(No Model.)

3 Sheets—Sheet 1

W. H. JENKINS.

MINING DRILL.

No. 335,591. Patented Feb. 9, 1886.

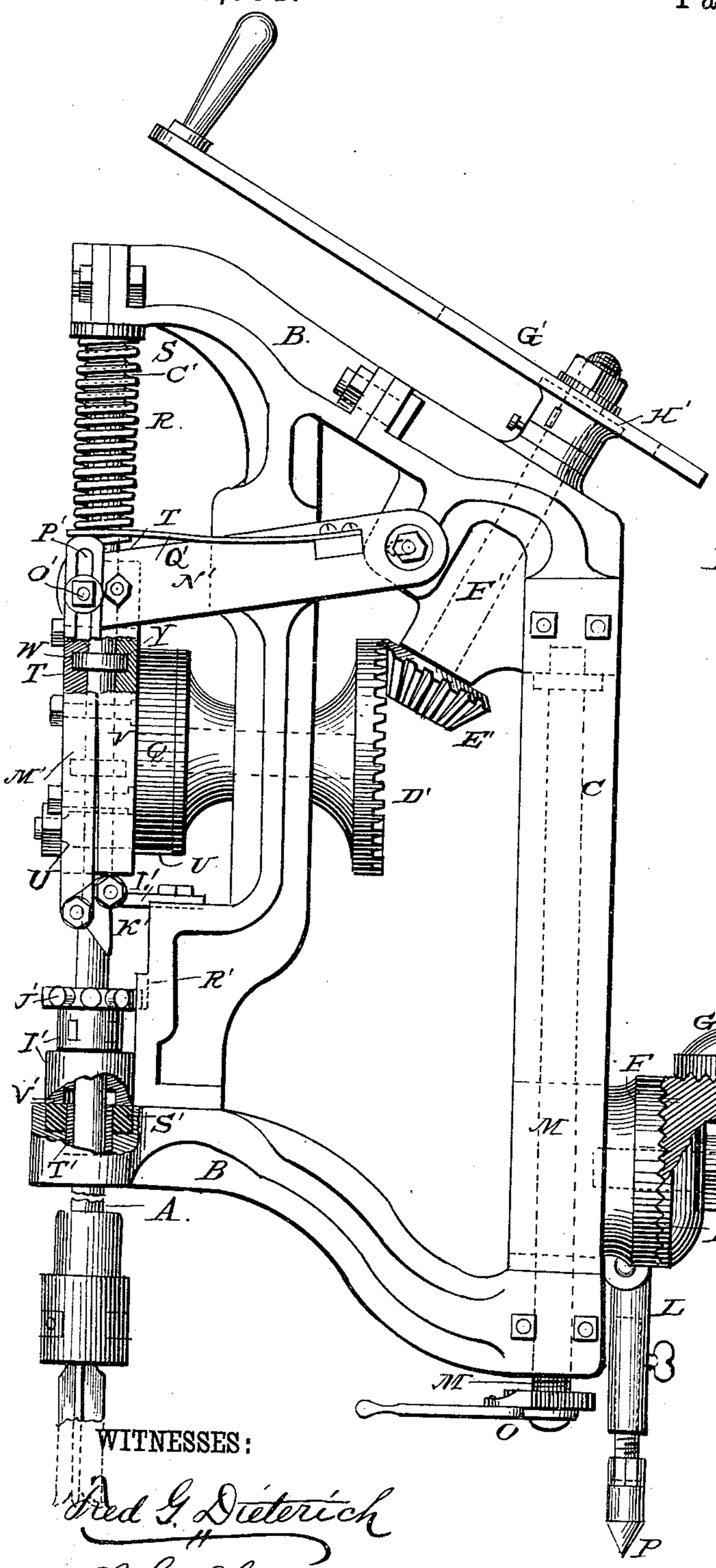

Fig. 1.

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A. G. Lepue.

INVENTOR:

Wm H. Jenkins

BY Munn & Co

ATTORNEYS.

(No Model.)

