No. 837,118.

PATENTED NOV. 27, 1906.

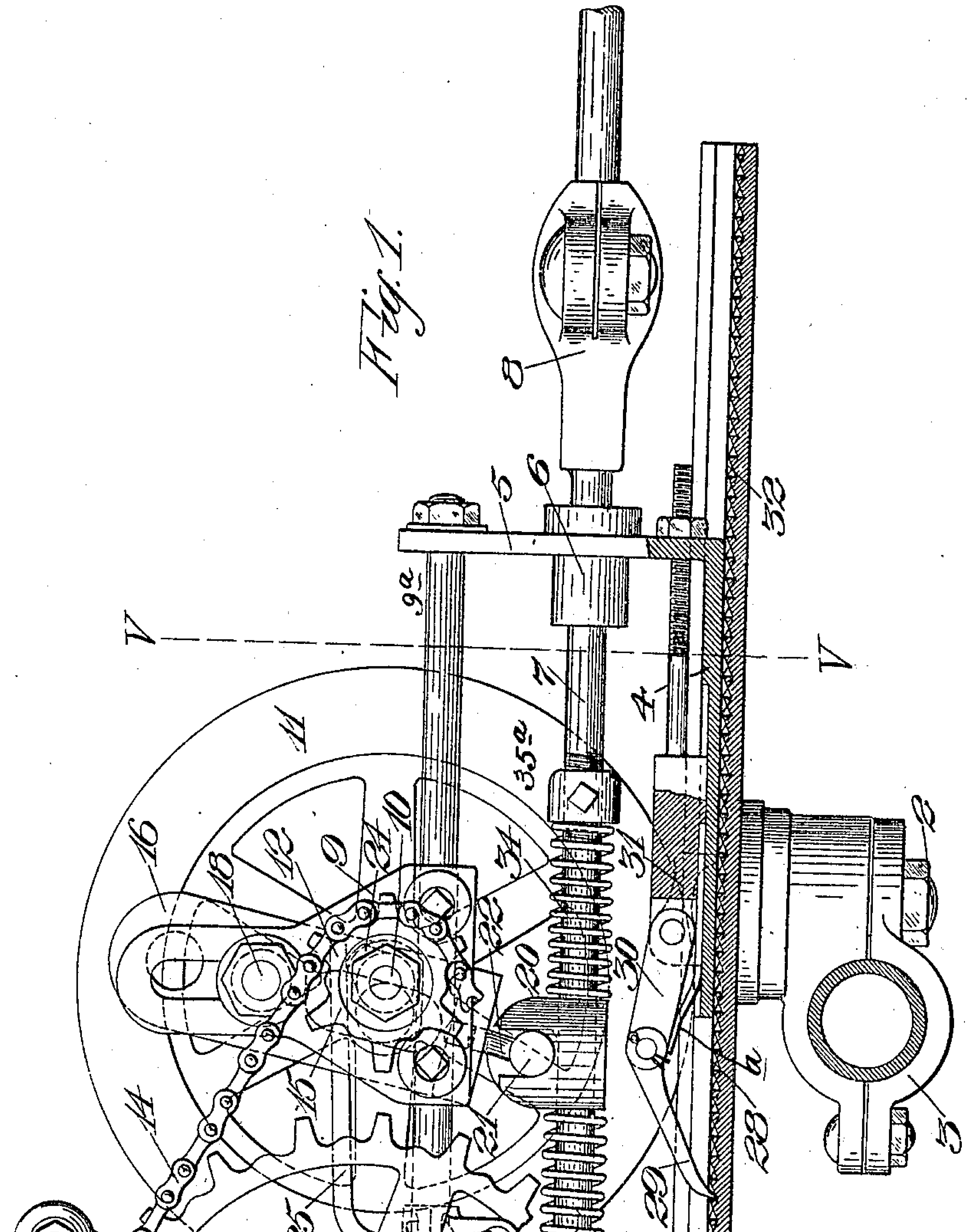
J. J. REKAR.

ROCK DRILL.

