No. 619,125. Patented Feb. 7, 1899.

R. BINNIE.

DRILLING MACHINE.

(Application filed May 25, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2.

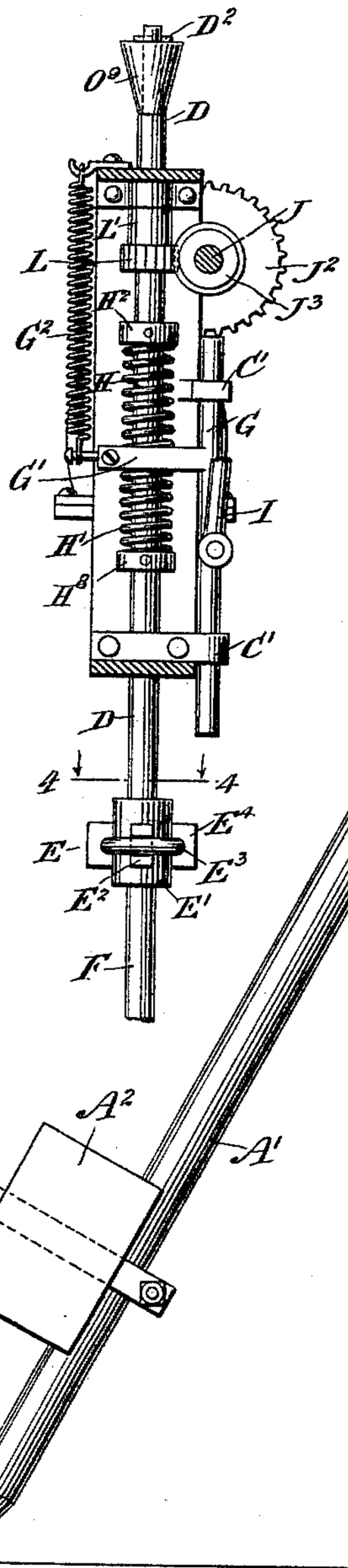

Fig. 1.

