(No Model.) 4 Sheets—Sheet 1.

A. I. PARSONS.

ROCK DRILLING MACHINE.

No. 302,424. Patented July 22, 1884.

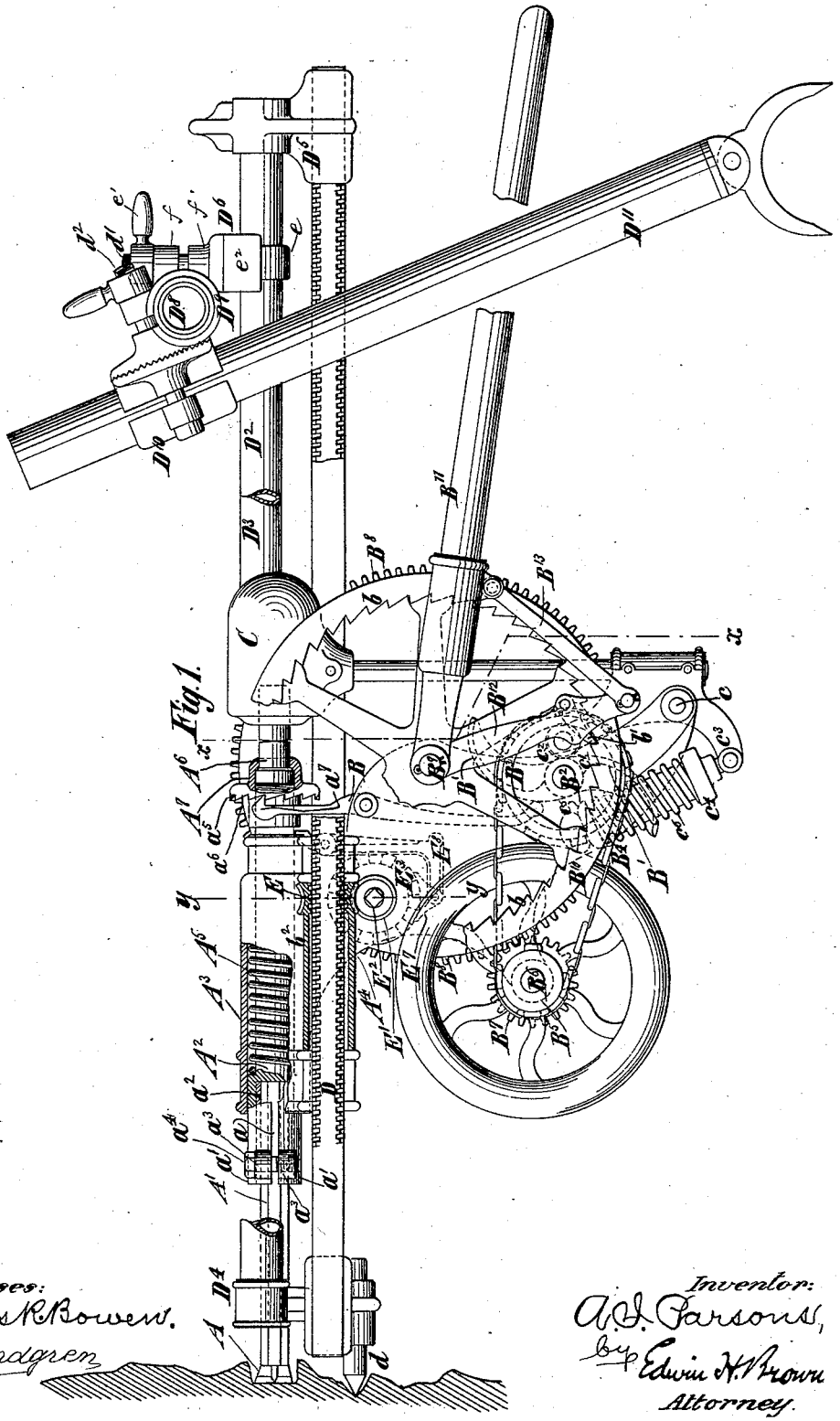

Fig. 1.

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(No Model.) .

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Fig. 4.