APPLICATION FILED APR. 13, 1906.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

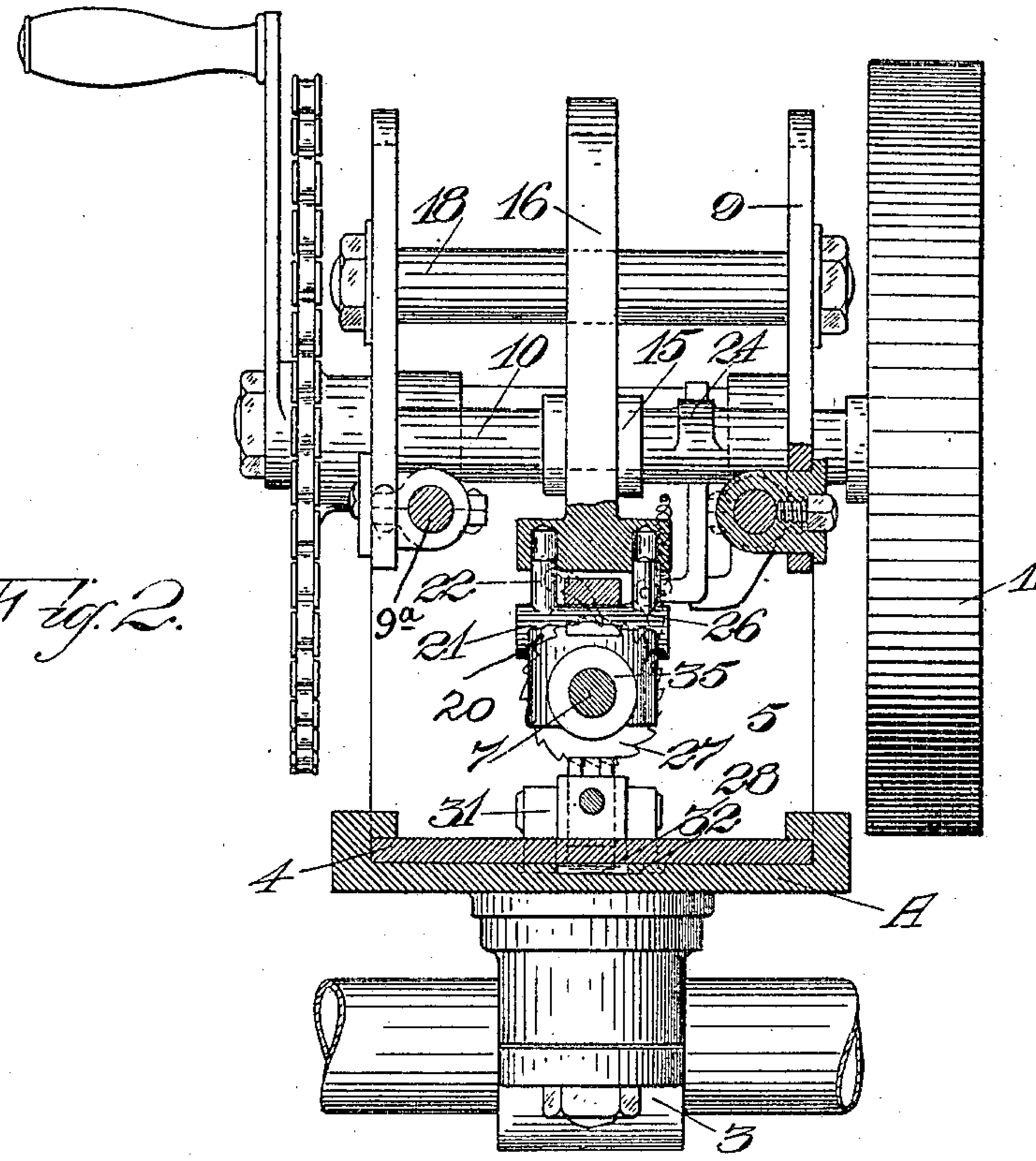

Fig. 2.

