(No Model.)

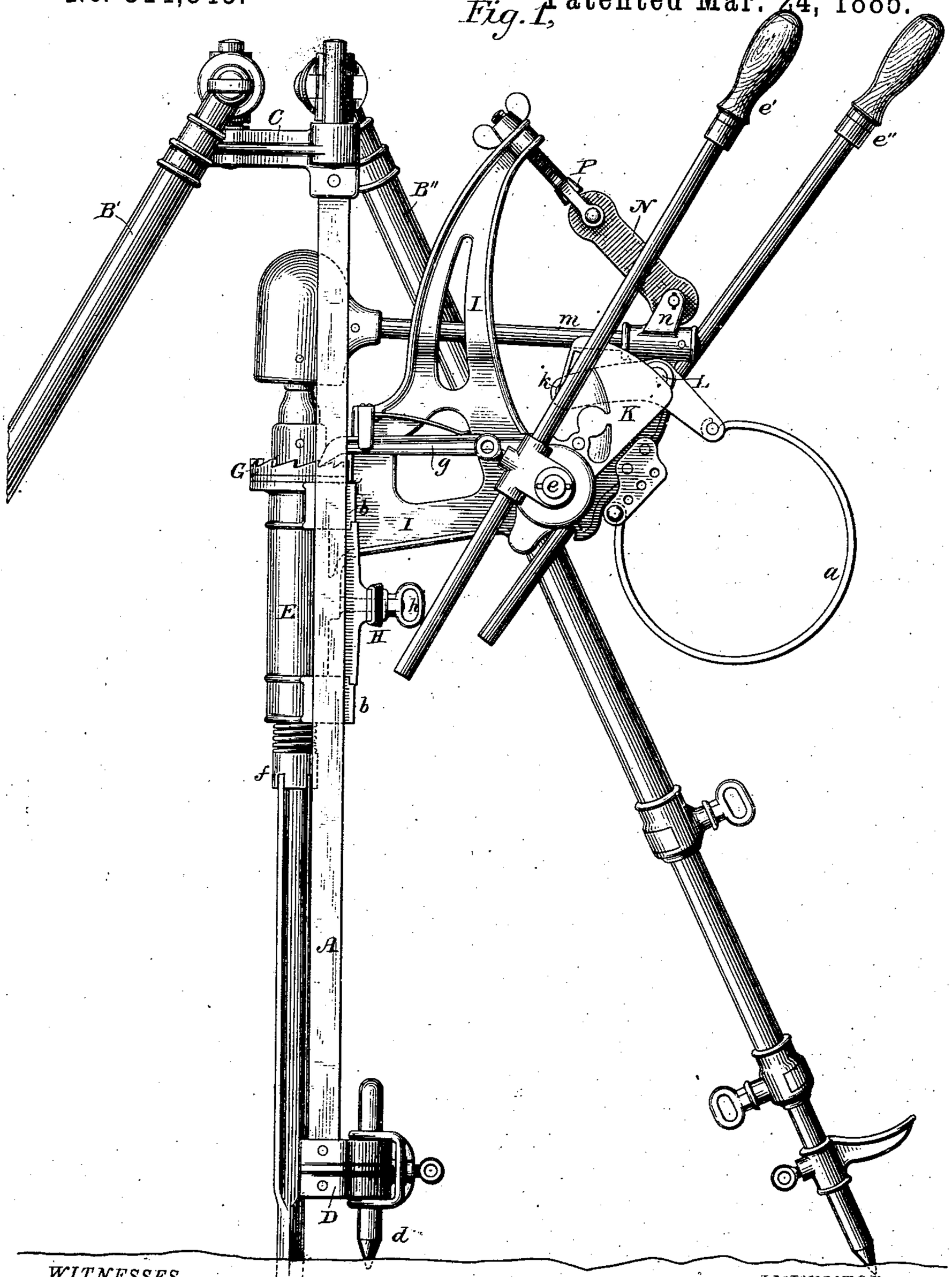
2 Sheets—Sheet 1.

H. F. PARSONS.

ROCK DRILLING MACHINE.

No. 314,343. Patented Mar. 24, 1885.

