(No Model.) 2 Sheets—Sheet 1.

J. J. CRIST.

DRILL.

No. 556,252. Patented Mar. 10, 1896.

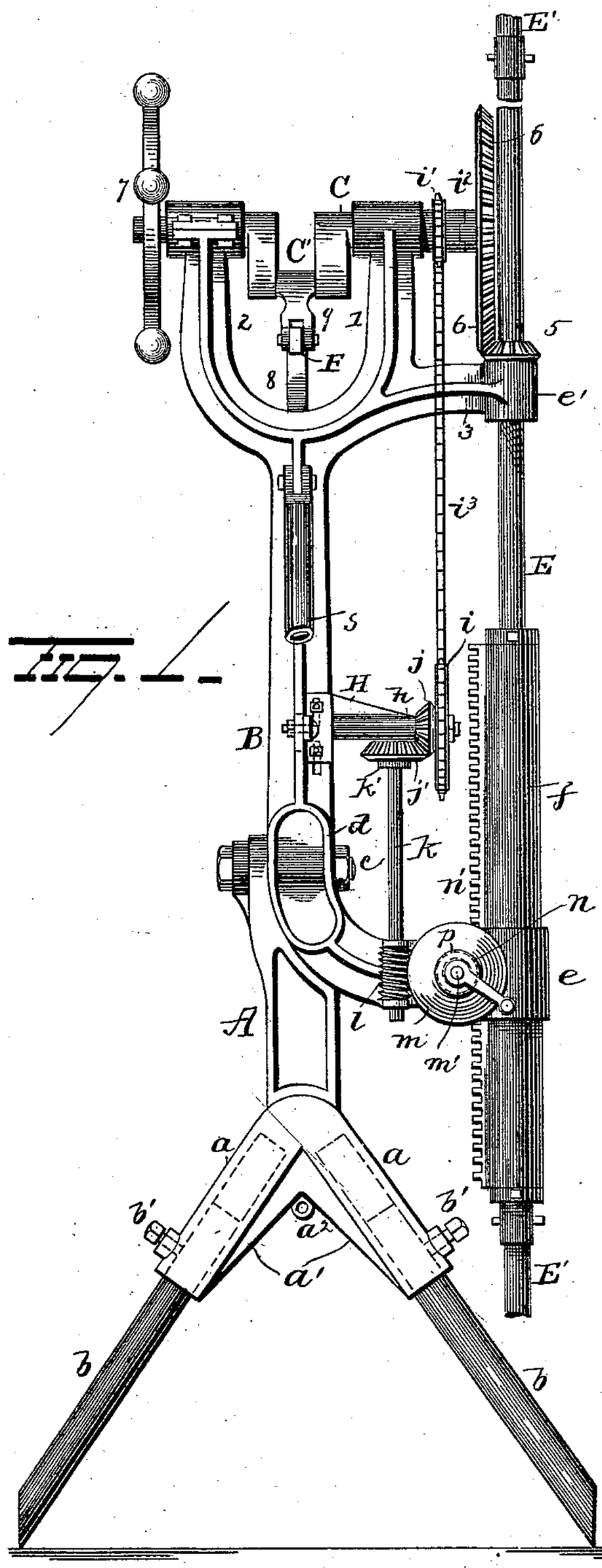

FIG. 1.