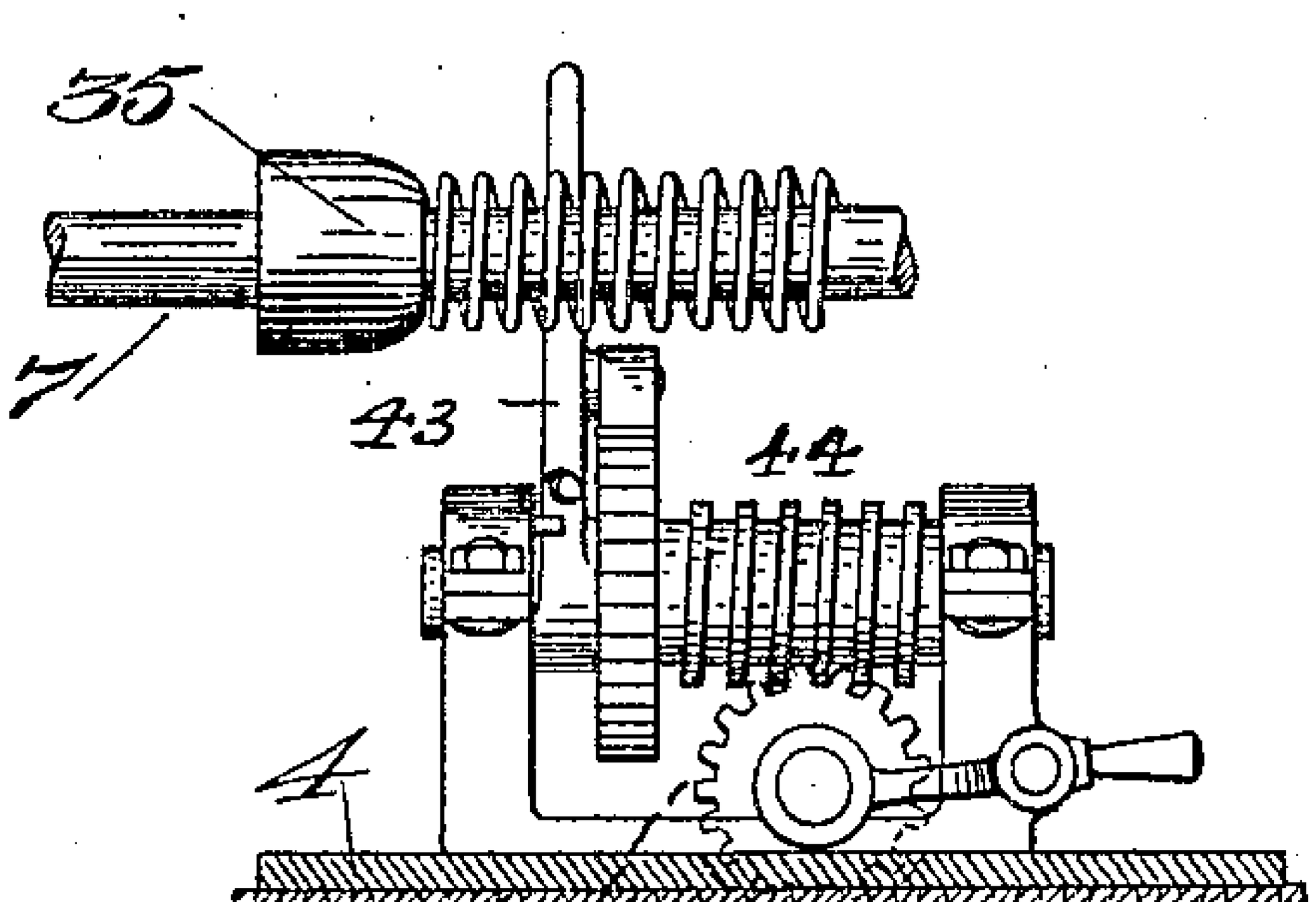

Fig. 3.

