

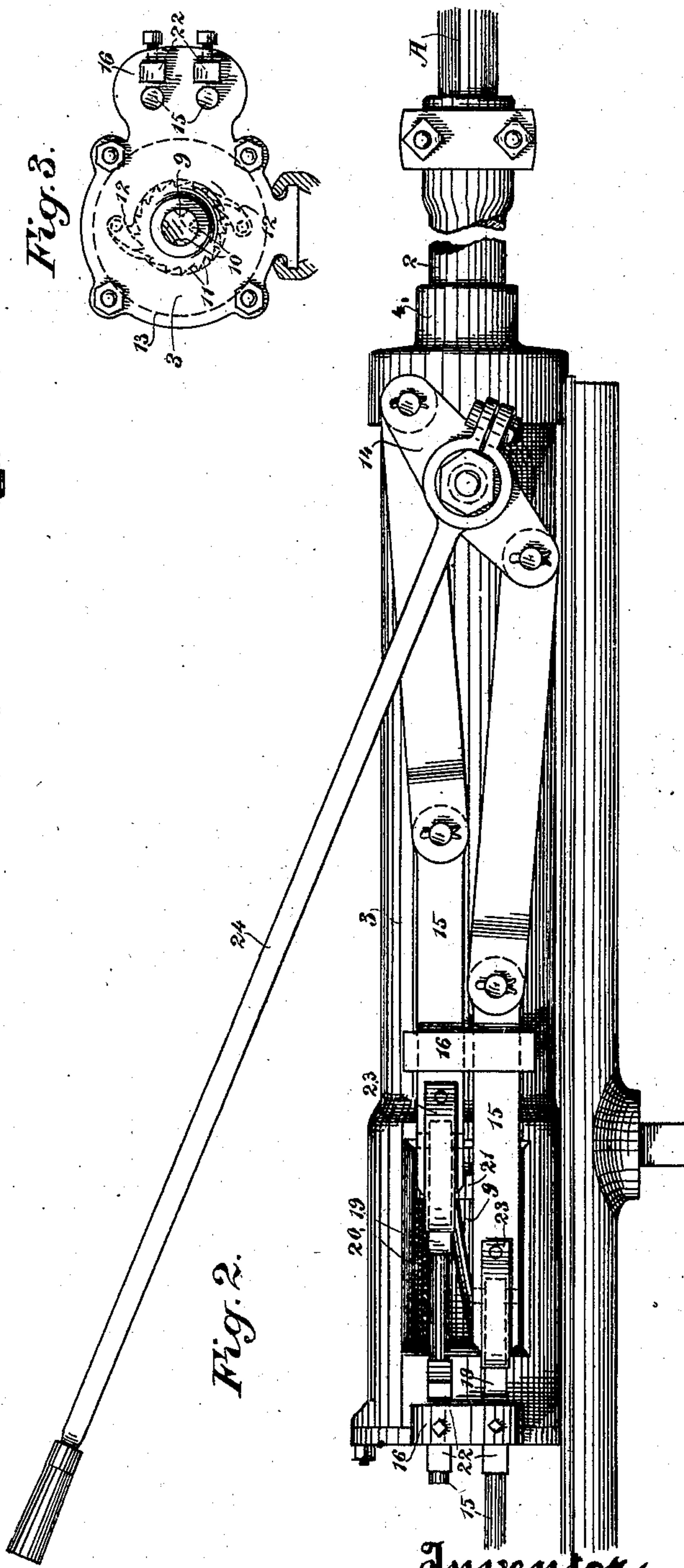
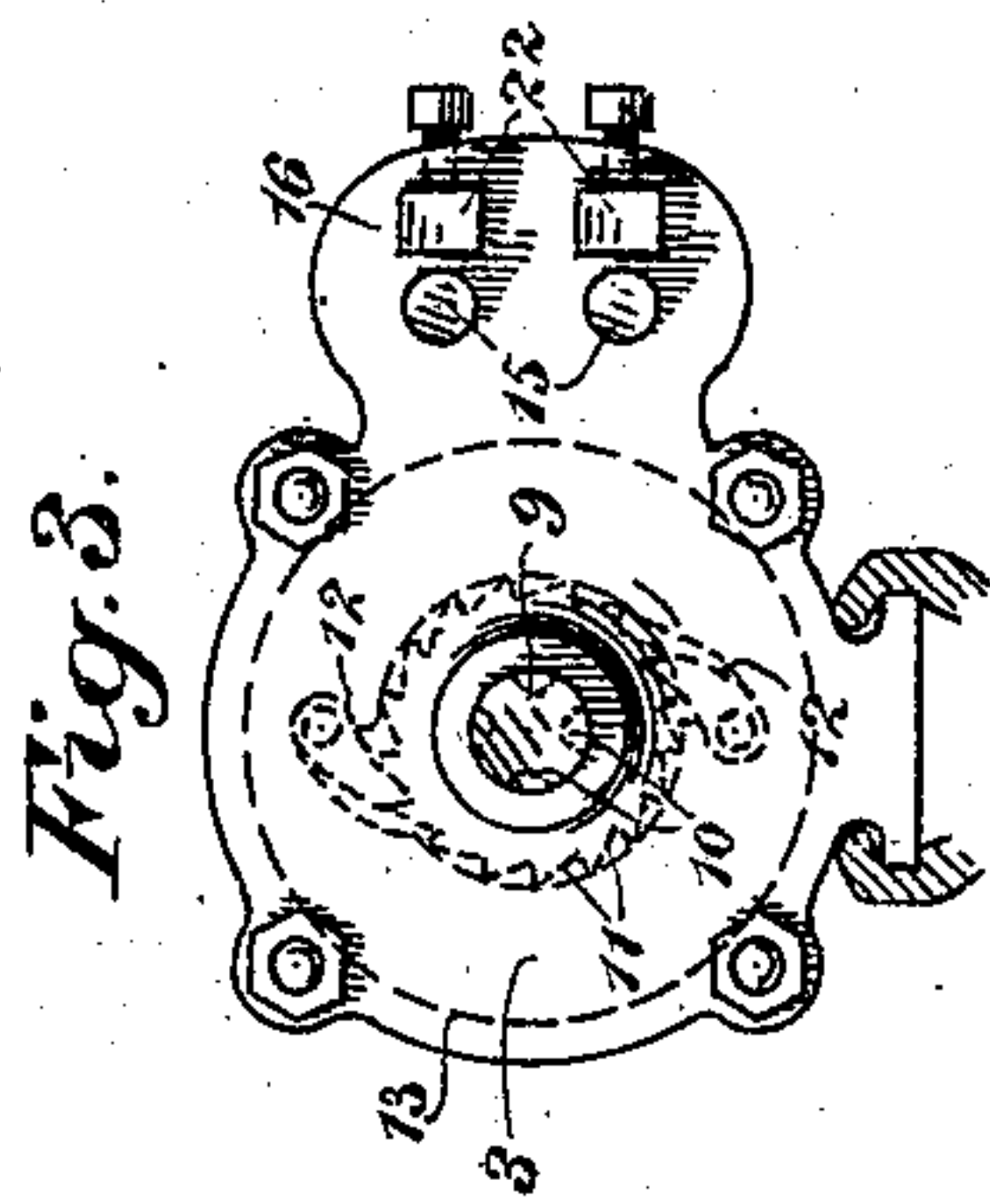