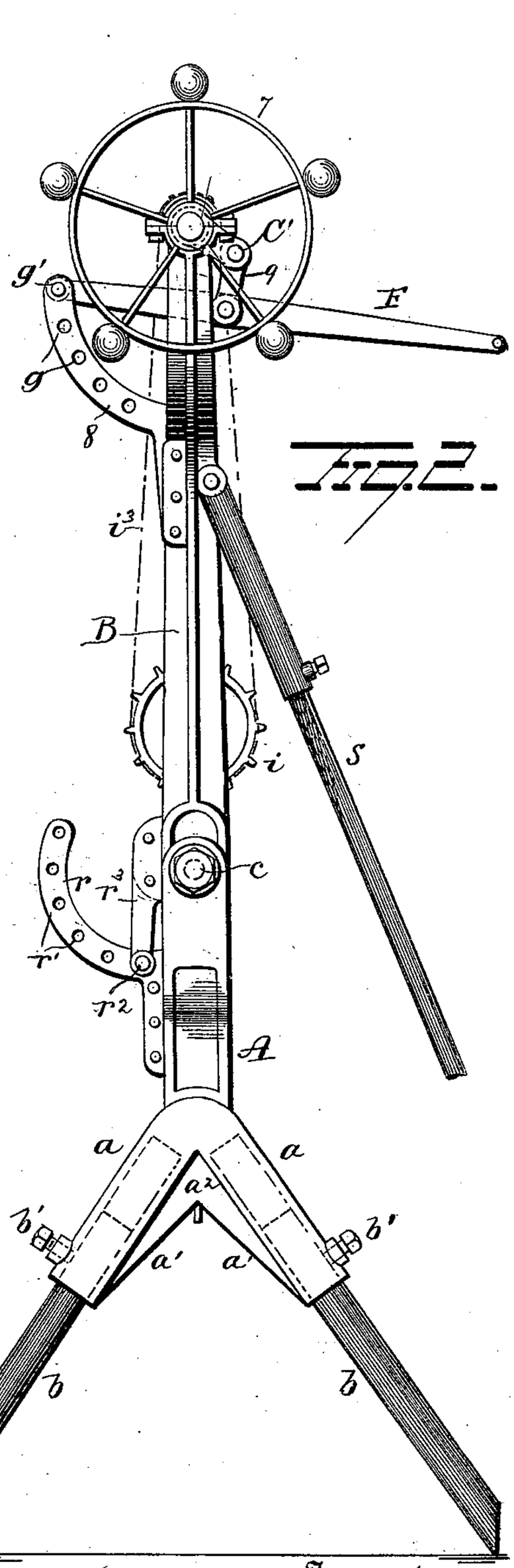

FIG. 2.

Witnesses
E. D. Nottingham
G. F. Downing.

Inventor
J. J. Crist
By M. D. Leggett & Co
Attorneys

(No Model.) 2 Sheets—Sheet 2.