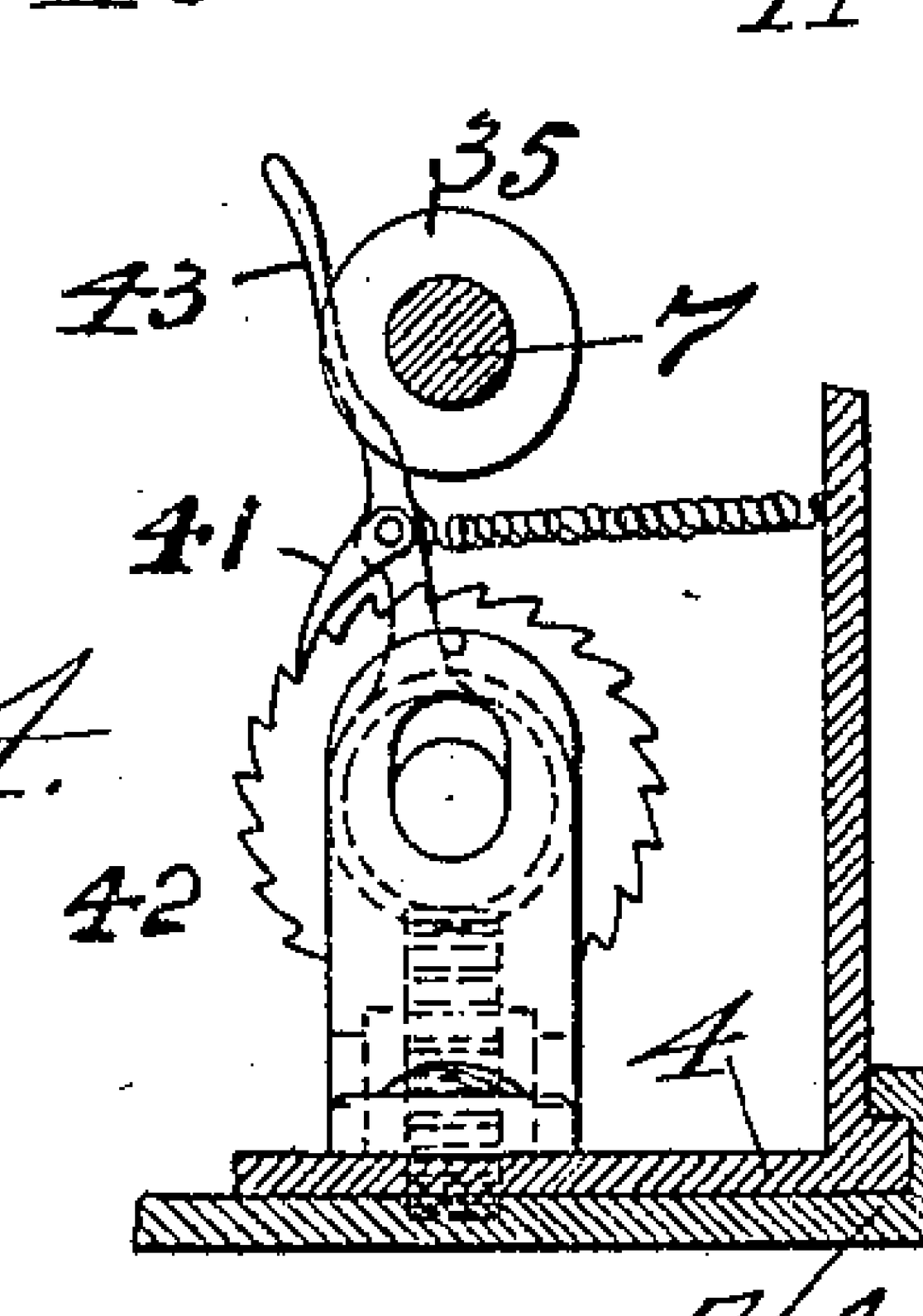

Fig. 4.

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3 SHEETS—SHEET 3.