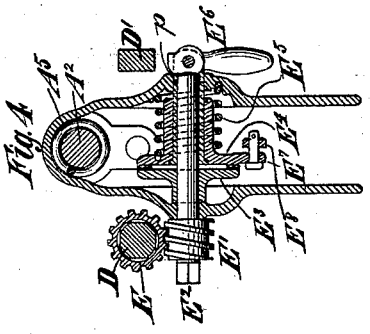
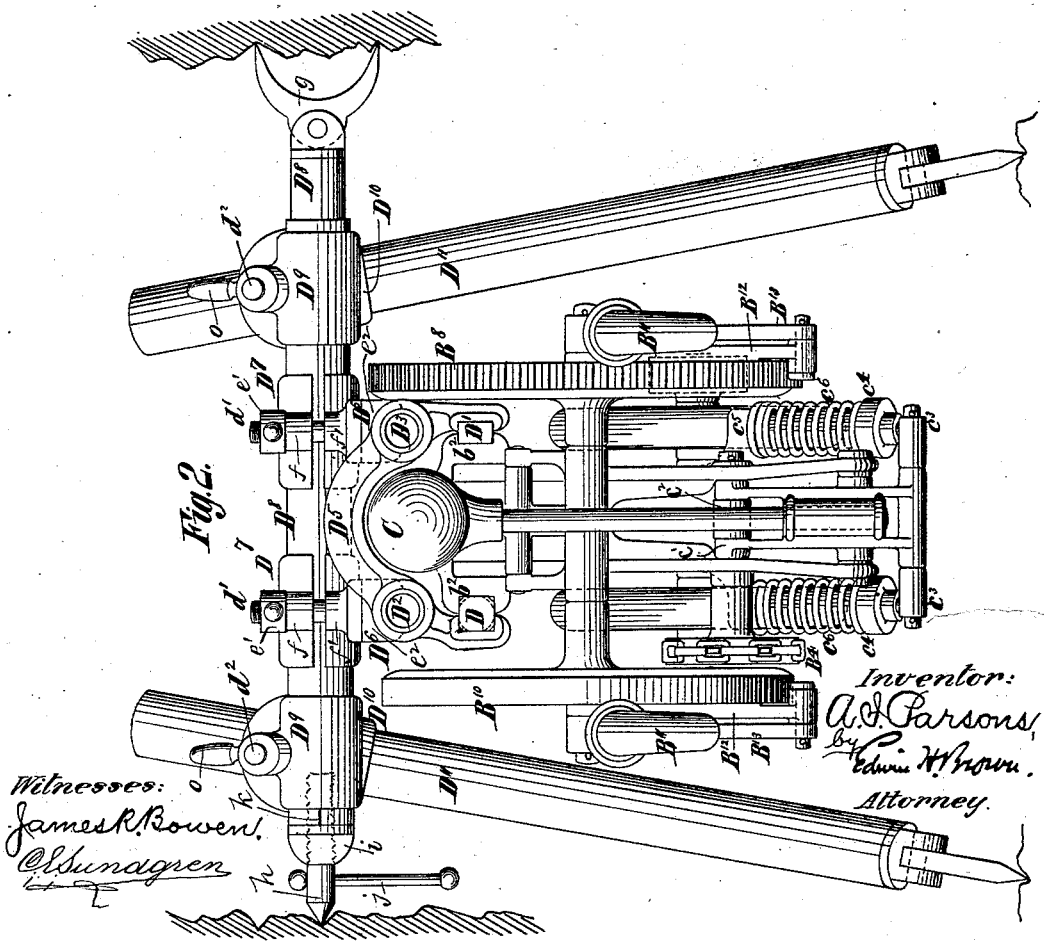


Fig. 2.



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A. I. PARSONS.

ROCK DRILLING MACHINE.

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Fig. 6.

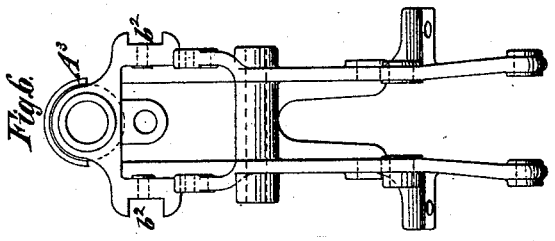


Fig. 5.