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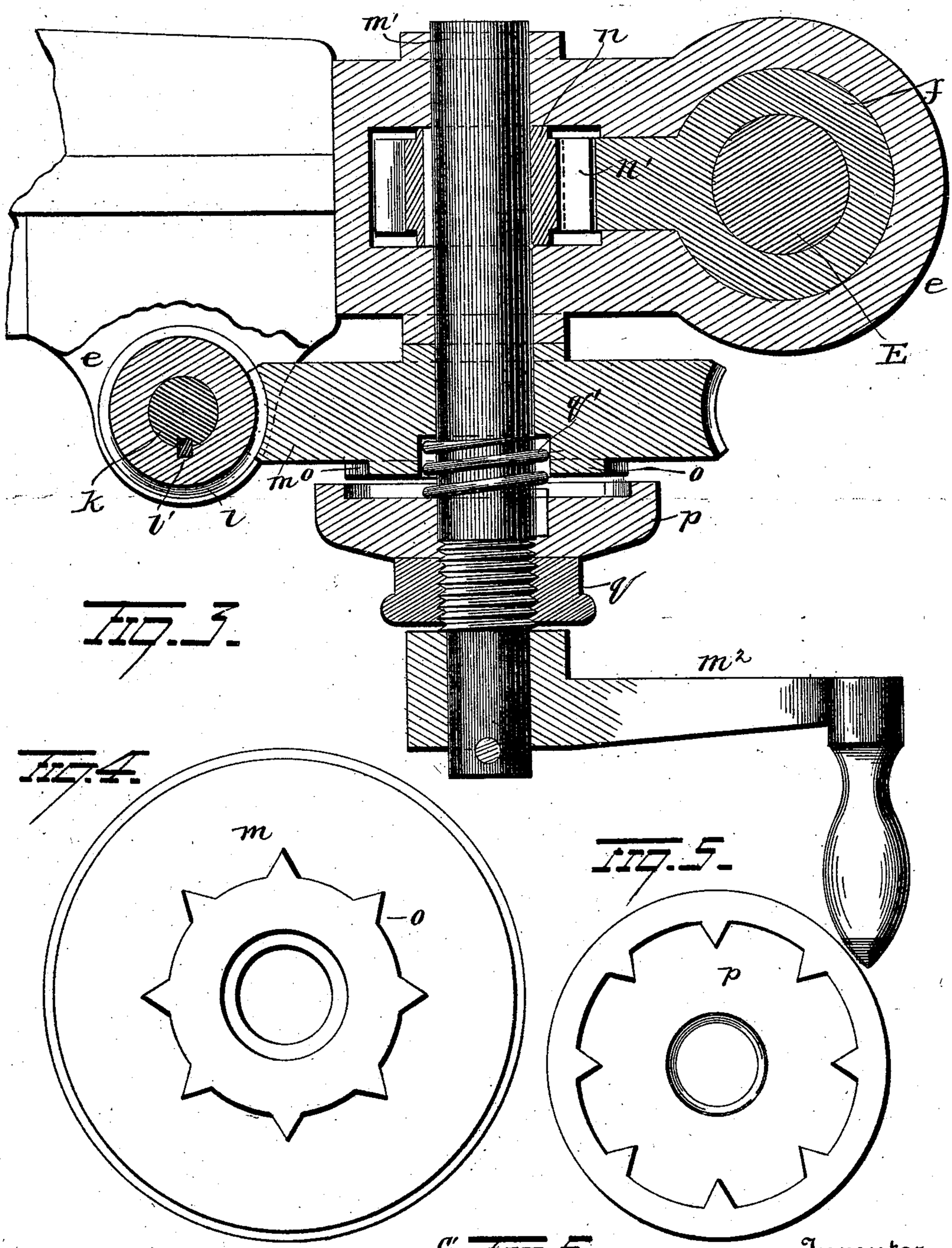
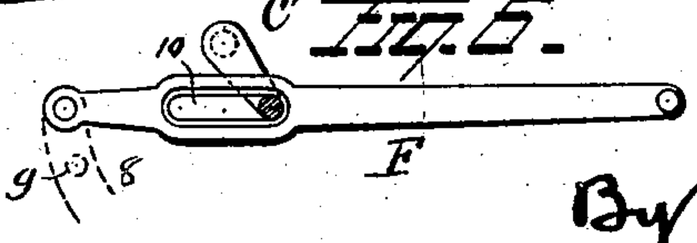


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.



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J. J. Crist
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Attorneys

UNITED STATES PATENT OFFICE.

JOHN J. CRIST, OF WICHITA, KANSAS.

DRILL.

SPECIFICATION forming part of Letters Patent No. 556,252, dated March 10, 1896.

Application filed March 22, 1895. Serial No. 542,810. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. CRIST, a resident of Wichita, in the county of Sedgwick and State of Kansas, have invented certain new and useful Improvements in Drills; and I do hereby 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.

My invention relates to an improvement in drills, and more particularly to rock-drills, one object of the invention being to produce simple and efficient means whereby to adapt the drill for operation at different angles.

A further object is to so construct a drill that it can be operated at any angle within one hundred and eighty degrees.

A further object is to provide operating devices which shall be adjustable relatively to the angle at which the drill is to be operated.

A further object is to produce simple and efficient means for applying power to operate a drill.

A further object is to provide simple framework for a drill.

A further object is to produce feed mechanism for a drill which shall be efficient and accurate in operation.

A further object is to produce a rock-drill which shall be simple in construction and effectual in all respects in the performance of its functions.