Fig. 1.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2,

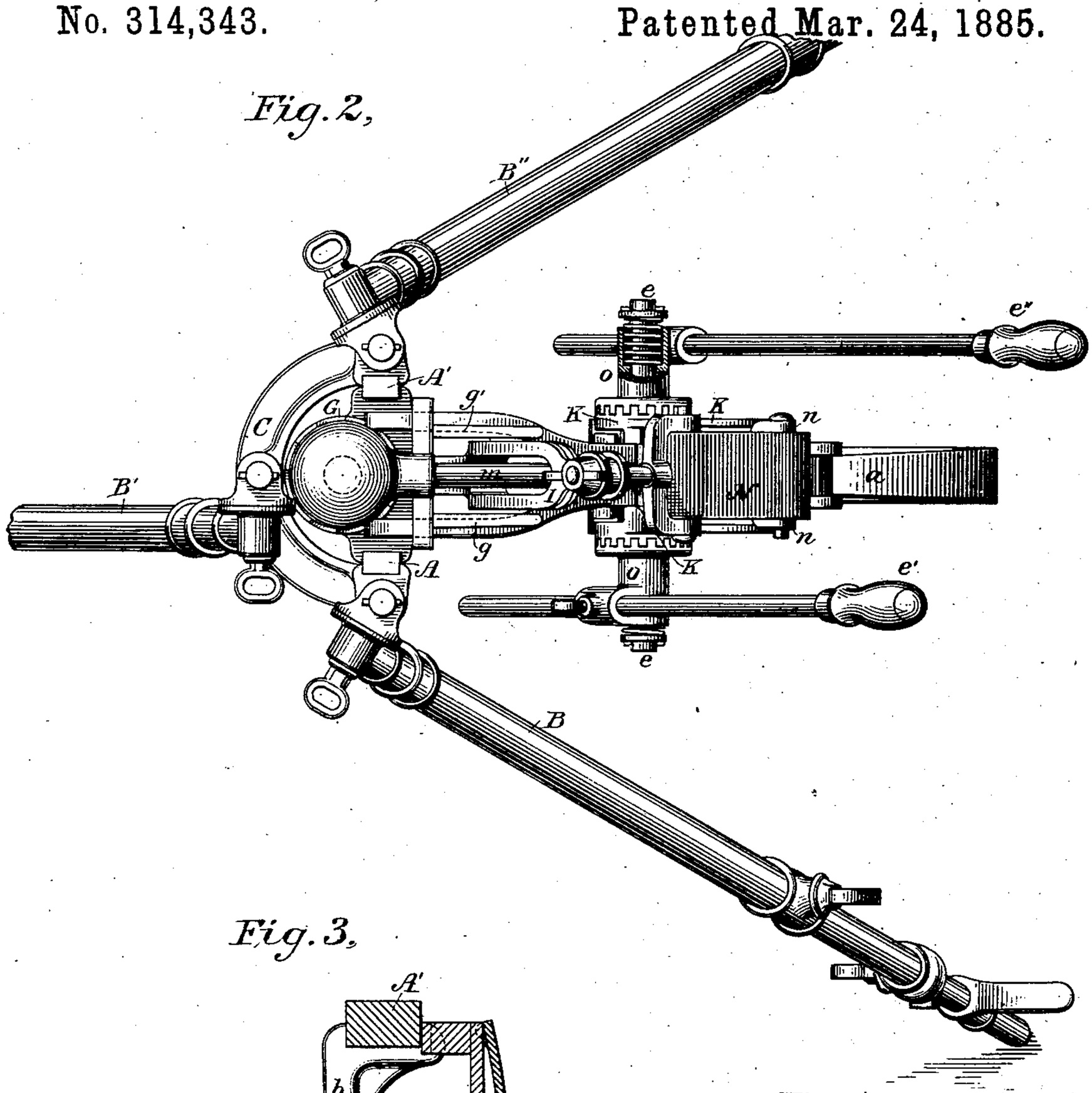


Fig. 3,

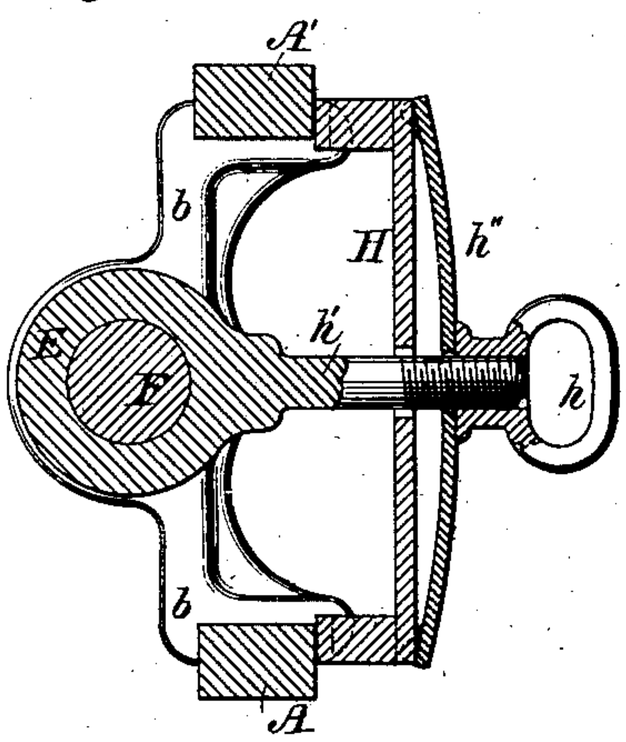
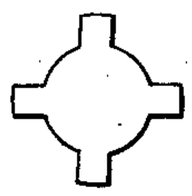


Fig. 4,



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UNITED STATES PATENT OFFICE.

HENRY F. PARSONS, OF NEW YORK, N. Y., ASSIGNOR TO THE PARSONS HAND ROCK DRILL COMPANY, OF NEW YORK.

ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 314,343, dated March 24, 1885.

Application filed September 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. PARSONS, a citizen of the United States of America, residing at the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Rock-Drilling Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 represents a drill-machine constructed on principles similar to those described in the two applications of Hugo Borchardt and myself, both of which were filed September 12, 1881. Fig. 2 represents a top view of the same. Fig. 3 represents a sectional view showing certain details of construction. Fig. 4 represents a top view of the drill-rod, this being also the form of the socket in the end of the drill-holder into which the drill-rod fits.

My present invention consists of certain improvements on the drill-machine described in said applications and the machine described in Letters Patent granted to me, dated October 25, 1881, and numbered 248,787. Said machines, and especially the machines described in the said applications, have given general satisfaction; but I have ascertained by their use that the spring for operating the hammer, which is shown therein, (and which is represented in the accompanying drawings by the spring lettered *a*,) in practical use is likely to become broken by the continually-repeated compressions which it receives, and by the suddenness with which its expansion is arrested and the vibrations or jars produced thereby. The reaction of the metallic spring also detracts from its value in a rock-drill by detracting from the steadiness and positive force of the blow which it causes the hammer to strike.

I have made numerous efforts and experiments to overcome the difficulties referred to by altering the arrangement of the metallic spring, but without entire success until I conceived my present invention.

