No. 620,847. Patented Mar. 7, 1899.

M. C. JACKSON.

ROCK DRILL.

(Application filed Feb. 7, 1898.)

(No Model.) 2 Sheets—Sheet 1.

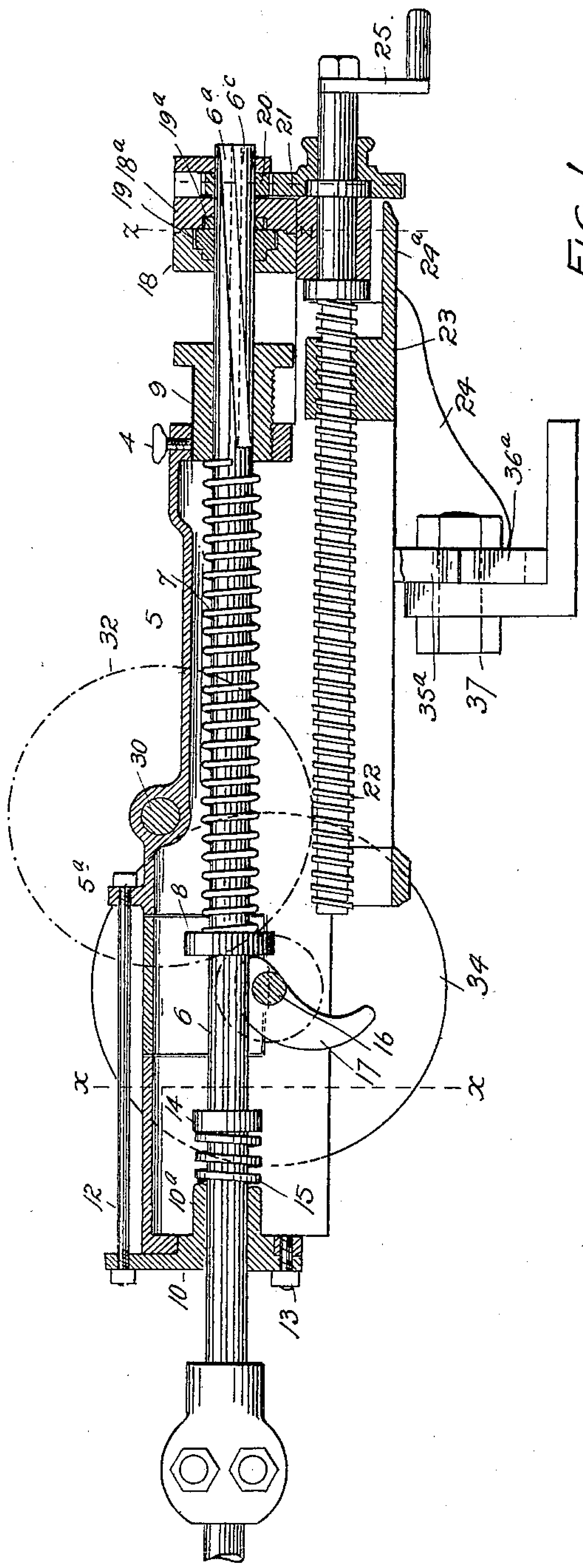

FIG. 1

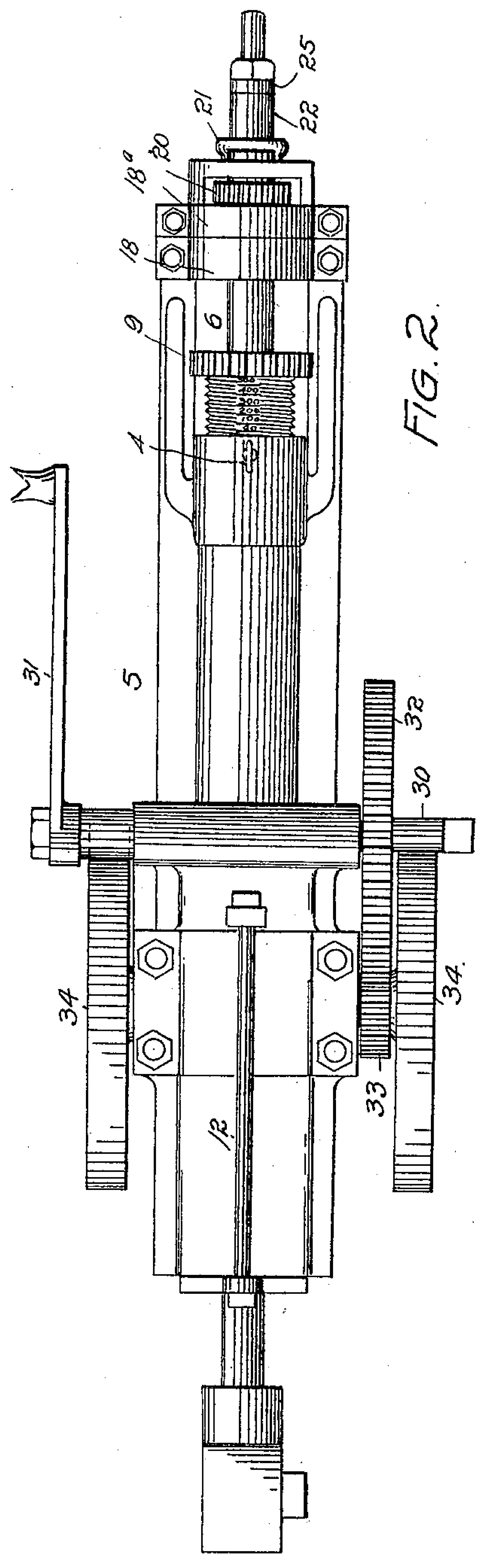

FIG. 2.

Witnesses
G. J. Rollandet
Edith Himsworth

By his Attorney

Inventor
M. C. Jackson.

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2 Sheets—Sheet 2.