With these objects in view the invention consists in certain novel features of construction and combinations and arrangements of parts, as hereinafter set forth and pointed out in the claims.

In the accompanying drawings, Figure 1 is a front elevation of a drill, illustrating my improvements. Fig. 2 is a side or edge view. Figs. 3, 4, and 5 are views illustrating details. Fig. 6 is a view showing a modified form of lever F and connection.

A represents a standard having a series of (preferably four) hollow or socketed arms *a* for the reception of legs *b*, adjustably secured therein by means of set-screws *b'*. The arms are connected by strengthening-webs *a'*, from which an eye a^2 projects for the attachment of a stone or other device whereby to weight the drill to insure the proper engagement of the legs *b* with the ground. A frame B is pivotally connected to the upper end of the standard by means of a bolt *c*, and one face of the standard is curved for the accommodation of the curved lower end of the frame.

The frame B is made + shaped in cross-section and in proximity to its curved lower end is made with parallel webs *d* connected together at their ends so as to form an ellipse. In both webs *d* the pin *c* has a bearing. The upper end of the frame B is bifurcated or made with two arms 1 2, having bearings at their upper ends for the accommodation of a transverse crank-shaft C.

At the lower extremity of the frame B a collar or bearing *e* is located, and from the upper portion of the frame an arm 3 projects laterally and is provided at its free end with a collar or bearing *e'* in line with the collar or bearing *e*. A long sleeve or pipe *f* passes through the collar or bearing *e*, and through the sleeve or pipe *f* the revoluble drill-shaft E passes, said shaft also passing loosely through the collar *e* and being provided at its lower end with a drill E', secured thereto in any suitable manner.

The shaft E is made with a spline adapted to pass loosely through a recess in a bevel-pinion 5 mounted on the collar *e'*. Rotary motion will be imparted to the pinion 5 and the drill-shaft by means of a gear-wheel 6, carried by the crank-shaft C, which latter is provided with a fly-wheel 7. An arm or segment 8 projects from the frame B and is provided with a series of perforations *g* for the reception of a pin *g'*, whereby one end of an operating-lever F is pivotally connected to said arm or segment, and the lever F is connected at a point between its ends with the crank-arm C' of the shaft C by means of a link or pitman 9; or, if desired, the lever F may be made with an elongated slot 10 for the reception of the crank-arm C', as shown in Fig. 6, and the link or pitman 9 omitted. From this construction and arrangement of parts it will be seen that by vibrating the lever F rotary motion will be imparted to the

crank-shaft C, and that this motion will be transmitted through the gearing above described to the drill-shaft.

A bracket H is adjustably connected with the frame B at a point above the fulcrum *c* thereof and serves as a bearing for a short shaft *h*, on which a sprocket-wheel *i* is mounted. Another sprocket-wheel *i'* is secured to the crank-shaft C and connected with the gear-wheel 6 by means of a clutch i^2, motion being imparted from the sprocket-wheel *i'* to the sprocket-wheel *i* by means of a sprocket-chain i^3. A bevel-pinion *j* is adapted to rotate with the sprocket-wheel *i* and meshes with a bevel-pinion *j'* on the upper end of a shaft *k*, which latter is mounted at its upper end in an arm *k'* of the bracket *h*. The lower end of the shaft *k* passes loosely through a worm *l* and is made to rotate said worm by means of a spline *l'*. By adjustably securing the bracket *h* to the frame B and permitting an endwise movement of the shaft *k* in the worm *l* said bracket can be moved in order to take up slack in the sprocket-chain i^3. The worm *l* transmits motion to a worm-wheel *m* mounted loosely on a transverse shaft *m'*, and the latter also carries a pinion *n*, which meshes with a rack-bar *n'* secured to the pipe or sleeve *f*. Clutch-flanges *o* project from one face of the worm-wheel *m* and are engaged by the flanges of a clutch-disk *p* mounted to rotate with the shaft *m'* and have a sliding movement thereon. A portion of the shaft *m'* is screw-threaded for the reception of a nut *q* whereby to force the flanges of the clutch-disk into engagement with the flanges *o* on the worm-wheel. A spring *q'* encircles the shaft *m'* between the clutch-disk *p* and worm-wheel *m* for forcing said clutch-disk out of engagement with the clutch-flanges *o* when the nut *q* is loosened. The shaft *m'* is also provided with a crank-arm m^2, by means of which to turn it for a purpose hereinafter explained.