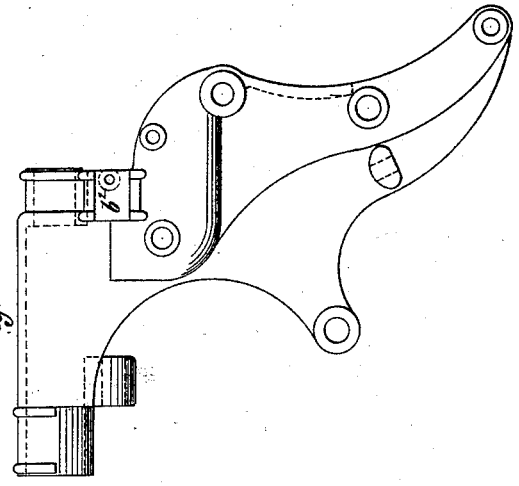
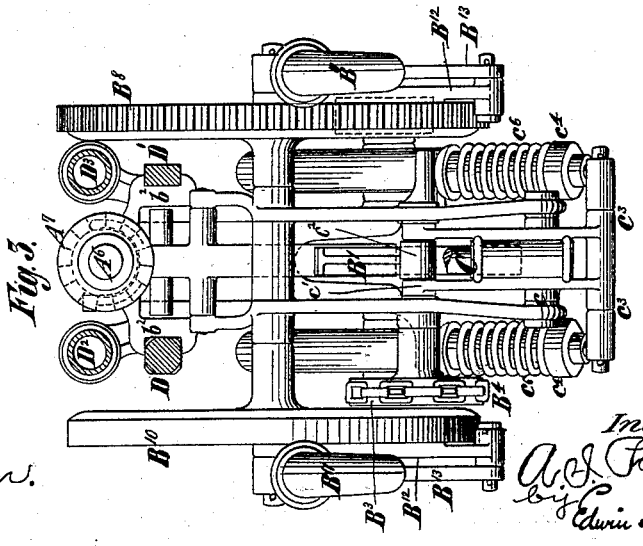


Fig. 5.



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(No Model.) 4 Sheets—Sheet 4.

A. I. PARSONS.

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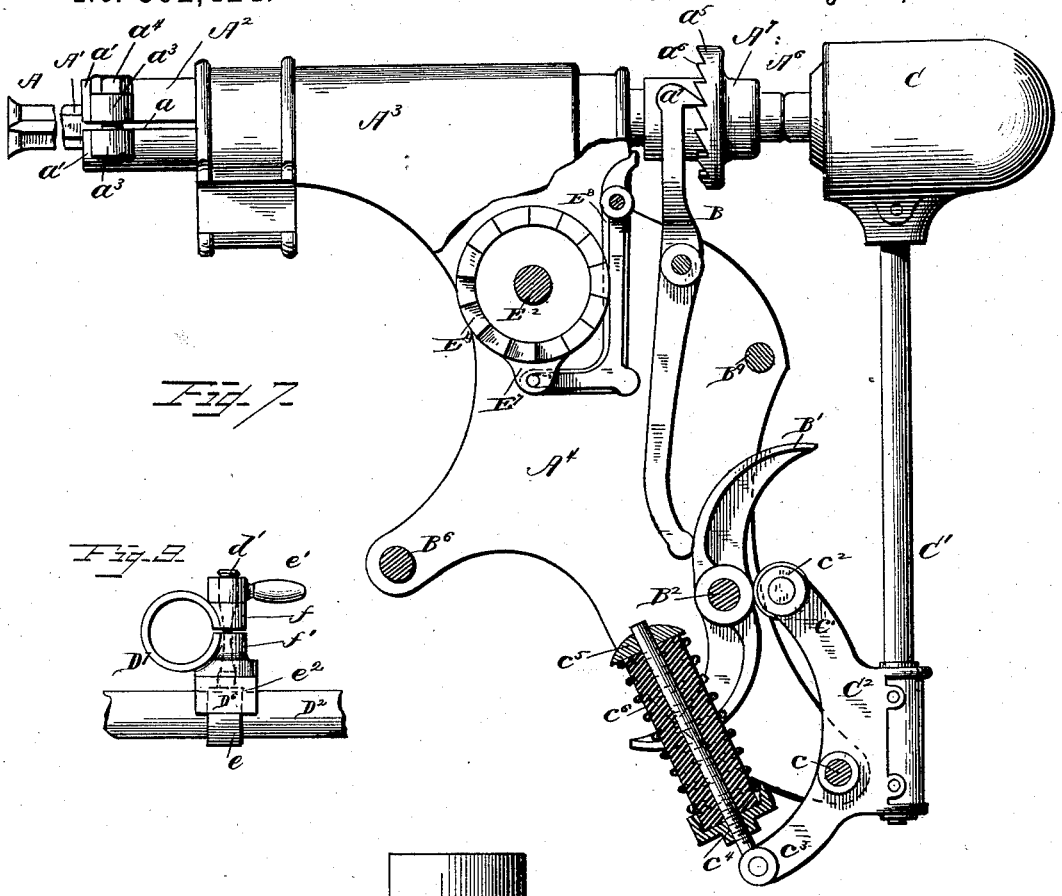