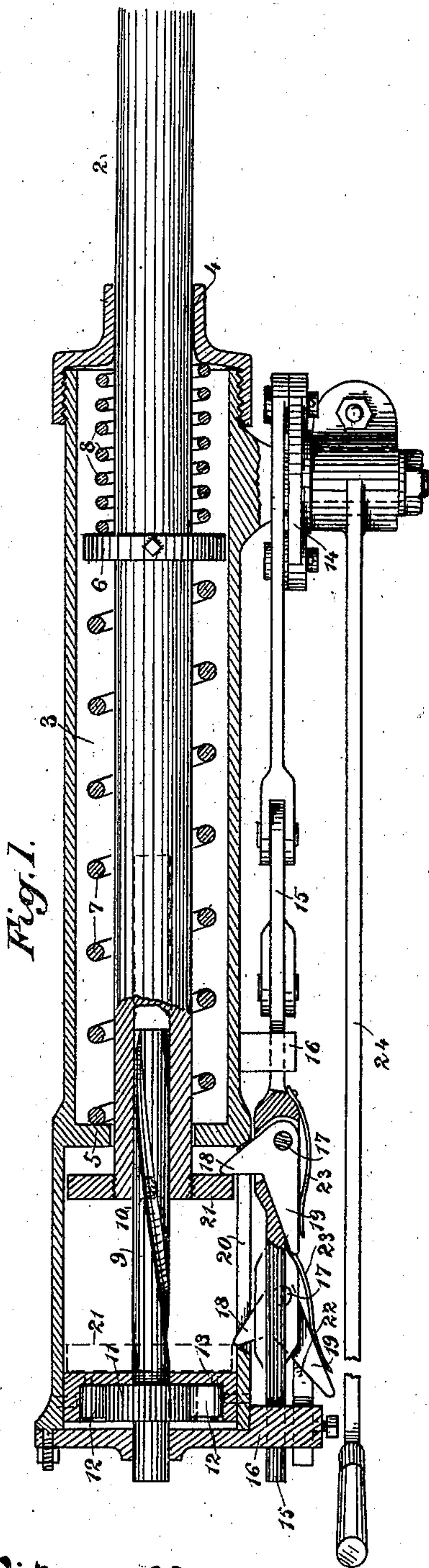
No. 702,499.