A segment *r* is secured to the standard A and provided with a series of perforations *r'* for the reception of a pin r^2, which latter also passes through a hole in the free end of an arm r^3 secured to the frame B.

From the construction and arrangement of parts above described it will be seen that the frame B, carrying the drill and its operating and feed mechanism, can be swung on the pin or bolt *c* and made to assume any desired angle, so as to enable the drill to operate in any direction desired. When the machine is adjusted to drill in a horizontal or nearly horizontal line it will be supported by means of an adjustable arm *s* secured to the frame B near its upper end. Instead of securing the drill to the lower end of the drill-shaft it may be secured to the upper end when it is desired to drill upwardly, in which case the operating-lever F will be made to rotate the crank-shaft in a reverse direction and thus cause the drill to be fed upwardly. Thus it will be seen that the drill can be operated at any angle from zero to one hundred and eighty degrees.

When, during the operation of the machine, the drill has reached the forward end of its movement and it is desired to return it to its normal position, the nut *q* will be loosened, so as to permit the disengagement of the clutch-disk *p* from the clutch-flanges *o* on the worm-wheel *m*, and the shaft *m'* will then be turned ty means of the crank m^2, whereupon the sleeve or pipe *f* and the drill-shaft will be reburned to their normal positions in an obvious manner.

My improvements are very simple in construction and comprise but few parts. The machine can be adjusted to operate in any desired direction, and my improvements are effectual in all respects in the performance of their functions.

Various slight changes might be made in the details of construction of my invention without departing from the spirit thereof or limiting its scope, and hence I do not wish to limit myself to the precise details of construction herein set forth; but,

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

1. In a drill, the combination with a frame, a crank-shaft, a drill-shaft and gearing between said shafts, of a curved segment having perforations, secured to said frame, an operating-lever pivoted at one end to the segment at one of said perforations and connected between its ends to the crank of said crank-shaft, substantially as set forth.

2. In a drill the combination with a frame, a crank-shaft mounted therein, a drill-shaft and gearing between said shafts, of an operating-lever having an adjustable connection with the frame, a link or pitman between said lever and the crank of the crank-shaft, and a fly-wheel carried by said crank-shaft, substantially as set forth.

3. In a drill, the combination with a frame, an operating-shaft, a sleeve and a drill-shaft adapted to rotate in and move longitudinally with said sleeve, of a bracket adjustably secured to the frame, a short shaft mounted in said bracket, a sprocket-wheel carried by said short shaft, a sprocket-wheel on the operating-shaft, a sprocket-chain passing over said sprocket-wheels, a worm-shaft adapted to receive motion from the short shaft, a worm adapted to rotate with and move on said worm-shaft, and gearing between said worm and sleeve, substantially as set forth.

4. In a drill, the combination with a frame, an operating-shaft, a sleeve and a drill-shaft adapted to rotate in and move longitudinally with said sleeve, of a transverse shaft adapted to transmit motion to the sleeve, a worm-wheel mounted loosely on the transverse shaft, a clutch-disk adapted to engage said worm-wheel, a spring between said wheel and

disk, a nut on the transverse shaft to retain the clutch-disk in engagement with the worm-wheel, a crank on said transverse shaft, a worm meshing with the worm-wheel and gearing between said worm and the operating-shaft, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN J. CRIST.

Witnesses:
J. K. SAWYER,
B. D. ALLEN.