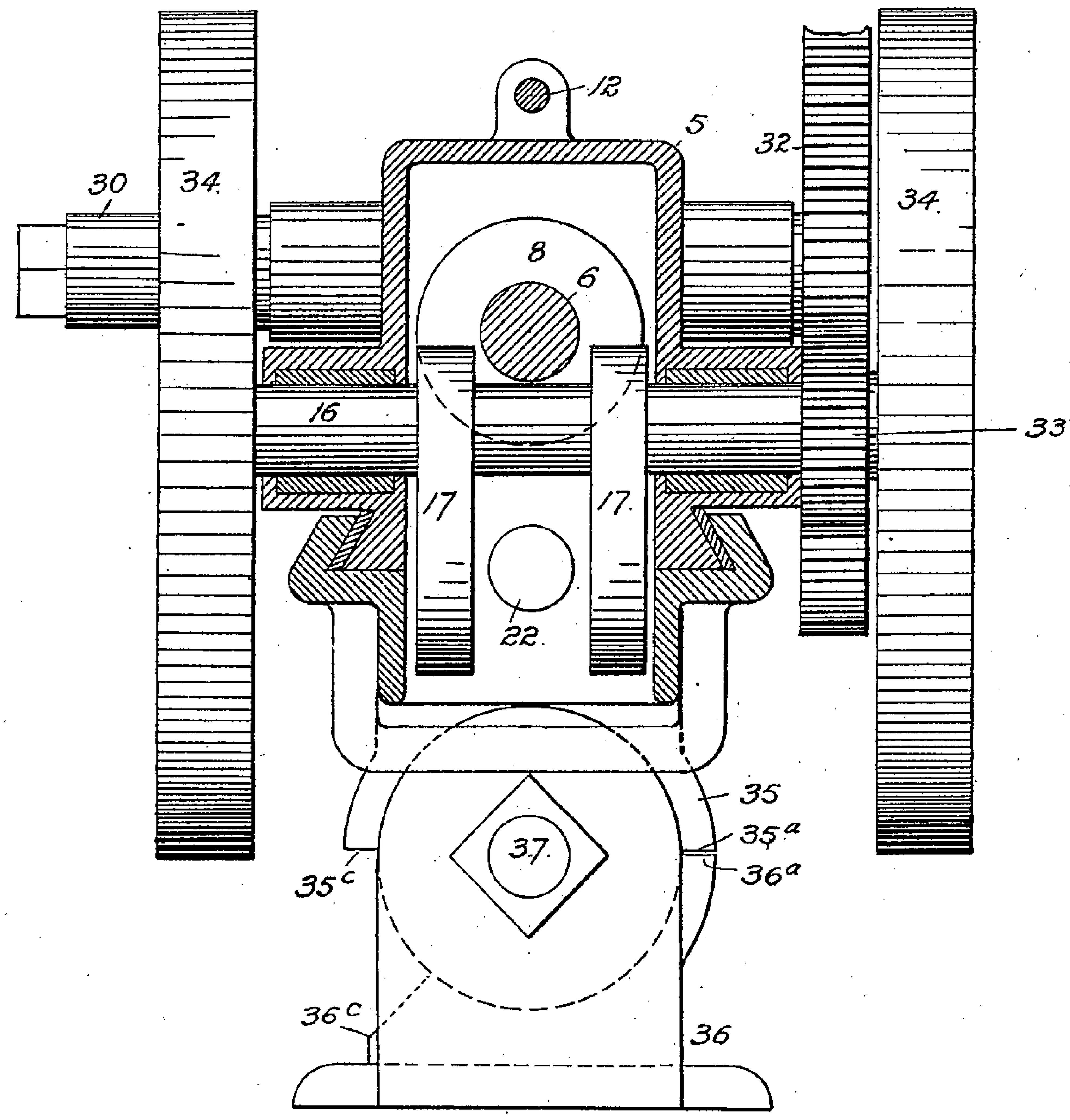

FIG. 3

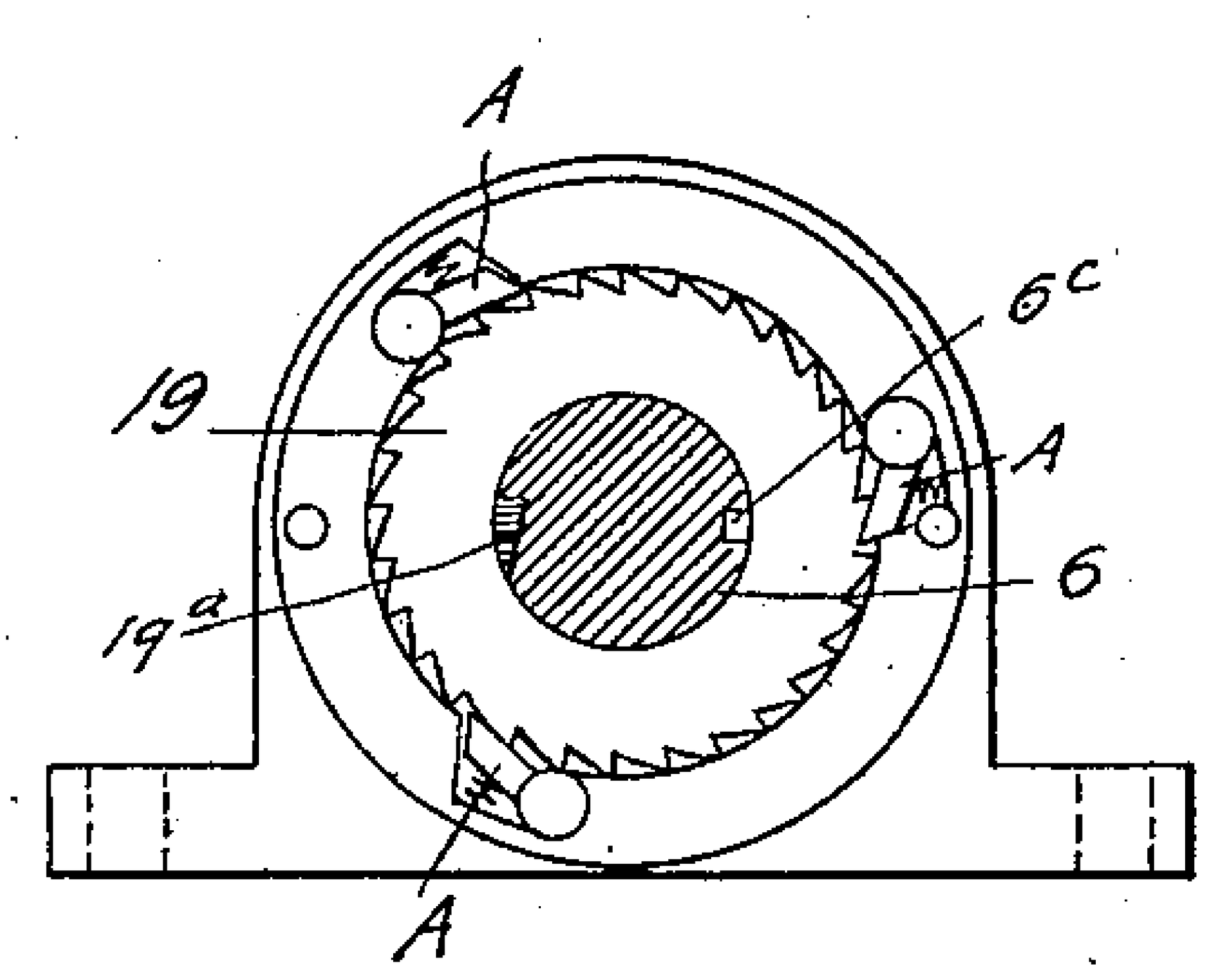

FIG. 4

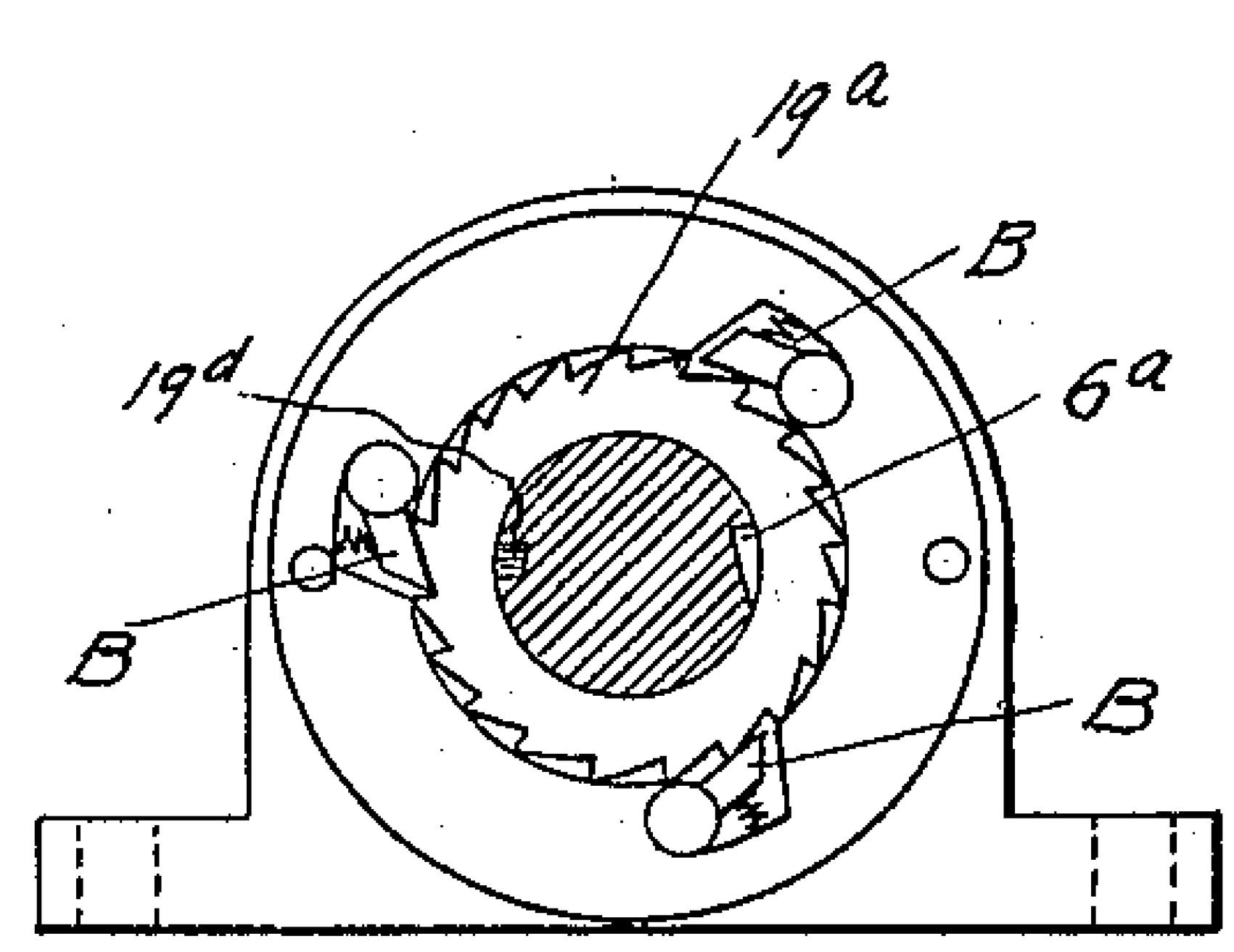

FIG. 5

Witnesses
[signature]
Edith Hinsworth.

By his Attorney [signature]

Inventor
M. C. Jackson.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

MANETHO C. JACKSON, OF DENVER, COLORADO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE JACKSON DRILL AND MANUFACTURING COMPANY, OF SAME PLACE.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 620,847, dated March 7, 1899.

Application filed February 7, 1898. Serial No. 669,304. (No model.)

To all whom it may concern:

Be it known that I, MANETHO C. JACKSON, 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 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 letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in 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 drill-casing, a portion of the inclosed parts being shown in elevation. Fig. 2 is a top view of my improved drill. Fig. 3 is a section taken on the line *x x*, Fig. 1, looking toward the right. Fig. 4 is a section taken on the line *z z*, Fig. 1, looking toward the left. Fig. 5 is a section taken on the line *z z*, Fig. 1, looking toward the right.

Similar reference characters indicating corresponding parts in these views, let the numeral 5 designate the drill-casing, in which is located the reciprocating shaft 6, surrounded by the coil-spring 7, whose forward extremity bears against a collar 8, fast on the shaft, while its opposite extremity engages a tension-nut 9, exteriorly threaded to engage interior threads formed on the casing extremity, which is open to receive said nut. This nut is flattened on one side and graduated. This graduated face is provided with numerals to indicate the power of the blow which the drill will deliver when the nut is screwed into the casing to the mark indicated by the numeral. A set-screw 4 is screwed into the casing to engagement with the graduated face of the nut for the purpose of locking the latter in any desired position of adjustment.

The forward head 10 of the casing is attached thereto by a rod 12 and a screw 13. The rod passes through registering apertures formed in the upper part of the head and in a lug 5^a, formed on the top of the casing. The rod is held in place by nuts screwed upon its threaded extremities. The screw 13 passes through an aperture in the head and is screwed into the adjacent casing extremity. This screw is held in place by a nut screwed against the head. The casing-head 10 is provided with an interiorly-projecting sleeve 10^a. Between this sleeve and a collar 14 on the drill-shaft is located a buffer-spring 15. Journaled in the casing below the drill-shaft 6 is a transverse rotatable shaft 16, provided with two cams 17. These cams are located on opposite sides of the reciprocating shaft, and they are adapted to engage the collar 8 thereon as the shaft 16 is rotated.