3 Sheets—Sheet 2.

W. H. JENKINS.

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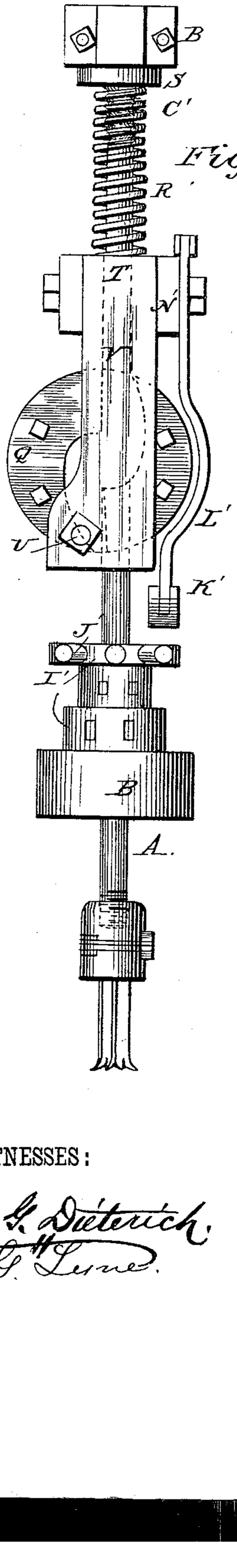


Fig. 2

Fig. 3.

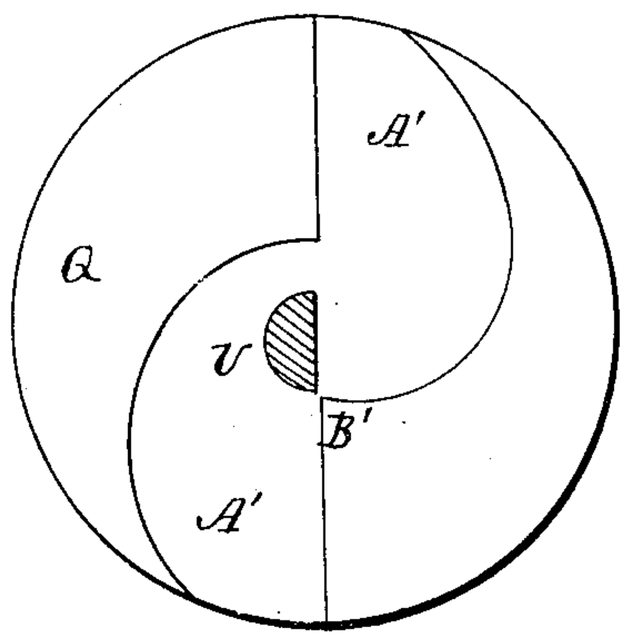
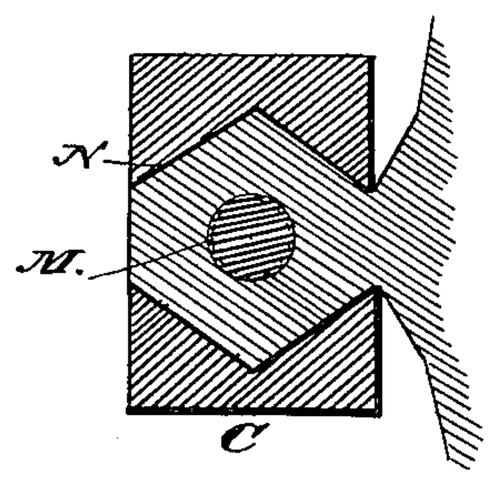


Fig. 4.



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3 Sheets—Sheet 3.

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MINING DRILL.