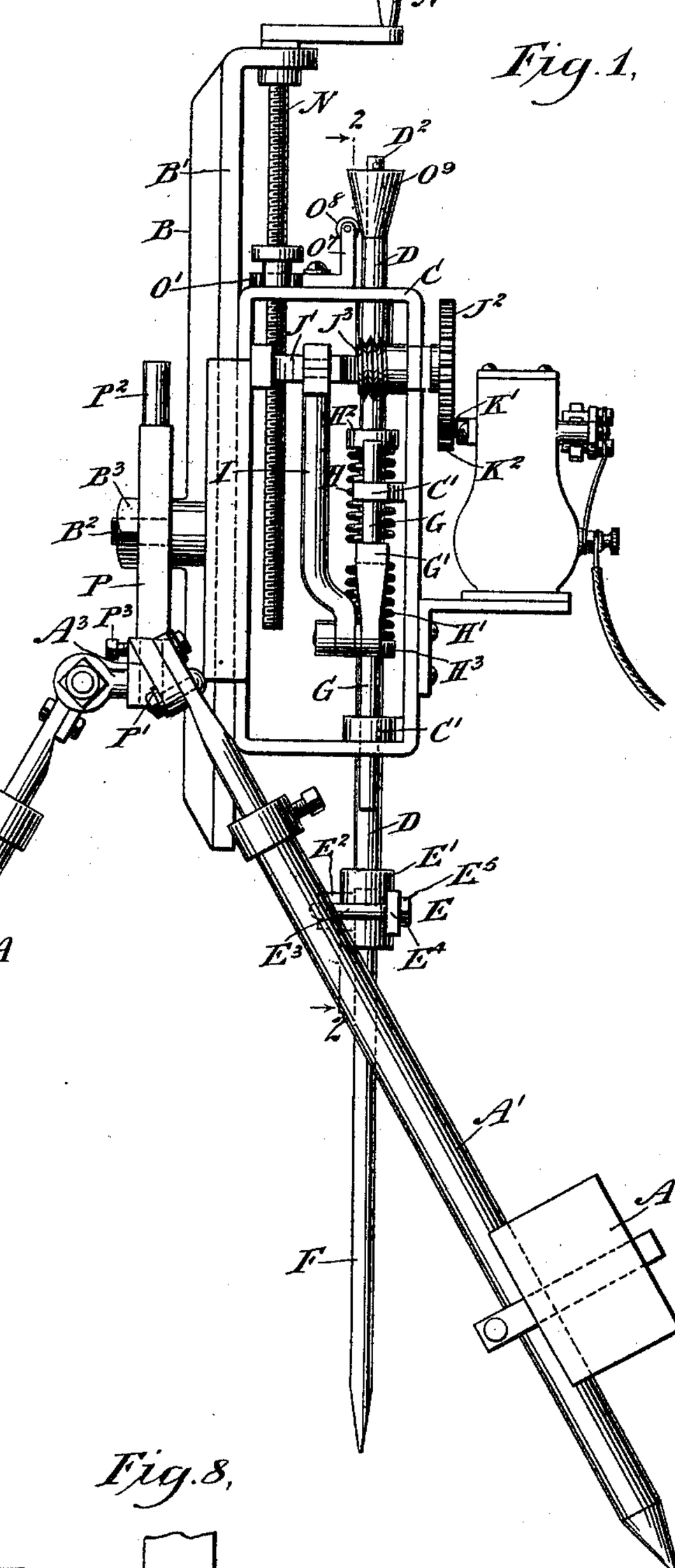

Fig. 8.

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Fig. 3,

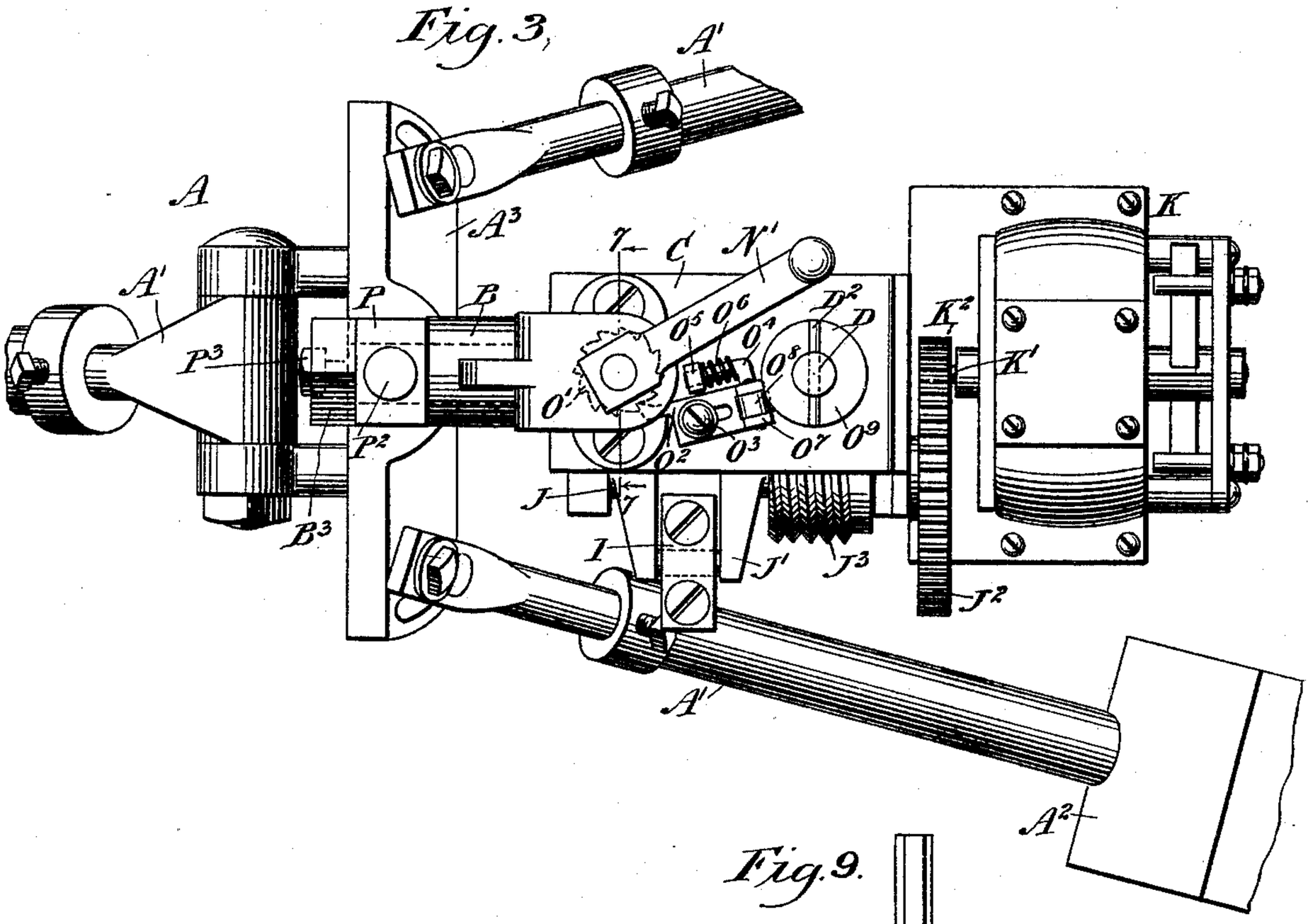


Fig. 9.