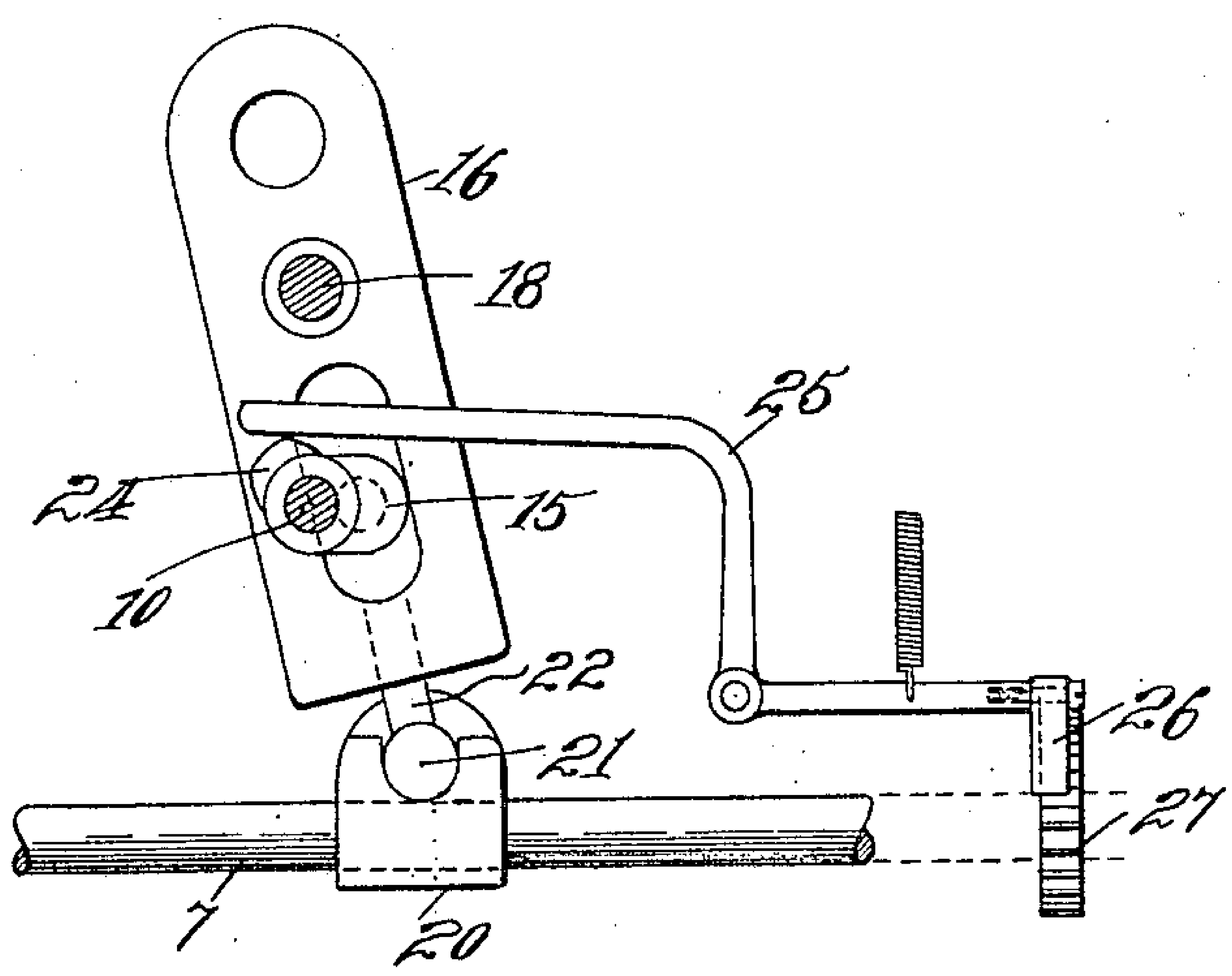

Fig. 5.

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UNITED STATES PATENT OFFICE.

JOSEPH J. REKAR, OF SAN FRANCISCO, CALIFORNIA.

ROCK-DRILL.

No. 837,118. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed April 13, 1906. Serial No. 311,461.

To all whom it may concern:

Be it known that I, JOSEPH J. REKAR, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Rock-Drills, of which the following is a specification.

My invention relates to a drill which is especially designed as a hand apparatus.

It consists in the combination of mechanism and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation, partially in section, showing my invention. Fig. 2 is a section on line *v v* of same. Figs. 3 and 4 show a modification of the feed. Fig. 5 is a sectional view taken through the cam 24 at right angles to the shaft 10.

It is the object of my invention to provide a portable hand-operated drilling mechanism.

A is a suitable base or support. In the present case I have shown it in the form of a plate having guide-channels at each side edge and a shank 2, which extends from the plate A into the jaws of a clamp 3. This clamp has a hole through it, which will fit a standard to which it may be secured, the standard being suitably fixed with relation to the rock-face to be drilled in any usual or suitable manner.