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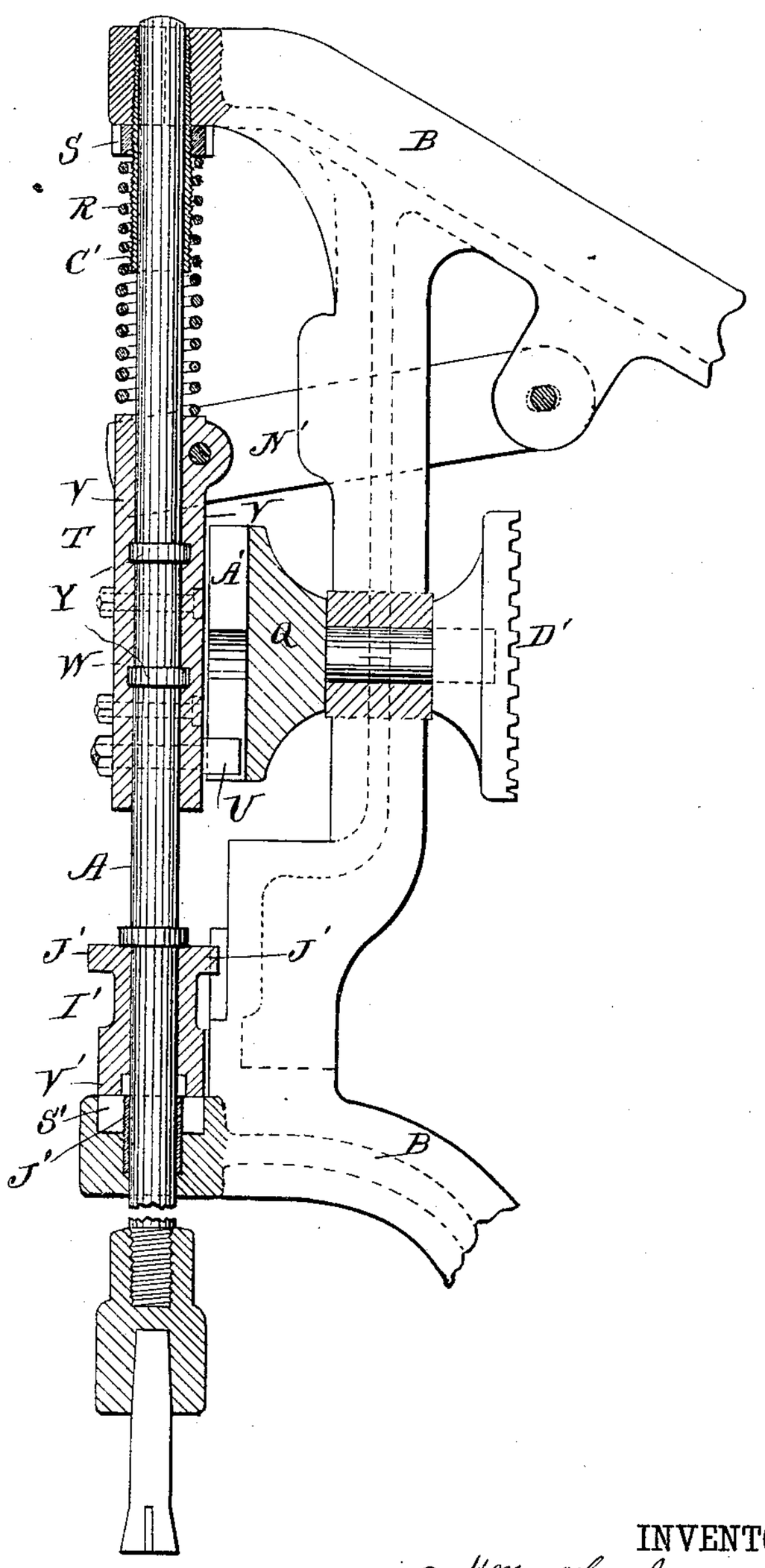
Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM H. JENKINS, OF IRWIN, COLORADO.

MINING-DRILL.

SPECIFICATION forming part of Letters Patent No. 335,591, dated February 9, 1886.

Application filed August 22, 1883. Serial No. 104,434. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. JENKINS, of Irwin, in the county of Gunnison and State of Colorado, have invented a new and useful Improvement in Mining-Drills, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, forming part of this specification.

My invention consists of the novel construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is in part a plan view of the drilling mechanism, showing the drill-carrying frame turned to a horizontal position, and partly in section. Fig. 2 is an edge or face view of the drill-carrying frame, and Fig. 3 is a detail view of the drill-operating cam. Fig. 4 is a detail sectional view, and Fig. 5 is a sectional view, partly broken away, taken in the plane of the drill-rod and its supporting-frame.

A indicates the drill-rod supported in the arms B B of a movable frame, C, which is connected to the bar D. The bar D is formed with a clamp, E, by which it is to be secured to a post or column for holding it in position, and it is connected to the frame C by the corrugated clutches F G, attached to the two respectively, and the angular bar H, having corrugated clutches I J, which are secured to the clutches F G by bolts and nuts, as shown.

By loosening the bolts and separating the clutches the frame C may be moved on the bolts in the direction of the axis of the bar D, or at right angles thereto, in a manner which will be readily understood from the drawings.