Fig. 7.

Fig. 9.

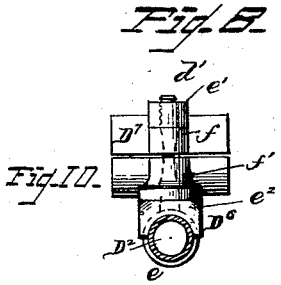

Fig. 8.

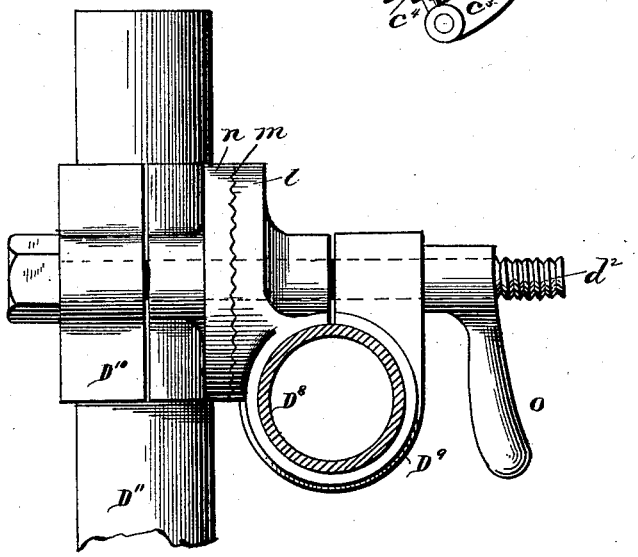

Fig. 10.

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UNITED STATES PATENT OFFICE.

A. INGRAM PARSONS, OF JERSEY CITY, NEW JERSEY.

ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 302,424, dated July 22, 1884.

Application filed August 8, 1883. (No model.)

To all whom it may concern:

Be it known that I, A. INGRAM PARSONS, of Jersey City, in the county of Hudson and State of New Jersey, have invented a certain new and useful Improvement in Rock-Drilling Machines, of which the following is a specification.

This improvement will be described in detail, and subsequently pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional side view of a drilling-machine embodying my improvement. Fig. 2 is a back view of the same. Fig. 3 is a cross-section of certain parts of the machine, taken at the plane of the dotted line *x x*, Fig. 1. Fig. 4 is a sectional view of the machine, taken as indicated by the dotted line *y y*, Fig. 1. Fig. 5 is a side view of the main frame of the machine. Fig. 6 is a back view of the main frame of the machine. Fig. 7 is a side elevation, on a larger scale, of the main frame, spindle therein, and hammer, taken on a plane inside the near side of the frame in Fig. 1, the said near side being broken away, and the near spring being shown in longitudinal section, the parts on the far side of the frame being omitted for clearness' sake in this detail. Fig. 8 is a top plan view of the double adjustable split-sleeve tripod or stand coupling, also on an enlarged scale. Fig. 9 is a detail side elevation of part of the side bar with the cross-bar clamp, the scale being that of Fig. 1; and Fig. 10 is a front elevation of the parts shown in Fig. 9.

Similar letters of reference designate corresponding parts in all the figures.