My present invention consists, principally, in combining with the helve of the hammer a rubber spring for the purpose of actuating the hammer; and experiment has shown that the use of this rubber spring is not open to the objections stated, and that it produces a blow of the hammer which is different from and much more effective than the blow produced by the metallic spring in its effect upon the drilling operation.

Another portion of my improvement consists in the method, hereinafter to be described, of adjustably securing the hand-levers to the actuating-shaft of the machine.

Another portion of my improvement consists in so forming the guides upon which the operative portions of the machine are supported that said operative portions may be slid off of the guides before the supporting parts of the machine are set up, and the operative parts need not be placed in position on the supporting parts until the latter have been set up.

Another feature of my improvement consists in the method by which I attach the drill to the drill-holder.

I will now proceed to describe the machine.

A A′ are the guides upon which the operative parts of the machine are fed forward as the drilling progresses. These guides may be held in any position by the adjustment of the supporting-legs B B′ B″, one of which is represented as being removed in Fig. 1, so as not to obstruct the view of the other portions of the machine. These supporting-legs are adjustable lengthwise, and are connected with the upper portion of the guides by universal joints, so that they may be placed in any position which is required by the nature of the ground and the direction in which the drilling is to be performed. The leg B′ is attached to a curved casting, C, which connects the two guides A A′ in such a manner as to admit of the passage of the hammer and other mechanism between them. The forward ends of the guides are connected by a similar curved casting, D, which is held in position on the rock by an adjustable pin, *d*, which is pointed so as to take into the surface of the rock. The guides A A′ are by preference made rectangular. The frame to which the operative portions of the machine are attached has grooved arms (lettered *b*) situated on each side of the barrel E, in which the drill-rod operates. The grooves in these arms *b* are made to accurately fit upon the guides A A′, and the guides A A′ ex-