Patented June 17, 1902.

V. Y. SMITH.  
HAND ROCK-DRILL.

(Application filed July 17, 1901.)

(No Model.)



Witnesses,  
J. F. Aschbeck

Inventor,  
Valerius Y. Smith  
By Dewey Strong & Co. Attorneys



# UNITED STATES PATENT OFFICE.

VALERIUS Y. SMITH, OF OAKLAND, CALIFORNIA.

## HAND ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 702,499, dated June 17, 1902.

Application filed July 17, 1901. Serial No. 68,634. (No model.)

*To all whom it may concern:*

Be it known that I, VALERIUS Y. SMITH, a citizen of the United States, residing at Oakland, county of Alameda, State of California, have invented an Improvement in Hand Rock-Drills; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a device for drilling rocks and the like and a mechanism including an impelling-spring, means by which the drill is retracted against the action of the spring, means for releasing it and allowing the spring to act, means for turning the drill between each forward impulse, and a lever and connected mechanism by the alternate movement of which the drill is retracted and released for each forward stroke.

My invention also comprises details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a horizontal central section through the drill. Fig. 2 is a side elevation of the same. Fig. 3 is a rear end view.

The drill or cutting-bit A is fixed by any suitable clamp or fastening to a drill-shank 2, which is slidable within an outer casing 3 of any suitable or desired construction. The forward end of the shank is guided by the sides of the opening through which it passes at the front of the casing, as shown at 4. Near the rear end it passes through a guide-opening formed by an annular internal flange, as shown at 5. Upon the shank 2 within the casing is fixed a collar 6, which may be adjustable to any desired point upon the shank. Between the collar and the annular flange at 5 is a spiral spring 7 of sufficient stiffness, and when the drill-shank is withdrawn this spring is compressed between the flange at 5 and the collar 6. When the drill-shank is released, the elasticity of the spring acting against the collar 6 impels the drill forward and causes the cutting-bit A to strike with a force corresponding dependent upon the stiffness of the impelling-spring. A lighter spring 8 is fixed between the collar 6 and the end of the casing, and this acts as a buffer to reduce the shock of the stroke, and

it may be made of any degree of stiffness by altering the position of the collar 6.

In order to turn the drill between each forward impulse, the rear end of the shank 2 has a hole made longitudinally in it, and the spirally-grooved stem 9 enters this hole, within which it is loosely slidable.

10 is a lug or spur formed on the side of the opening in the shank 2 and extending inwardly, so as to engage one of the spiral grooves in the stem 9.

Upon the outer end of the stem 9 is a ratchet-wheel 11, and this is engaged by pawls 12, which are pivoted in chambers in a disk or head 13, so that when the drill-shank is retracted, the ratchet-wheel 11, being held stationary by the pawls 12, the spiral 9 being engaged by the lug 10, will turn the drill-shank slightly, and when released, so that the spring acts to drive it forward, the ratchet will turn freely, not being held by the pawls in that direction, thus allowing the drill to strike the point of impact fairly.

In order to retract the drill and its shank, I have shown a mechanism consisting of a double lever centrally fulcrumed having rods extending from it and carrying trip-levers which alternately engage a disk or head upon the drill-shank, so as to retract the lever, and are afterward disengaged to allow the spring to impel it forward. This double centrally-pivoted lever is shown at 14, and the rods 15 are pivoted to the outer ends upon opposite sides of the fulcrum-point. These rods extend parallel with the casing 3 and are slidable through holes in guides 16, suitably fixed at some point on the casing. The trip-levers are fulcrumed in the rods 15, as shown at 17, and have arms 18 and 19, the first of which projects through an open slot 20 into the casing, where it engages a head 21, fixed upon the rear end of the drill-shank. The other arm 19 extends rearwardly and approximately parallel with the line of movement of the carrying-rod 15, and this arm is so beveled that in its rearward movement it engages an incline 22, which acts in retraction, turning the two arms about the pivot-point 17 until the arm 18 is disengaged from the head 21. This occurs when the drill and its