A designates a drill of the usual or any other suitable form. It is secured to a rod, A′, which preferably has polygonal sides, and is fitted into a chuck in the drill-spindle A^2. The chuck of the drill-spindle is formed by making the forward portion of the drill-spindle cylindrical, and splitting or notching it, as at *a*, so as to form resilient or yielding jaws *a′*. Between these jaws *a′* are fitted bushings a^2, which are made externally in the form of segments of a cylinder, and are internally shaped to conform to the contour of the drill-rod A′. The jaws *a′* are provided with lugs a^3, through which pass bolts a^4, whereby the jaws may be drawn together to cause the bushings to clamp the drill-rod. The bolts a^4 engage with notches in the edges of these bushings, and thereby hold the bushings in place between the jaws. This chuck forms the subject-matter of another application filed April 10, 1884, for Letters Patent, divided from this application, and therefore need not be herein more fully set forth. The drill-spindle fits in a slideway, A^3 A^4, forming part of the main frame of the machine. The rear portion of the drill-spindle is much smaller in diameter than the slideway A^3, and is surrounded by a spiral spring, A^5, that bears at one end against the larger forward portion of the drill-spindle, and at the other end against the rear end of the slideway. The drill-spindle, with the spring A^5 in place upon it, is inserted in the slideway from the forward end. The drill-spindle extends through a hole in the rear end of the slideway, in which it fits snugly, so as to be guided therein. The rear end of the drill-spindle is provided with a detachable striking-pin, A^6. This striking-pin is made of steel, and has a flange at the forward end. A nut, A^7, is slipped over the rear end of the striking-pin and screwed onto the rear end of the drill-spindle outside the slideway, A^3. The nut A^7 not only serves to secure the striking-pin to the drill-spindle, but it also serves to prevent the drill-spindle from moving out of the slideway and to effect the rotation and feeding of the drill forward.

It is very advantageous to be able to remove and replace a worn-out striking-pin with a new one, and it is for this reason that I use a striking-pin which is separable from the drill-spindle. The nut A^7 is provided with a flange, a^5, which is provided on the forward side with ratchet-teeth a^6. A pawl, a^7, formed at one end of a lever, B, engages with these ratchet-teeth. This lever is fulcrumed to the main frame A^4 of the machine. The end of the lever B which is opposite to that on which the pawl a^7 is formed is acted upon by a cam, B′, that is mounted upon a shaft, B^2. The shaft B^2 is journaled in the main frame A^4 of the machine, and the cam B′ is composed of two portions resembling toes or wipers. Each time the shaft B^2 is rotated the lever B is oscillated twice. The oscillation of the lever B by the cam B′ causes the lever to force back the nut A^7, and consequently the drill-spindle, drill-

rod, and drill. Owing to the travel of the end of the lever which is provided with the pawl a^7 through the arc of a circle, the nut, drill-spindle, drill-rod, and drill will also be partially rotated for the purpose of presenting the drill in a different position to the material upon which it is operating before the next stroke. As soon as the cam allows the lower end of the lever B to move backward, the spring A^5 will force the drill-spindle, drill-rod, and drill forward till the drill reaches the bottom of the hole which it is forming. The nut A^7 will of course move forward during this forward motion of the drill-spindle, and its forward motion will force the upper end of the lever B forward. The spring A^5 effects the return of the drill with a slow motion, but as fast as the motion of the cam in releasing the lever B leaves said spring free to act. This spring does not effect the "strike" or cut of the drill, but merely returns it to the position where it is to cut, or, in other words, to the bottom of the hole which it forms. When the nut A^7 is moved forward by the action of the spring A^5, the pawl a^7 on the upper end of the lever B plays over the ratchet-teeth a^6 of the nut, so as to take a new hold. The shaft B^2 has affixed to it a sprocket-wheel, B^3, that receives a chain, B^1, which also passes around a sprocket-wheel, B^5, mounted on a shaft, B^6. The shaft B^6 is journaled in the main frame of the machine, and has affixed to it a toothed pinion, B^7, that engages with a gear-wheel, B^8. The gear-wheel B^8 is mounted on a shaft, B^9, at one side of the main frame of the machine. The shaft B^9 is journaled in the main frame of the machine, and at the side of the main frame of the machine which is opposite to that adjacent to which the gear-wheel B^8 is arranged it has mounted upon it a wheel, B^{10}. The wheels B^8 and B^{10} have ratchet-teeth b on the inner periphery of their rims. Levers B^{11} are fulcrumed loosely upon the shaft B^9, and serve as the means whereby power is applied for operating the machine. The operator may oscillate these levers alternately or in unison.