Mounted on the rear extremity of the casing is a detachable housing composed of two parts 18 and 18^a. These housing parts surround the shaft 6 and inclose two ratchet-collars 19 and 19^a, respectively. The portion of the shaft which passes through the ratchet-collars is provided with a spiral groove 6^a and a straight groove 6^c. The spiral groove is shown in full lines in Fig. 1 and the straight groove in dotted lines. The ratchet-collar 19 is provided with a lug 19^c, projecting into the spiral groove of the shaft, while the ratchet-collar 19^a is provided with a lug 19^d, projecting into the straight groove of the shaft. Pivotally mounted on the housing parts and engaging the teeth of each ratchet-collar are three spring-actuated dogs. The dogs engaging the collar 19 are designated by the reference character A, while those engaging the collar 19^a are designated by the reference character B. The dogs are so arranged with reference to the toothed periphery of the said collars that while one dog is engaging a tooth the other dog is a short distance from a tooth and the third dog somewhat farther from the tooth. By reason of this feature if one tooth breaks the movement of the shaft will be quickly checked by another tooth, and so on until all the dogs are broken.

The housing part 18^a extends rearwardly

and is recessed to receive a small gear-wheel 20, through which the shaft 6 passes. This gear is splined on the shaft, whereby the shaft passes freely therethrough longitudinally. The gear, however, turns with the shaft as the latter is rotated. This gear 20 meshes with another gear 21, splined on the rear extremity of the feed-screw 22, which is journaled in the casing 5, and engages a nut 23, fast on the guide-track 24. When the feed-screw is automatically turned through its engaging nut as far as it will go, the gear 21 engages a rearward projection 24[a] of the guide-track, causing the gear to slide backward, whereby it is disengaged from its meshing gear 20. The rear extremity of the feed-screw is provided with a hand-crank 25, which is employed to reverse or move backward the drill-casing on the track. The hand-crank may also be employed to turn the screw for the purpose of moving the casing forward in case it is not desired to operate the feed automatically.

Journaled in the upper half of the casing 5 is a shaft 30, having a hand-crank 31 made fast to one extremity thereof. To this shaft is also made fast a gear 32, meshing with a pinion 33 on the cam-shaft 16, which is also provided with two fly-wheels 34, one being located on each side of the drill-casing.

The operation of the drill is as follows: The shaft 30 is rotated by turning the hand-crank 31. This movement rotates the gear 32, which, meshing with the pinion 33, rotates the cam-shaft 16. The rotation of the last-named shaft imparts a corresponding movement to the cams 17, causing them to engage the collar 8 and force the shaft 6 backward, compressing the power-spring 7. As soon as the shaft is released the recoil of the power-spring throws the shaft forward, bringing the drilling-tool in forcible contact with the rock. As the shaft 6 is drawn backward its spiral groove 6[a] engages the lug 19[c] on the ratchet-collar 19, causing the drill-shaft to make a partial rotation in the direction indicated by the arrow in Fig. 4, since the dogs A prevent the ratchet-collar from turning in the opposite direction. As the shaft turns the ratchet-collar 19[a] is also turned, since the lug 19[d] on the said collar engages the straight groove 6[c] of the shaft. The collar 19, however, does not turn during the backward movement of the shaft. During the forward movement of the shaft the latter is locked against rotation in the reverse direction by the engagement of the lug 19[d] on the ratchet-collar 19[a] with the straight groove of the shaft, since the dogs B prevent the collar from turning. The collar 19 turns in the direction indicated by the arrow in Fig. 5 during the forward movement of the shaft, the collar 19[a] remaining stationary, since it can only turn when the shaft is turned. As the drill-shaft rotates the feed-screw rotates through the instrumentality of the meshing gears 20 and 21. The turning of the feed-screw carries the casing forward by virtue of the engagement of the threads of the screw with the nut 23 on the stationary guide-track 24. Just before the feed-screw reaches its forward limit of movement the projection 24[a] of the guide-track engages the gear 21 and slides it backward sufficiently to throw it out of mesh with the gear 20. This feature prevents the breaking of the parts which otherwise might result in case the drill-shaft were operated after the feed-screw could no longer turn. The guide-track 24 is provided with a depending apertured projection 35, having two shoulders 35[a] and 35[c], located on opposite sides thereof. The lower part 35[d] of this projection is circular. This projection 35 is fastened to an angle-bracket 36 by means of a bolt 37, passing through registering apertures formed in the two parts. This bracket is provided with shoulders 36[a] and 36[c], which the shoulders 35[a] and 35[c] are adapted to engage. When the drill is in the upright position, the shoulders 35[a] and 36[a] are in engagement and the nut is tight on the bolt 37. When the parts are in this position, the shoulders 35[c] and 36[c] are considerably separated. When the drill-shaft has been drawn backward sufficiently to remove the drill-tool from the hole in the rock, the drill-casing and track may be tipped to one side for the purpose of exposing the hole in the rock by loosening the nut on the bolt 37 and turning the projection 35 on the bolt as an axle until the shoulder 35[c] engages the shoulder 36[c].

