, allowing the drill-shaft to feed.

4. The combination with the casing and reciprocating shaft, of a clamp surrounding the shaft, a rod suitably connected with the clamp and adapted to reciprocate with the shaft, a device attached to said rod and provided with two tongues rigidly connected therewith and located out of line with each other, said tongues being separated by a suitable space and having beveled faces, the said rod engaging a guide in the casing whereby it has no rotary movement and can only move in a direct line, and a toothed wheel suitably incased and mounted on the shaft in such a manner as to cause the shaft and wheel to rotate together, while the shaft moves longitudinally in the wheel, the cogs of the gear engaging the tongues of the reciprocating shaft.

5. In a rock-drill, the combination with the casing and the reciprocating shaft, of a clamp surrounding the shaft, and comprising two members loosely connected by dogs adapted to engage the shaft, a rod suitably connected with the clamp and adapted to reciprocate with the shaft, said rod carrying a device having two tongues not in line, said tongues having separated beveled extremities, a cog-wheel suitably incased and splined on the shaft, the cogs of said wheel engaging the tongues of the turning device.

6. In a rock-drill, the combination with the casing, the reciprocating shaft, and the power-spring, of the cogged racks movably supported on the casing, a gripping-collar surrounding the shaft, spring-held dogs attached to the racks and engaging the gripping-collar, trip-stops attached to the casing and lying in the path of the dogs, a clamp mounted on the shaft and comprising two members loosely connected by cams, said clamp being engaged by the power-spring on one side and by the gripping-collar on the other side, a mutilated gear journaled in the casing and having opposite segments engaging the two racks, and means for rotating the drill-shaft, comprising a rod attached to the clamp, a cogged wheel splined on the shaft, and a suitable device attached to the rod and engaging the cog-wheel whereby the latter together with the shaft is rotated.

7. In a rock-drill, the combination with the casing, the reciprocating shaft and the power-spring, of two cogged racks movably supported on the casing and carrying dogs, a gripping-collar surrounding the shaft and alternately engaged by the dogs, a mutilated gear having opposite segments engaging the racks, a suitable lever for operating the gear, and a clamp surrounding the shaft and engaged by the power-spring, the front end of the casing being provided with a stop adapted to resist the movement of the clamp while the shaft feeds.

8. In a hand rock-drill, the combination with the reciprocating shaft and the power-spring, of a clamp surrounding the shaft and engaged by the spring, said clamp being composed of two members loosely connected with apertured dogs adapted to grip the shaft, one aperture of each dog being elongated, as and for the purpose set forth.

9. The combination with a rock-drill, of a supporting-bar to which the drill-casing is suitably attached, an extension-bar telescoping in the main bar, a loose gripping-collar connecting the two bars and adapted to automatically prevent the inward movement of the inner bar, a clamp surrounding the main bar and having a threaded projection passing through an opening in the drill-casing and secured by nuts screwed on said projection and engaging the casing on opposite sides, said bar being provided with two collars one located on each side of the clamp, and an arm attached to one of the collars and extending at a suitable angle to the bar and engaging the bracket on the casing of the drill.

10. The combination with a rock-drill, of a supporting-bar to which the casing is suitably attached, an extension-bar telescoping in the main bar, a loose gripping-collar connecting the two bars and adapted to automatically prevent the inward movement of the inner bar, two collars surrounding the main bar and locked thereon by set-screws, said collars being connected by a tongue, and a clamp attached to the casing of the drill and having a groove engaged by the tongue connecting the clamps.

11. In a rock-drill, the combination with the drilling mechanism, of means for rotating the drill-shaft comprising a device connected with the shaft in such a manner as to reciprocate therewith, said device engaging a guide on the casing whereby it is permitted no rotary motion and can move only in a direct line, said device having two tongues out of line with each other and separated by a suitable space, said tongues having beveled faces, and a cogged or toothed wheel suitably incased and mounted on the shaft in such a manner as to cause the shaft and wheel to rotate together, while the shaft moves longitudinally in the wheel, the cogs or teeth of the gear engaging the tongues of the reciprocating device.

12. The combination with a rock-drill, of a supporting-bar to which the drill-casing is suitably attached, an extension-bar telescoping in the main bar, and a loose gripping-collar connecting the two bars and adapted to automatically prevent the inward movement of the inner bar, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ABRAHAM M. SOUTHARD.

Witnesses:

G. J. ROLLANDET,
ALFRED J. O'BRIEN.