B^{12} are arms hung loosely upon the shaft B^9, and at the outer ends are connected by rods B^{13} to the levers B^{11}. These arms consequently move in unison with the levers, and are in effect part of the levers.

On the arms B^{12} are pivoted pawls b', that engage with the ratchet-teeth b of the wheels B^8 B^{10}. Springs will preferably be employed to hold these pawls in engagement with the ratchet-teeth on which they act. When the levers B^{11} are oscillated, the wheels B^8 B^{10} and their shaft B^9 are rotated, each movement of a lever producing a partial rotation. If the levers are oscillated alternately, a continuous rotary motion of the wheels B^8 B^{10} and shaft B^9 may be produced. The gear-wheel B^8 is very much larger than the pinion B^7. The sprocket-wheel B^5 is intended to be one-half the size of the sprocket-wheel B^3, so that two rotations of the sprocket-wheel B^5 will be necessary to produce one rotation of the sprocket-wheel B^3, its shaft B^2, and the cam B'.

C is a hammer whereby the cut of the drill is effected. It has a heavy head, and its helve C' is inserted in a stock, C^2, that is fulcrumed by a pin or stud, c, to the main frame of the machine. The hammer-head is provided with a renewable pin that makes contact with the striking-pin attached to the drill-spindle. The hammer-stock is fulcrumed between two bifurcate portions or arms, which form the lower part of the main frame of the machine. The cam B' is also located between these bifurcate portions or arms. The hammer-stock has an arm, c', that is provided with an anti-friction roller, c^2, bearing against the cam B'. When one toe or wiper of this cam is operating upon the lever B, the other is operating upon the arm c' of the hammer-stock. The cam, acting on the hammer-stock, swings or oscillates the hammer backward. At the lower end the stock-piece has two laterally-extending arms, c^3, to which are pivoted shouldered pins c^4, that at the upper end work through lugs c^5, extending from the main frame of the machine. Springs c^6 are arranged around the pins c^4, between their shoulders and the lugs c^5. These springs are preferably composed of tubular rubber blocks, through which the pins c^4 extend, and helical springs encircling such blocks. The shouldered ends of the pins and the ends c^5 form abutments or seats for the springs, the shouldered pins moving and compressing the springs against the said lugs. When the arm c' of the hammer-stock is oscillated backward by the cam B', the springs c^6 are compressed, and when the cam B' releases the arm c' the springs c^6 oscillate the hammer-stock, so as to impel the hammer forcibly against the striking-pin of the drill-spindle. Through the blows thus given by the hammer the cut of the drill is effected. The main frame of the machine is furnished at the sides with slideways b^2, that fit on bars D D', constituting ways or shears. The bars D D' are parallel with each other, and are rigidly connected together and to bars D^2 D^3 by cross-pieces D^4 D^5. The cross-piece D^5 is bowed sufficiently to allow of the movement of the hammer under it. The main frame of the machine, and of course all the parts supported thereby, can be slid along the bars D D', to feed the drill forward. The cross-piece D^4 has a spur, d, which extends into the material in which the drill works and contributes to the support thereof. The bars D^2 D^3 are encircled by clamps D^6, each composed of a ring, e, (see Fig. 9,) surrounding and sliding on said bars, and having a spindle, d', in one piece therewith, which spindle is screw-threaded at its upper end to receive a handled nut, e', and on this spindle is a follower-block, e^2, shaped on its under side to fit the bar. On these spindles, between their follower-blocks and nuts, are secured the perforated lugs f f' of split