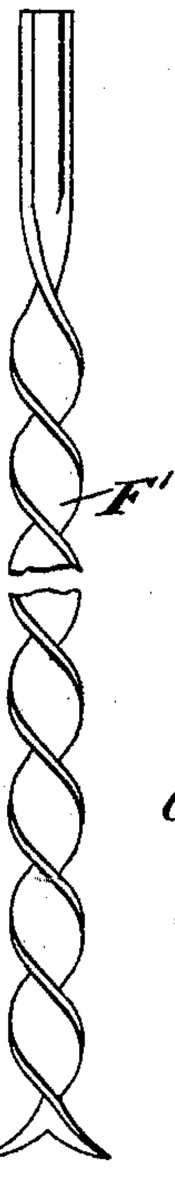


Fig. 4,

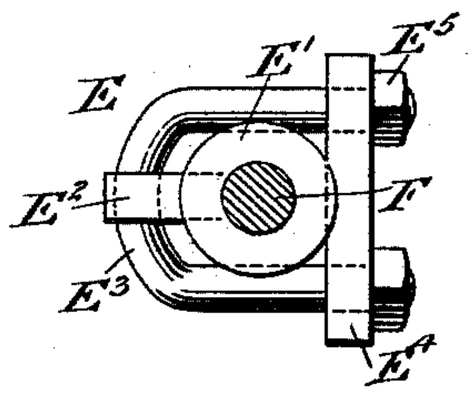


Fig. 5,

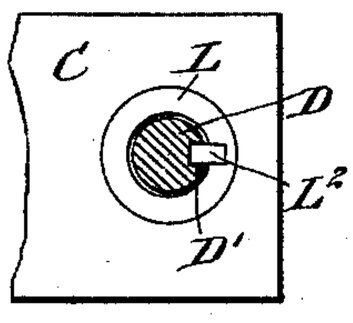


Fig. 6,

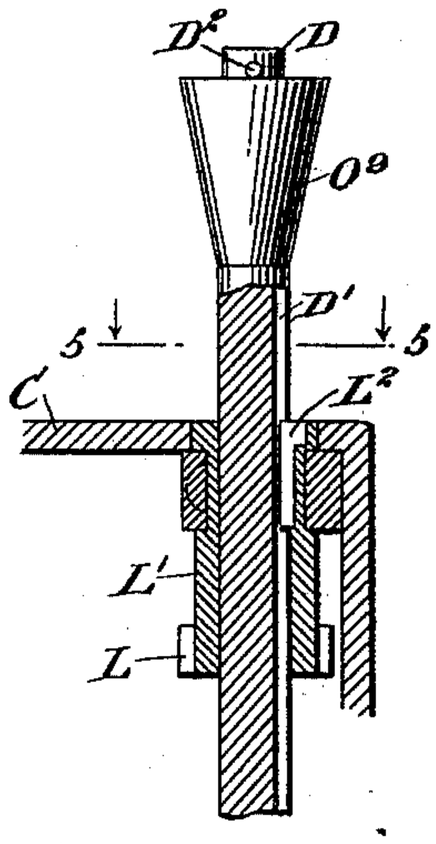
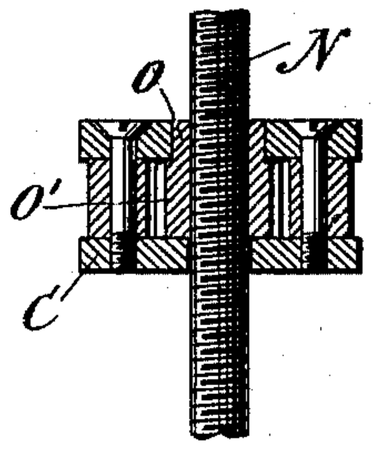


Fig. 7.



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UNITED STATES PATENT OFFICE.

ROBERT BINNIE, OF BOLIVAR, PENNSYLVANIA.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 619,125, dated February 7, 1899.

Application filed May 25, 1898. Serial No. 681,677. (No model.)

To all whom it may concern:

Be it known that I, ROBERT BINNIE, of Bolivar, in the county of Westmoreland and State of Pennsylvania, have invented a new and Improved Drilling-Machine, of which the following is a full, clear, and exact description.