tend continuously up past the curved piece C, as shown in Fig. 2, so that the operative parts of the machine, being supported by the grooved arms *b*, can be slid off of the top of the guides without being intercepted by any of the supporting parts of the machine. This construction enables the supporting parts of the machine to be placed in position before the operative parts are attached, and the operative parts may then be attached by simply sliding the grooved arms *b* onto the guides A A′ at the top, and, as there is an open space between the bars both front and rear, there is no obstruction offered by the guides to the passage of the bracket and operative parts from the top to near the bottom of the frame. The drill-holder F is free to reciprocate and revolve within the barrel E, though in the form of machine shown in the drawings the drill is not lifted between each stroke of the hammer, as is the case with some of my machines. The lower end of the drill-holder is provided with a shoulder, *f*, between which and the lower end of the barrel E is interposed a spiral spring for holding the drill in position against the rock. The drill-rod is circular in section, but is provided on four sides with rectangular wings which extend radially to a short distance, as shown in Fig. 4. In the lower end of the drill-holder F is formed a socket corresponding in form with the form of the top of the drill represented in Fig. 4. This socket, it will be perceived, may be readily made by boring a hole in the bottom of the drill-holder of the shape and size of the body of the drill, and then making two cross-cuts at right angles corresponding to the thickness of the ribs. The wings on the sides of the drill prevent any rotation of the drill in the drill-holder. I have found that when the drill is slid into the socket in the bottom of the drill-holder no other means of attachment is necessary in the form of machine shown, there being, as above remarked, no lifting of the drill between the strokes of the hammer.

Above the barrel of the machine there is secured to the drill-holder a circular ratchet, G, which is caused to rotate intermittently between each stroke of the hammer by the pawls *g g′*. Between this circular ratchet and the top of the barrel E is placed a leather washer, so that as the drill is forced forward by the blows of the hammer the circular ratchet-wheel comes in contact with the leather washer and forces the barrel of the machine forward upon the guides A A′, when necessary for feeding the machine.

A too rapid feed of the machine is prevented by the adjustable friction-brake H, (shown in detail in Fig. 3,) which bears upon each of the guides A A′, between the grooved projections *b*, and which brake may be tightened or loosened by the set-nut *h* working upon the screw *h′*, attached to the barrel E.

Between the set-nut *h* and the brake H is interposed the spring *h″*, so as to produce a yielding pressure on the brake. To one side of the barrel is secured a bracket-arm, I, which projects out laterally for the support of the main shaft *e* and the operative parts. This main shaft projects through the bracket I at right angles with the direction of the drill, and is reciprocated by the hand-levers *e′ e″*.

Secured to the shaft *e* is a casting, K, which is fully described in the above-mentioned applications. The pawls *g g′* are pivoted to this casting a short distance from the center of the shaft *e*, so that each reciprocation of the hand-levers *e′ e″* causes the pawls *g g′* to reciprocate, and, as the pawls are arranged to take into the ratchet-wheel G on opposite sides of the drill-holder, (one pawl being made to pull and the other to push,) the ratchet-wheel, and consequently the drill-rod, is revolved the length of one tooth for each half-stroke of the levers *e′ e″*. The casting K also contains two wings, between which extends an arm of the three-armed lever *k*. This arm of the lever *k* is pierced near its end by a loose pin operated alternately by cams arranged at each of its ends on the inside of the wings of the casting K, so that for each reciprocation of the hand-levers *e′ e″* the pin referred to is raised and dropped twice by the cams. The particular mechanism for doing this is fully described in the above-mentioned applications. The lever *k*, which is pivoted at L, will follow the motions of the pin. The helve *m* of the hammer is secured to another arm of the lever *k*, and the hammer is thus, by the cams on the casting K, raised and dropped twice for each vibration of the hand-levers *e′ e″*.