sleeves D^7, which encircle the supporting-bar D^8. This bar is arranged crosswise of the bars D^2 D^3, and is held in any desired angular adjustment in the plane of such bars by the movement of the clamps D^6 along said bars, and the clamps and split sleeves are bound to their respective bars and to each other by the turning of the nuts, forcing the lugs of the split sleeves toward each other against the springiness incident to the splitting of the sleeves, and the follower-blocks down upon the bars D^2 D^3. The bar D^8 has a grapple or spur, *g*, at one end, and an adjustable spur or point, *h*, at its other end, to admit of the supporting of the drill in the walls of the tunnel or shaft. The spur *h* is screw-threaded and inserted in a socket-piece, *i*, slipped in the end of the tubular bar D^8, a hand-piece, *j*, being used, after the manner of a carpenter's bench-vise screw, to adjust the said point. The bar D^8 is split at its spur end, as indicated by the line *k*, and the socket-piece is held in this slit end by compressing such end by the split sleeve D^9. The split sleeves D^9 resemble the split sleeves D^7 in general construction and operation; but they have a base-piece, *l*, in the plane of their perforated lugs, and the face of this base is notched, roughened, or toothed radially, as indicated by the line *m*, Fig. 8, to engage similar bases, *n*, on the split sleeves D^{10}. The sleeves D^9 are supported on the bar D^8, and the sleeves D^{10} are connected therewith by the bolts d^2 and handled nuts *o* thereon, the said bolts d^2 passing entirely through the lugs of the several pairs of sleeves D^9 D^{10}, and serving to simultaneously tighten up the said bars of sleeves around the parts to which they are applied to fix said parts in given positions. The sleeves D^{10} secure the legs D^{11} to the bar D^8, and by means of the toothed bases *l n* the relative angles of the said legs and bar may be indefinitely varied to secure the best support for the drill in the location in which it may be in working. The bar D^8 may, as usual, be of telescoping sections to vary its length, and the said sections may be held in place in any approved manner. The easily-operated split sleeves permit the ready adjustment of the drill and its supports for working in any direction up and down, or laterally, and constitute a substantially universal joint for the same.

Having now explained the manner in which the main frame of the drilling-machine is supported, and that it may be slid along the bars D D′ to effect the feed of the drill, I will now describe the means whereby the main frame of the machine is moved along the bars D D′. The bar D is approximately square in the cross-section; but throughout a portion of its length it has the corners chamfered off and notched obliquely, so as to form segments of a screw-thread. A nut, E, surrounds this bar and engages with the screw-thread segments of the bar D. The exterior of this nut is so formed as to constitute a worm gear-wheel. This worm gear-wheel engages with a worm, E′, on a shaft, E^2, which is journaled in the main frame of the machine, and has mounted on it a ratchet-wheel, E^3. This ratchet-wheel is rigidly secured to the shaft by a cross-pin or otherwise. The ratchet-teeth are on one side of this wheel, instead of being on the periphery.

On the shaft E^2 is loosely mounted a ratchet-wheel, E^4, having its teeth on the side that is opposite the teeth of the ratchet-wheel E^3, and reversed from the ratchet-teeth of the said wheel E^3. A spring, E^5, arranged between the ratchet-wheel E^4 and an adjacent portion of the main frame of the machine, impels the ratchet-wheel E^4 into engagement with the ratchet-wheel E^3. The ratchet-wheel E^4 has a tubular shank, P, and at the end of this shank is pivoted a lever, E^6, which, when turned into one position, will act upon the adjacent end of the shaft E^2 and force it away, so as to separate the ratchet-wheels E^3 and E^4. The other end of the shaft E^2 is made polygonal or otherwise adapted to receive a wrench, whereby it may be turned to cause the worm E′ to impart motion to the nut E, for the purpose of feeding the main frame of the machine and the appurtenances thereof along the bars D D′. The ratchet-wheel E^4 is provided with an arm, E^7. A lever, E^8, fulcrumed to the main frame of the machine, is connected at one end to the arm E^7, and at the other end extended toward the nut A^7. When the nut A^7 is moved forward by a blow of the hammer on the striking-pin A^6 sufficiently far to come into contact with the lever E^8, the ratchet-wheel E^4 is shifted and a slight motion is imparted to the worm E′. The internal screw-thread of the worm E′, by acting on the screw-thread of the bar D, forces the main frame of the machine and the appurtenances thereof forward, thereby feeding the drill so that it may move farther into the hole which it is forming. If a blow of the hammer does not produce a sufficient movement of the drill to allow of the nut A^7 making contact with the hammer, then there will be no feeding of the drill. It is obvious, therefore, that this mechanism will only produce a feed of the drill when a feed becomes necessary. The feed of the drill may thus automatically vary with the character of the material which is being operated upon. When the lower end of the lever B moves forward, it makes contact with the lower part of the lever E^8 and oscillates the ratchet-wheel E^4, so that it will engage in a fresh position with the ratchet-wheel E^3.