The invention relates to portable drilling and mining machines of a class adapted for use in quarries and coal-mines for producing holes for the reception of blasting charges and for mining coal and channeling rock.

The object of the invention is to provide a new and improved drilling-machine which is simple and durable in construction, not liable to get out of order, very effective in operation, and arranged for convenient adjustment to permit of drilling in any desired direction.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a cross-section of the same on the line 2 2 in Fig. 1. Fig. 3 is an enlarged plan view of the improvement. Fig. 4 is an enlarged sectional plan view of the drill-chuck on the line 4 4 in Fig. 2. Fig. 5 is a sectional plan view of the drill-spindle and adjacent parts, the section being taken on the line 5 5 of Fig. 6. Fig. 6 is a sectional side elevation of the same. Fig. 7 is an enlarged sectional side elevation of the feed-screw and nut on the line 7 7 in Fig. 3. Fig. 8 is an enlarged sectional side elevation of the standard-support, and Fig. 9 is a side elevation of an auger or twist-bit to be used when working soft rock or a coal-bed.

The improved drilling-machine is mounted on a suitable tripod A, carrying a standard B, formed with guideways B′, on which is fitted to slide a drill frame or carriage C, having suitable bearings for a drill-spindle D, provided with a chuck E for carrying the drill F or the auger F′. (Shown in Fig. 9.) The drill-spindle D is arranged to receive a reciprocating and turning motion for drilling rock or only a turning motion when the auger is used in drilling in soft material or a coal-bed.

For imparting a reciprocating motion to the drill-spindle D the following device is provided: A cross-head G is fitted to slide in suitable bearings C′ on the drill-frame C, and this cross-head is formed with an arm G′, through which passes loosely the spindle D. Springs H and H′ press on opposite sides of the cross-head arm G′, their ends abutting against collars H^2 and H^3, respectively, secured to the drill-spindle D on opposite sides of the arm G′. The cross-head G is pivotally connected by a pitman I with the crank-arm J′ of a shaft J, mounted to turn in suitable bearings in the drill-frame C, and on the outer end of the said shaft is secured a gear-wheel J^2, in mesh with a pinion K^2, secured on the shaft K′ of a motor K of any approved construction.

As shown in the drawings, an electric motor is provided, which when set in motion causes the pinion K^2 to rotate the gear-wheel J^2 and shaft J, so that the crank-arm J′ imparts a reciprocating motion to the cross-head G by the pitman I. On the upstroke of the cross-head G the arm G′ presses against the spring H and lifts the drill-spindle D, and on the downstroke of said cross-head the arm G′ presses on the spring H′ and moves the drill-spindle D in a downward direction. It is evident that in either case a yielding connection is established between the cross-head and the drill-spindle, so that when the machine is working all percussion and jar incident to the drill F striking the rock is taken up by said springs to prevent injury to the cross-head G, pitman I, and crank-shaft J. A spring G^2 is connected with the arm G′ (see Fig. 2) to assist in the upstroke of said cross-head G.

In order to impart a continuous turning motion to the drill-spindle D, I provide the crank-shaft J with a worm J^3, in mesh with a worm-wheel L, having its hub L′ mounted to turn in the upper portion of the frame C, as is plainly illustrated in Fig. 6, said hub L′ carrying a key L^2, engaging a longitudinal keyway D′ formed in the spindle D. It is evident that when the shaft J is rotated, as previously explained, the worm J^3 by meshing with the worm-wheel L rotates the latter in its bearing in the frame C and by the key L^2 rotates the drill-spindle D, without, however,

interfering with the reciprocating motion of the drill-spindle, owing to the loose connection of the key L^2 with the keyway D'.

Now it is evident that when the machine is in operation a reciprocating motion as well as a continuous rotary motion is given to the drill-spindle D to insure a perfect drilling of the hole without undue jar to any of the parts of the machine.

When it is desired to drill a hole with the auger F', the pitman I is disconnected from the cross-head G and the crank-shaft J, and only a rotary motion is given to the drill-spindle by the worm J^3, worm-wheel L, and key L^2, as above explained.