Within the guide-plate A the plate 4 is slidably fitted, and the upturned end plates 5 carry guides 6, through which the drill-shank 7 is guided and slidable. The drill-head 8, which may be of any suitable or desired construction, is carried at the outer end of the drill-shank, and any suitable or desired character of drill may be fixed therein.

9 represents plates carrying journal-boxes supported above the line of travel of the drill-shank, and within these journal-boxes a shaft 10 is supported transversely to the line of travel of the drill. The plates 9 are clamped to rods 9[a], which connect the plates 5, Figs. 1 and 2. This shaft carries upon one end a sufficiently heavy balance-wheel, as at 11, and upon the other end I have shown a sprocket-pinion 12.

13 is a sprocket-wheel of larger diameter, and the chain 14, passing around the wheel and pinion, transmits power from the sprocket-wheel to the pinion, multiplying it to any desired extent. Upon the transverse shaft in line above the drill-shank is a crank or eccentric 15.

16 is a connecting rod or yoke the upper end of which is supported upon the transverse bar 18, fixed in line above the crank-shaft. The crank or eccentric passes through an open slot in this yoke, and it will be seen that by the rotation of the crank-shaft this yoke will be oscillated about its suspending support. The lower end of the yoke has connections by which the oscillating motion may be transmitted to reciprocate the drill-shank and drill. Such a connection is here shown as consisting of a block 20, carried by a drill-shank having a transverse cylindrical groove made in its upper surface. Within this groove or channel an oscillating pin or shaft 21 is fitted. From the upper side of this shaft pins 22 extend into corresponding holes made in the bottom of the oscillating yoke 16, and these pins are easily slidable, so that as the yoke oscillates and the block attached to the drill-shank moves alternately away from and toward the end of the yoke it will be seen that the pins will slide in the holes in the yoke, so that the rocking bar or pin which connects with the drill-shank may reciprocate with the drill-shank and be actuated by the oscillating yoke.

In order to relieve the shock caused by the rapid reciprocations of the drill-shank and at the same time to transmit the motion of the yoke to the shank, I have shown spiral springs 34, the inner ends of which abut against the slidable block 20. Suitable collars 35 and 35[a] are designed to hold the springs 34 between themselves and the central slidable block 20, and through said springs reciprocating motion is transmitted to the drill-shank. The collars are also adjustably mounted on the rod 7 to enable the springs to be compressed to any desired degree between the collars and intermediate block. This arrangement of parts allows the reciprocating motion to be transmitted to the drill-shank and at the same time relieving the parts of the shock of the rapid motion and also compensating in a degree for variations in the stroke of the drill against the rock.

In order to vary the length of stroke to suit the conditions, I have shown the yoke as having its upper end either slotted or perforated and means for adjustingthe pivot-bar 18 up or down in the standards and in

the yoke. Thus when the pivot-bar 18 is raised by loosening the nuts which clamp it in the standard the distance between the fulcrum of the yoke and the crank or eccentric will be lengthened and the stroke correspondingly shortened. When the fulcrum of the yoke is moved downward and nearer to the crank or eccentric, it will be seen that the lower end of the yoke will have a greater amplitude of movement, and will thus increase the length of stroke of the drill.

In order to rotate the drill, I have shown a cam 24, carried by the crank-shaft, and a lever, arm 25 is fulcrumed so that one end is raised by each contact with the cam. The other end carries a pawl 26. This pawl engages with a ratchet-wheel 27, through which the drill-shank is slidable and with which it is connected by a feather, so that when the pawl turns the ratchet by each reciprocation the drill-shank will also be turned and with it the drill.

In order to feed the apparatus forward as the hole is deepened, various devices may be employed. One of such devices I have shown consisting of a rack 28, formed in the bottom of the plate A. A pawl 29 is fulcrumed to the end of a lever-arm 30, so that the point of the pawl may engage with the rack, it being understood that the drill is designed for horizontal work and is seldom if ever inclined to so great a degree as to allow the pawl to be disengaged from said rack. The lever-arm 30 is carried upon the plate 4, which is guided and slidable in the plate A. The collar 35, before mentioned, is of somewhat larger diameter than the collar 35[a] and is of sufficient diameter to enable it to contact with the angle of the lever-arm 30 to depress this angle of connection. The other collar 35[a] only acts to return and compress the spring 34 between itself and the block 20. The depression of the lever-arm extends the pawl to engage with a tooth in the rack and to push the frame which carries the drill forward a notch. A spring *a*, connecting with the pawl-carrying arm, serves to raise the angle of junction between the arm and the pawl, and thus retract the point of the pawl after each depression. Thus when the apparatus has been moved forward to compensate for the advance of the drill in the hole it will be moved so far that the part carried by the drill-shank which actuates the pawl will not act to move the pawl until the drill has again advanced, so that this part will move far enough to actuate the pawl. Thus the feed will be automatic and dependent upon the rapidity of the work.