I am aware that it is not new to secure a tool to its handle by heading the tool and slipping a screw-threaded cap over such head and then screwing the cap on the handle.

I am also aware that it is not new to provide a hand rock-drill with a tool holder or spindle secured to the breast-plate by a headed post, on which it rotates, and screw-cap.

I am also aware that it is not original with me to provide a percussion-drill with a re-

movable striking-pin held to the spindle by a pinching-nut. My invention in this particular is limited entirely to providing such a removable striking-pin with a flange and a screw-nut to engage such head, and a thread on the spindle to detachably connect the two.

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

1. The combination, substantially as shown and described, of the main frame, the hammer-stock pivoted therein, and containing the hammer, the arms c' c', extending from the said stock, and supporting the friction-roller in operative proximity to the actuating-cam, the laterally-extended arms c^3, and the two compound springs c^6, borne by said arms c^3, and abutting against the main frame at each side of the machine to increase the force or power of the drill, as and for the purpose set forth.

2. In a drilling-machine, the combination, with a drill-spindle and its frame, of a lever fulcrumed to said frame, and engaging said spindle to turn it to give the drill-rod the requisite rotation, a hammer, also pivoted in said frame, and a cam to operate said lever and hammer to impart the necessary motions to the two in proper time, substantially as shown and described.

3. The combination and arrangement of the main frame, the hammer C, the hammer-stock pivoted in said frame and provided with a friction-roller in operative connection with the hammer-retracting cam B′, the laterally-extended arms c^3 c^3 of such stock, the shouldered pins c^4, pivoted to said arms and working through lugs c^5 of the main frame, and the two springs c^6 c^6 on said pins, and by them, under the motion of the hammer-stock incident to the retractive action of the cam, compressed against the lugs of the main frame, substantially as shown and described.

4. In a drilling-machine, the combination of the main frame of the machine and its attached parts, the screw-threaded bar D, the worm-threaded nut E, traveling on said bar, the worm E′ on a shaft borne transversely in the frame, the ratchet-wheels E^3 E^4 on said shaft, the lever E^8, fulcrumed on the main frame and connected with the wheel E^4, and the reciprocating drill-spindle A^2, provided with a projection for operating upon the free end of the lever E^8, substantially as and for the purpose described.

5. The combination, substantially as shown and described, with the main frame and the supporting-bars therefor, of the threaded bar D, the nut E, threaded internally to engage and arranged on such bar, and worm-threaded externally crosswise of its perimeter, the worm E′ and its shaft E^2, borne transversely in and by the frame, the ratchet-wheels E^3 E^4 on said shaft, the lever E^8, fulcrumed in the said frame and connected with wheel E^4, the drill-spindle in the main frame, its projecting spring, the lever B, fulcrumed on the frame and engaging said spindle to retract it, the lever-actuating cam B′, and a projection on the spindle to engage the lever E^8, to operate the ratchet-wheels, the worm on their shaft, and through it and the worm-nut the rod D, to forward the drilling mechanism, as set forth.

6. In a rock-drill, the combination, with the main frame and drill-spindle, of the threaded supporting-bar, the worm-gear nut E, engaging the same, the worm E′, meshing with the said nut, the shaft E^2, on which said worm is secured, the ratchet-wheels E^3 E^4, one fast and the other loose on said shaft, and adapted to engage each other, and the lever E^6, for throwing said wheels in and out of engagement, substantially as shown and described.

7. The combination, with the side bars, D^2, the cross-bar D^6, and their adjustable connections, of the split sleeve D^7, encircling bar D^8, and engaged by connections of the side and cross bars, the legs D^{11}, and the split sleeves D^9 and D^{10}, having the roughened base-pieces l m, respectively, and connected by the single bolt d^2 and nut o, substantially as shown and described.

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