In order to impart an intermittent feed motion to the frame C and the parts carried thereby, I provide a threaded feed-screw N, mounted to turn in the standard B and provided at its upper end with a crank-arm N', adapted to be turned by the operator for moving the frame C into the desired position at the time of starting the machine or for turning the frame C after the hole is drilled. The feed-screw N screws in a ratchet-wheel nut O, mounted to turn in suitable bearings in the frame C, and the ratchet-wheel O' of the nut O is adapted to be engaged by a spring-pressed pawl O^2, fitted to slide on a bolt O^3, secured to the frame C, (see Figs. 1 and 3,) said pawl being provided with a guide-arm O^4, mounted to slide in a bearing O^5 and pressed on by a spring O^6. The pawl O^2 is further provided with an upwardly-extending arm O^7, carrying a friction-roller O^8, adapted to be engaged by the side of a cone-shaped roller O^9, mounted to turn loosely on the upper reduced end of the spindle D, but prevented from slipping off by a cross-pin D^2. When the drill-spindle D is near the end of its downward stroke, then the roller O^9 engages with its inclined side the friction-roller O^8, so as to push the pawl O^2 inward against the tension of the spring O^6 to turn the ratchet-wheel O' of the nut O, so that the said nut screws on the feed-screw N and moves the frame C downward. On the upstroke of the spindle D the roller O^9 moves out of engagement with the friction-roller O^8, and the spring O^6 then returns the pawl O^2 to its previous position, the feed-screw N remaining stationary during this operation.

The tripod A is provided with the usual extension-legs A', carrying adjustable weights A^2 for giving the necessary stability to the tripod. The legs are pivoted on a head A^3, in which is mounted to turn the pin P' of a vertically-disposed support P, in which is mounted to turn the standard B by means of a bolt B^2, the nut B^3 of which is adapted to clamp the standard in place on the support after the desired adjustment is made. Now it will be seen that by the arrangement described the support P can be turned in the head A^3 and the standard B can be turned in the support P to bring the drill or auger into the desired position, according to the hole to be drilled. The standard B swings in a plane approximately at a right angle to the plane in which the support P is turned, so that any desired inclination can be given to the drill F. The support P is preferably provided with a second pin P^2 at the opposite end for fastening supplementary braces extending to the mine roof or sides to hold the machine securely in position while using it as a force-auger. A set-screw P^3, screwing in the head A^3, serves to fasten the support P in place after the desired adjustment is made. The chuck E for carrying the drill F or auger F' is provided with a socket E', secured on the lower end of the drill-spindle D, and in said socket is fitted to slide loosely a clamping-key E^2, adapted to engage the inserted end of the shank of the drill or auger, and this key is carried by and pressed inwardly by a clip-bolt E^3, engaged at its end by a clip-plate E^4, abutting against the side of the socket E' opposite the entrance of the key E^2. It is evident that by screwing up the nuts E^5 on the clip-bolt E^3, the latter firmly presses the key E^2 in engagement with the drill F to fasten the latter in place on the socket E'.

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

1. A drilling-machine, comprising a frame, a standard on which the frame is mounted to slide, a drill-spindle carried by the frame, a shaft provided with a crank-arm and mounted to turn in the frame, a cross-head fitted to slide in bearings on the frame, an arm on said cross-head through which the drill-spindle loosely passes, a spiral spring located at one side of the frame and connecting the arm on the cross-head with a hook on the upper part of the frame, springs engaging opposite sides of the cross-head arm and bearing against collars on the drill-spindle, a pitman connecting the cross-head with the crank-arm, a gear-wheel on the outer end of said crank-shaft a motor carried by the frame, a pinion on the shaft of the motor and meshing with the said gear-wheel, and a gearing for connecting the crank-shaft with the drill-spindle for rotating the latter substantially as shown and described.

2. A drilling-machine provided with a standard, a frame or carriage mounted to slide on said standard, a feed-screw mounted to turn at its upper end in said standard, a ratchet-wheel nut engaging the said feed-screw and mounted to turn in suitable bearings in said frame or carriage, a pawl for engagement with the ratchet-wheel of the nut, the said pawl being mounted to slide on a bolt secured to the frame, a guide-arm on said pawl, a spring pressing on said guide-arm, an upwardly-extending arm on said pawl carrying a friction-roller and means carried by the drill-spindle for engaging the said friction-roller, as and for the purpose set forth.

3. A drilling-machine provided with a frame or carriage mounted to slide, a feed-screw for

imparting movement to said frame, a ratchet-wheel nut engaging the said feed-screw and mounted to turn in said frame, a pawl for engagement with the ratchet-wheel of the nut, the said pawl being mounted to slide on the frame, and having a guide-arm mounted to slide in a bearing, a spring pressing on said guide-arm, an upwardly-extending arm on said pawl carrying a friction-roller, and a cone-shaped roller on the reciprocating drill-spindle and adapted to engage the said friction-roller, substantially as shown and described.

ROBERT BINNIE.

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JOHN A. COULTER.