It is evident the cams for operating the reciprocating drill-shaft may, if desired, be placed upon or formed integral with the fly-wheels. In this case the collar 8 would be provided with lateral projections passing through slots formed in the casing and extending into the path of the cams.

Having thus described my invention, what I claim is—

1. The combination with the drill-casing, the reciprocating drill-shaft and the power-spring surrounding the shaft, of a crank-shaft journaled in the casing, a gear fast on the crank-shaft, another shaft journaled in the casing, a cam fast on the last-named shaft and adapted to engage a collar on the reciprocating shaft, a pinion fast on the cam-shaft and meshing with the gear on the crank-shaft, a pair of fly-wheels mounted on the extremities of the cam-shaft, a feed-screw journaled in the casing, a guide-track upon which the casing is mounted, the guide-track being provided with a nut which the said screw engages, means for feeding the casing to keep pace with the movement of the drill into the rock, said means comprising a gear splined on the drill-shaft, another gear splined on the feed-screw and meshing with the gear on the drill-shaft, the guide-track being provided with a projection arranged to move the gear on the feed-screw sufficiently to disengage it

from the gear on the drill-shaft by the time the said screw has reached its forward limit of movement.

2. The combination of the guide-track, the casing movably mounted thereon, the drill-shaft mounted on the casing, means for reciprocating the drill-shaft, means for rotating said shaft, a feed-screw journaled in the casing, the guide-track being provided with a nut which the said screw engages, means for feeding the casing to keep pace with the movement of the drill into the rock, said means comprising a gear splined on the drill-shaft, another gear splined on the feed-screw and meshing with the gear on the drill-shaft, the guide-track being provided with a projection arranged to move the gear on the feed-screw sufficiently to disengage it from the gear on the drill-shaft, by the time said screw has reached its forward limit of movement.

3. The combinatian with the guide-track, the drill-casing movably mounted thereon, the reciprocating shaft and the power-spring surrounding the shaft, of a crank-shaft journaled on the casing, a gear fast thereon, another shaft journaled in the casing, a cam fast thereon and adapted to engage a collar on the drill-shaft, a pinion fast on the cam-shaft and meshing with the gear on the crank-shaft, the guide-track being provided with an apertured depending shouldered projection, and an apertured bracket adapted to be bolted to said projection and provided with shoulders adapted to engage the shoulders of the projection, the shoulders of the two parts being separated on one side, as and for the purpose set forth.

4. The combination of the guide-track and the drill-casing movably mounted thereon, the said track being provided with an apertured depending shouldered projection, and an apertured bracket adapted to be bolted to said projection, and provided with shoulders adapted to engage the shoulders thereof, the shoulders of the two parts being separated on one side, as and for the purpose set forth.

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

MANETHO C. JACKSON.

Witnesses:

G. J. ROLLANDET,

A. J. O'BRIEN.