Various modifications of the feed may be employed, one of which is shown in Figs. 3, 4, in which a worm-gear is introduced between the shaft and the rack and is operated similarly by the reciprocation of the drill-shank.

If the drill is much inclined, it would slide forward upon the support A, because the pawl 29 and its work 28 only retain it in one direction. To prevent this, I have shown a rack 32 with teeth facing opposite to the teeth 28. A pawl 31 moves in unison with the arm 30. It is disengaged when 30 is depressed and the pawl 29 actuated and engages its rack when the arm 30 again rises.

Any available motor may furnish power.

In Figs. 3 and 4 the lever 43 carries the pawl 41, which engages the circular ratchet-disk 42, and is moved by the collar 35. The ratchet-disk 42 is fixed upon a screw-shaft 44, and this screw engages a gear 40, which gear or one upon the same shaft engages a rack 28[a] on the bed A, and will thus advance the drill.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a drill, of a channel guide-plate and support therefor, a frame slidable in the guides of said plate, a drill-shank, means for reciprocating said shank within the guided frame, a rack carried by the supporting-plate, a pawl carried by the movable frame and means carried by the reciprocating drill-shank whereby the pawl is caused to engage the rack and advance the drill and frame, said means including a collar upon the drill-shank and a fulcrumed pawl-carrying lever with which the collar contacts.

2. In a rock-drill, a frame, a drill and mechanism by which it is reciprocated in the frame, a guide-plate in which the drill-frame is slidable, a rack carried by said plate, a pawl, an arm to which said pawl is fulcrumed, an enlargement carried by the drill-shank adapted to contact with the arm and depress it and the pawl transversely and advance the drill-frame in its guide-plate.

3. In a drilling apparatus, a supported guide-plate having a rack-bar, a drill-frame guided and slidable upon the plate, a pawl carried by the frame engaging the rack, a drill-shank slidable in the frame, a crank-shaft journaled above the drill-shank, a yoke fulcrumed above the crank-shaft and having its intermediate portion engaging the crank whereby it is reciprocated, connection between the lower end of the yoke and the drill-shank, and means carried by the drill-shank to actuate the pawl.

4. In a drilling apparatus, a frame, a drill-shank slidable therein, a crank-shaft journaled above the drill-shank, a yoke fulcrumed above the shaft and having its intermediate portion engaged by the crank, a transverse pin or shaft having pins extending therefrom and slidable in the lower end of the yoke, a block fixed to the drill-shank having a transverse groove in which the pin-shaft oscillates, and by which motion is transmitted to the drill-shank.

5. In a drilling apparatus, a guided slida-

ble frame, a drill-shank, a boss or enlargement carried by said shank having a cylindrical transverse groove, a pin loosely fitting said groove and having upwardly-extending pins connected therewith, a crank or eccentric shaft journaled across the frame above the drill-shank, a yoke fulcrumed above the shaft and slotted to engage the crank or eccentric, said yoke having its lower end perforated to receive the pins and transmit motion to the drill-shank, means for rotating the drill-shank.

6. In a rock-drill, a frame, a drill slidable in said frame, and mechanism to reciprocate the drill, a base upon which the frame is movable and a rack thereon and a pawl, a lever to which it is pivoted, mechanism actuated by the movement of the drill-shank to move the lever and pawl and advance the drill-carrying frame, a second rack and a pawl acting in unison with and in opposition to the first-named pawl to limit the forward movement of the drill-frame.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH J. REKAR.

Witnesses:
S. H. NOURSE,
JESSIE C. BRODIE.