I am aware that smooth disks have been clamped together by a bolt for holding the arm of a drill-support in proper position; but the corrugated clutches are not only more positive in their action, but they serve as a gage for resetting the parts after withdrawing the drill-point to remove powdered rock from the drill-hole, or for other purposes. An exact resetting of the parts is necessary to prevent jamming the drill-point, and this cannot be readily secured by smooth friction-disks without loss of time and inconvenience.

By this construction the drill may be worked in a variety of positions, the number of which may be still further increased by turning the bar D on the column.

K and L are pivoted and adjustable arms which are to be set against the wall of a tunnel to brace and support the bar D against the action of the drill-rod. The arm K is pivoted centrally to the outer end of the bar D, and is made adjustable by means of telescoping parts connected by a set-screw, while the arm L is pivoted at one end to the body of clutch F, and always operates in a position parallel with the drill-rod. This latter arm is also formed with telescoping parts, and the body of the clutch F to which it is connected screws on the feeding-screw M, and is loosely fitted in V-shaped grooves N, formed in the drill-carrying frame C, so that by operating the screw by means of the ratchet and pawl O the frame will be fed forward with the drill. The arms K and L are provided with points P, screwing thereon to adapt the arms to be firmly set against the walls of the tunnel.

The drill-rod A is operated by means of the cam Q and spring R. The spring is arranged around the drill-rod between an adjusting collar, S, and a cross-head, T, secured to the rod, which cross-head carries a pin, U, which engages with the cam. The cross-head is formed of two plates, V, having recesses W in one side, and are bolted together on opposite sides of the rod, with the collars Y fitted in the recesses, to hold the cross-head securely in place. The pin U is made approximately semicircular in cross-section, and the cam Q is formed with a diagonal groove in its face, or rather with two grooves, A′, which meet at its center. One side of each groove A′ is formed on a radial line, while the other side is formed on a curved line of gradually-increasing curvature from the periphery to the center. The curved surface of the pin, when at the periphery of the cam, is turned toward the curved side of the groove, and as the cam turns the pin is lifted toward the center thereof until the radial side of the groove assumes a perpendicular position, when the flat side of the pin drops off the shoulder B′ on the cam into the other groove, A′, and the pin is forced back to the periphery by the tension thus put upon the spring R. The pin is thus lifted in one groove A′ and dropped back through the other in turn.

To secure the perfect operation of the device the pin should be arranged at one side of the center of the cam, as shown in the drawings—that is to say, the plane of the flat side

of the pin should coincide, or nearly coincide, with a plane cutting the cam diametrically. With the above construction not only are the gradually-curved sides of grooves A′ adapted to increase the lifting-power of the cam as the tension on the spring increases, but the semi-cylindrical shape of the pin and its arrangement with its flat side adapted to drop down the radial side of either groove A′ allows the pin to slip off shoulder B′ of the cam instantly and while the spring is under its greatest compression. In this manner all the power of the compressed spring is utilized.

I am aware that a drill-operating cam has been formed by two semicircular flanges arranged opposite to each other on a disk, and that two such cams have been arranged with their faces opposite to each other on a single shaft for lifting a drill-rod by means of two arms having friction-rollers in engagement with the cams. With such a construction, however, the space occupied by the shaft carrying the cams, as well as that occupied by one-half the diameter of the friction-roller, is necessarily deducted from the throw of the drill-rod, giving the drill-rod less force for a given length of spring than it would have if the roller could move to the center of the cam, while the cylindrical form of the friction-roller prevents the latter from slipping off the edge or shoulder of the cam completely at the instant it begins to fall—that is, the roller must move one-half its diameter from said shoulder before it can pass the same after beginning to fall, and during this movement the spring partly relaxes, and the otherwise available force of its greatest tension is lost before it fully acts upon the drill-rod.

By constructing the cam to operate singly, instead of in pairs, and thus dispensing with the need of a shaft running through its face, and by forming the lifting-pin of semi-cylindrical shape, instead of making it cylindrical or using a friction-roller, I am enabled to utilize the entire face of the cam from circumference to center for compressing the spring, and as no perceptible fraction of the force of the compressed spring is lost a comparatively short spring and small cam will suffice for all ordinary purposes.