Heretofore I have extended one arm of the lever *k* beyond the pivot L, as shown in the drawings, and attached thereto a circular spring, *a*, so that when the hammer was raised the spring *a* would be compressed, and when the hammer was released the force of the spring would be utilized in driving the hammer against the drill-holder; but, as before stated, this arrangement had certain disadvantages that are overcome by my improvement, which I prefer to apply in the following manner: I extend the bracket I upward to a considerable height above the helve of the hammer, as shown in Fig. 1, and attach to its upper portion one end of a rubber spring, N. The other end of this rubber spring is secured to an arm of the lever *k*, to which the helve *m* of the hammer is also secured. By this arrangement whenever the hammer is raised by the motion of the lever *k*, the arm *n* of this lever, to which the spring and the helve are attached, is vibrated, so as to cause the expansion of the spring N, and when the lever *k* is released by the cams on the casting K, so as to allow the hammer to strike the drill-holder, the spring N contracts with great speed and force and produces a blow on the hammer which is exceedingly effective in drilling. The material of which I make the spring N is rubber, and the dimensions which I prefer to give it for an ordinary-sized drilling-machine are one and one-quarter inch by two and one-half in trans-

verse section. I attach it at each end by passing through it a pin, as shown in Fig. 1. At the upper end the pin is secured to a yoke, P, having a screw which passes through the bracket I, and is provided with a set-nut on the opposite side of the bracket, whereby the tension of the spring may be increased or decreased at will. I have shown the method which I prefer for attaching the rubber-spring; but it is obvious that other means and arrangements may be employed.

For the purpose of making the levers *e' e''* adjustable around the shaft *e* at various angles with relation to the casting K, I produce upon the outside faces of this casting, around the shaft *e*, serrations or teeth, as shown in Fig. 2, and outside of the casting on each side I place the pieces to which the levers *e' e''* are secured. These pieces O O, on their inner sides, are provided with flanges which have teeth or serrations to correspond with the teeth or serrations on the casting K. It will thus be seen that by moving the pieces O O toward the end of the shaft *e* their teeth or serrations will be disengaged from the casting K, and the levers may be adjusted to any position around the shaft, whereas when the pieces O O are moved up against the casting K their serrations or teeth will engage with the casting, and any movement of the levers will carry with them the casting K.

For the purpose of keeping the pieces O O in contact with the casting in operation, I place between them and the flange or nut on the ends of the shaft *e* spiral springs, as shown in Fig. 2. When it is desired to adjust these hand-levers *e' e''* into any new position, the operator may pull the pieces O O toward the ends of the shaft *e* and against the force of the spiral springs, so as to disengage the teeth on the pieces O O from the casting and enable him to move them to any desired adjustment around the shaft. In whatever new position they are placed the spiral springs will force the teeth of each part to engage with those of the other.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a drilling-machine, of the yoke P, loosely secured to the bracket I, and the rubber spring N, one end of said spring being connected to the hammer and the other to the yoke, said yoke having a screw attached to the bracket, and provided with an adjusting-nut, substantially as described.

2. The combination, in a rock-drilling machine, with the drill-operating mechanism and its main shaft, of clutches on said main shaft composed of toothed members fixed to the shaft, and spring-pressed toothed members to which the operating-handles are secured, which spring-pressed members may engage the fixed members, so as to bring the handles to any desired angle to the perpendicular, substantially as described.

3. The combination, in a rock-drilling machine, of a casting carrying the drill-lifting cam, provided with corrugations or teeth on the side around the center on which it turns, and a lever for operating said cam, having corresponding corrugations or teeth on its attached end, and means for pressing the corrugated faces together, substantially as described, and for the purposes specified.

4. The combination, in a drilling-machine, of a casting carrying the drill-lifting cam, having corrugations or teeth on its side around the shaft on which it revolves, with the lever for operating said cam, having corresponding corrugations or teeth on its attached end, and a spring surrounding the shaft, constructed and arranged to press the corrugations of the lever into the corrugations of the casting, substantially as and for the purpose specified.

5. A rock-drill frame composed of parallel guide-bars upon which the drill-carriage moves, and which are connected by upper and lower yokes, one of the yokes being curved or bent outward and attached to the sides of the bars, so as not to interfere with the removal of the carriage, substantially as described.

6. The frame for drilling-machines herein described, consisting of the guide-bars A A, secured together by the connecting-bars C D, and having the upper bar curved to leave an open space between the guide-bars, and attached to the outer surfaces of the bars A, whereby a clear space is left for the passage of the bracket and operating parts into the machine and down toward the bottom of the guide-bars when the frame is in position for use, substantially as described.

7. The combination, with a drill having radial wings, of a drill-holder provided with a socket having a central hole of the shape and size of the body of the drill, and cross-cuts extending entirely across the holder, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY F. PARSONS.

Witnesses:

DANIEL H. DRISCOLL,

W. F. HAPGOOD.