shank have been retracted to the full extent of the stroke rearwardly, and as soon as the arm 18 is thus disengaged the spring 7 is free to act and impel the drill forward. A spring 5 23, pressing on the back of the arm 19, returns it to its normal position as soon as the rod 15 has been moved forward, so as to disengage the arm 19 from the incline 22. In order to operate this device, I have shown a 10 hand-lever 24 clamped to the hub of the double lever 14, so that by alternately moving the hand-lever up and down the double lever 14 will be oscillated upon its fulcrum and will thus alternately push the rods 15 (one of 15 which is connected with each end) backwardly, and, as before described, each of the arms 18 will alternately engage the head 21 and retract the drill. When the lever-arm is being moved sufficiently to disengage the arm 20 18 by reason of the movement of the arm 19 over the incline 22, the opposite arm will be advanced to its first position toward the front and will thus be out of the way of the head 21 when the drill is released, so that the spring 25 acts upon it. The opposite movement of the lever 24 will then act to engage this last-mentioned arm 18 with the head 21 and retract it, while the other one is correspondingly moved forward. Thus by means of this oscillating 30 lever 24 each complete oscillation of the lever gives two reciprocations of the drill and a correspondingly rapid advance.

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

1. The combination in a drill of a slotted casing, a drill-shank guided and longitudinally slidable within the casing, means by which the drill and shank are partially rotated at each reciprocation, a double centrally-pivoted lever, slide-bars connected to the arms of said levers, spring-pressed bell-crank levers pivoted in the rear ends of the slide-bars having one arm extending in the direction of the length of said bars and the 45 other arm projecting laterally through the slot in the casing and into the path of the drill-shank, to engage and retract the latter, and means for alternately engaging one of the arms of a bell-crank lever to withdraw the 50 other arm from engagement with the drill-shank.

2. The combination in a drill of a casing, a drill-shank guided longitudinally therein, 55 means by which the shank is given a partial rotation during each reciprocation, a centrally-pivoted lever on the outside of the casing, two slide-bars extending in the same direction and one disposed over the other said 60 bars each having one end connected to one arm of the centrally-pivoted lever, bell-crank levers pivoted in the rear ends of the slide-bars, having one arm extending in the direction of the length of said rods and the other 65 member projecting laterally into the casing in the path of the drill-shank, and adapted

to engage and retract the latter, means in the path of the first-named members of the bell-crank levers adapted to engage said members and alternately withdraw the other members 70 from engagement with the drill-shank, and a spring by which the shank is impelled forward after the release.

3. The combination in a drill of a casing, a spring-impelled drill-shank, means for partially rotating the same at each reciprocation, said shank having a head fixed to the rear end, and said casing having an opening in its side leading to said head, a double centrally-fulcrumed lever exterior to the casing, 80 slide-bars disposed one above the other and both extending in the same direction, and having their front ends connected to the double lever, bell-crank pawl-levers mounted in the rear ends of the slide-bars, each having one arm extending in the direction of the length of the bars and another arm extending transversely and entering through the slot of the casing, and adapted to engage the head on the drill-shank, springs acting 90 against said pawl-levers, and means in the path of the levers for depressing them to cause the release of the retracted drill-shank.

4. The combination in a drill of a closed casing having an internal abutment, a centrally-guided slidable drill-carrying shank having a head upon its inner end, and a spring surrounding the shank and having one end to seat against said abutment, said spring being compressible by the retraction of the 100 drill-shank and acting to impel the latter forward when released; bell-cranks carried by rods longitudinally slidable upon opposite sides of the cylinder, one arm of each bell-crank extending in the direction of the 105 length of the rods and another arm extending transverse and entering an opening in the casing, and adapted to alternately engage the head of the drill-shank; fixed inclines on the outside of the casing in the path of travel 110 of the other arms of the bell-cranks, acting to disengage the first-named arms from the head of the drill-shank, and springs acting against the bell-cranks to return them to normal position after being depressed by the inclines; a double centrally-fulcrumed lever with opposite ends of which the rods carrying the bell-cranks are connected, and a single 115 hand-lever connected with the center of the double lever, by the up-and-down movement of which said lever is oscillated. 120

5. The combination in a drill, of a closed cylindrical casing having a front guide for the drill-shank, a centrally-guided slidable drill-carrying shank having a head upon its 125 inner end, spring-pressed bell-crank levers fulcrumed in the rear end of the longitudinally-movable rods, one arm of each lever engaging the head on the drill-shank at each rearward movement, fixed inclines with which 130 the other arms of the bell-cranks engage to release the drill-shank at the termination of



its rearward movement, a fixed stop in the casing in front of said head and forming a rear guide for the drill-shank, a collar and means for changing its position upon the  
5 drill-shank, a spring interposed and compressible between the two when the drill is retracted, and a cushion-spring located between the collar and the front of the casing, said collar capable of regulating the tension of both springs, substantially as described. 10  
In witness whereof I have hereunto set my hand.

VALERIUS Y. SMITH.

Witnesses:

S. H. NOURSE,  
H. F. ASCHECK.