To vary the tension of the spring, the collar S is screwed on a threaded sleeve, C′, attached to the frame C and arranged between the rod A and the spring R. An adjustable cross-head for supporting the upper end of the spring has been used for varying the tension of the spring, and also a collar secured to the drill-rod, with which the cam engages for lifting the rod, has been made movable to vary the tension of the spring. These constructions I disclaim. The shaft of the cam Q is provided with a gear, D′, meshing with a bevel-pinion, E′, on a shaft, F′, which is to be operated by a hand-crank, G′, or by any other suitable means. The crank G′ is to be formed with a longitudinal slot for the bolt H′, whereby the handle of the crank may be brought nearer to or farther from the shaft F′, according to its nearness to the wall of the tunnel.

To give the drill-rod the necessary rotary motion for changing the position of the drill-point preparatory to each stroke, it is provided with a rigid collar, I′, having radial pins J′, which are engaged, one by one, by a cam, K′, at each lift of the drill-rod. This cam, which has a V-shaped point, is pivoted to an arm, L′, rigidly attached to the frame C and connected to the cross-head T by a bar, M′, which is pivoted to said cam and connected by a slot and bolt to the guide-arms N′ of the cross-head. As the drill-rod is lifted the collar I′ brings its pins in position for one of them to be engaged by the cam K′, and the upward movement of the cross-head causes the bolt O′ to strike the upper end of the slot P′ in the bar M′, which gives a slight oscillation to the cam K′, and thus rotates the drill one tooth. As the cross-head descends the cam K′ is forced to resume its normal position by the spring Q′. The collars Y on the drill-rod allow the latter to turn in the cross-head, while the arms N′, pivoted to the cross-head and the frame C, prevent the cross-head from turning with the drill-rod. To allow for the oscillation of the arms N′, they are to be connected to frame C by a loose or sliding joint. As the drill-rod descends or strikes, under the action of the spring R, a pin or tooth of the collar I′ is carrried into a groove, R′, in the frame, which prevents the drill from turning as it delivers its stroke.

S′ indicates a rubber cushion set in the lower arm, B, of the frame C, and T′ is a tube which separates the drill-rod from the cushion. The collar I′ has a circular flange, V′, which is adapted to strike the cushion as the drill descends.

What I claim is—

1. The combination, with a drill-rod, of a cam for operating the same, which cam is provided with grooves forming an unobstructed way across its face leading through its center, one side of each of which grooves is curved with a gradually-increasing curvature from the periphery to the center of the cam, substantially as shown and described, and for the purpose set forth.

2. The combination, with a drill-rod having a lifting-pin, of a cam for operating the same, which cam is provided with grooves A′ A′, meeting at the center and forming an unobstructed way across its face from opposite points on or near its periphery, and having said grooves formed each with a radial side and a curved side of gradually-increasing curvature from its periphery toward its center, substantially as shown and described, and for the purpose set forth.

3. The combination, with a cam having means for lifting from its periphery toward its center, of a spring-actuated drill-rod, or similar device, having a lifting-pin of approxi-

mately semicircular form in cross-section, substantially as shown and described, whereby the pin shall be released by the cam instantly when the rod begins to strike, as set forth.

4. The combination, with the cam having meeting grooves A′, each formed with a radial and a curved side, of the spring-actuated drill-rod having a pin attached thereto, which pin is approximately semicircular in cross-section, substantially as shown and described.

5. The combination, with the drill-rod and the actuating-spring arranged thereon, of the threaded sleeve C′, attached to the supporting-frame of the drill-rod and arranged between the said rod and spring, and the collar S, screwing on the said sleeve and bearing against the upper or outer end of the spring, substantially as shown and described.

6. The combination, with the drill-rod having the collar provided with radial pins, of the cam pivoted to a stationary part and arranged to engage said pins, and the slotted bar loosely connecting the cam with a projection on the cross-head on the drill-rod, and the spring placed in engagement with said bar, substantially as specified.

7. In a mining-drill, the combination of the frame, the drill-rod, and the cross-head having the guide-arms N′ pivoted thereto and connected to the frame by a sliding joint, substantially as shown and described, and for the purpose specified.

8. The combination, with the drill-rod, of the collar I′, having the circular flange V′, the rubber cushion S′, and the tube T′, arranged between the rod and cushion, substantially as shown and described.

9. The combination, with a stationary column, of the bar D, supported near its center on said column, as shown, and adapted to be rotated thereon, means for supporting a drill-rod at one end of said bar, the arm K, pivoted at its center to the opposite end of the bar D and adapted to bear at both ends against the walls of a shaft, and the pivoted arm L, connected to the said bar near the end supporting the drill-rod, substantially as shown and described.

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