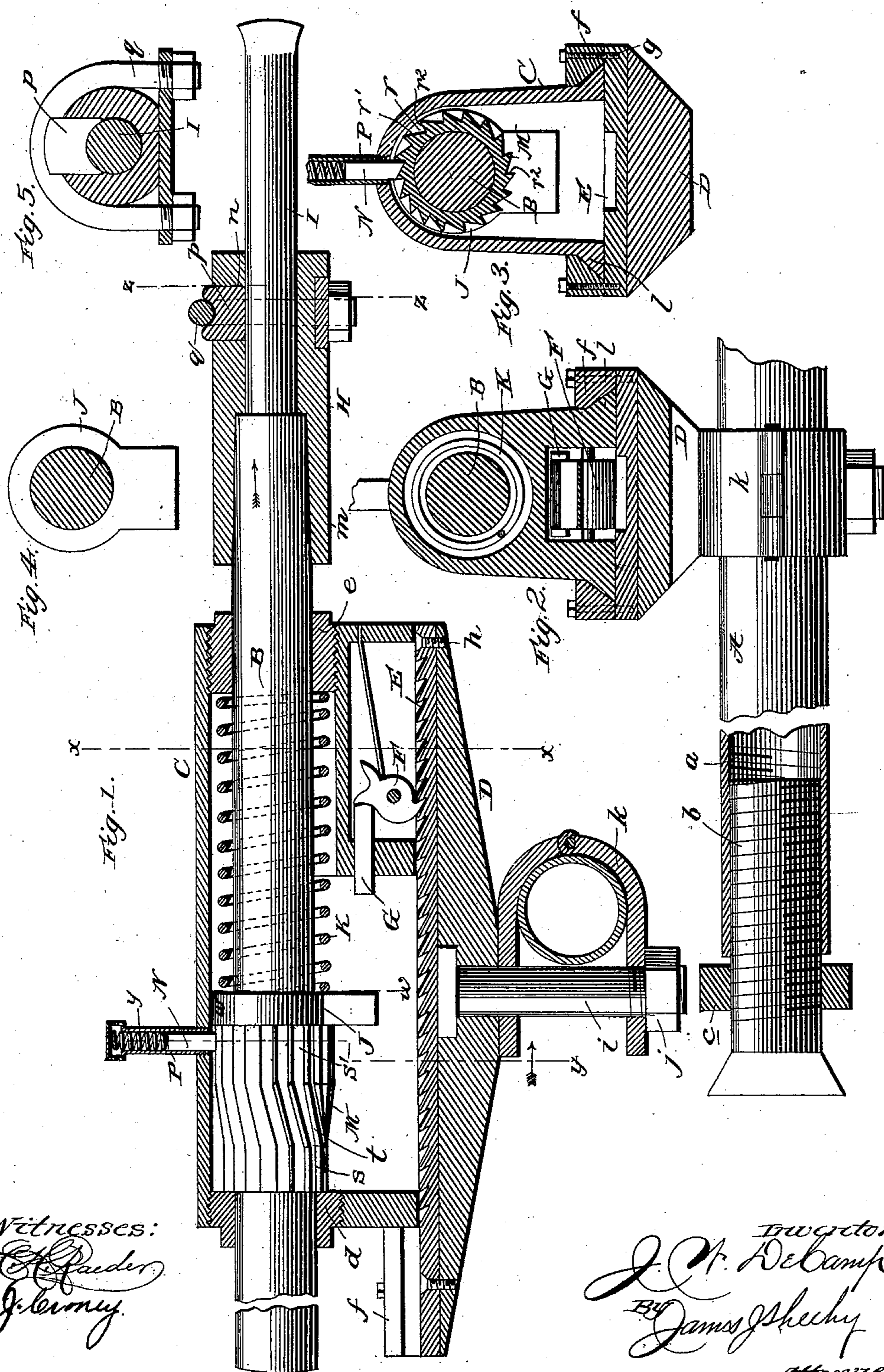


(No Model.)

J. W. DE CAMP.
ROCK DRILL.

No. 601,223.

Patented Mar. 22, 1898.



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UNITED STATES PATENT OFFICE.

JOSEPH WARREN DE CAMP, OF HELENA, MONTANA, ASSIGNOR OF ONE-HALF
TO L. M. SHAW, OF SAME PLACE.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 601,223, dated March 22, 1898.

Application filed June 30, 1897. Serial No. 642,975. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH WARREN DE CAMP, a citizen of the United States, residing at Helena, in the county of Lewis and Clarke and State of Montana, have invented certain new and useful Improvements in Rock-Drills; and I do 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 improvements in rock-drills; and it has for one of its objects to provide a drill embodying a simple and efficient means for automatically turning the drill-rod subsequent to each blow of the sledge, thus dispensing with the services of a second man to turn the drill, as is common in manual drilling.

Another object of the invention is to provide a drill embodying an automatic feed for advancing the drill-rod as the depth of the hole being drilled increases.

Another object is to provide a drill embodying a spring for withdrawing the drill-rod after each blow, and means for regulating the tension of such spring in accordance with the hardness of the rock being operated upon; and still another object is so provide a means whereby the drill-rod and its appurtenances may be adjusted both vertically and horizontally as well as at various angles of inclination with respect to its support.

Other objects and advantages of the invention will be fully understood from the following description and claims when taken in conjunction with the annexed drawings, in which—

Figure 1 is a longitudinal sectional view of my improved drill complete in its operative position. Figs. 2 and 3 are transverse sections taken in the planes indicated by the lines *xx* and *yy* of Fig. 1; and Figs. 4 and 5 are detail transverse sections taken in the planes indicated by the lines *ww* and *zz*, respectively, of Fig. 1.

In the said drawings similar letters designate corresponding parts in all of the several views, referring to which—

A indicates the drill-support, which may be of any suitable type, although I prefer to em-

ploy a piece of gas-pipe having internal screw-threads *a* at one end and an extension-piece *b*, screwed into such threaded end and provided with a jam-nut *c*, as illustrated. This construction is advantageous because it permits of the support being readily fixed between two walls of a hole or pocket and also because it permits of the support being readily increased or diminished in length, as desired.

B indicates the drill-rod. C indicates the movable frame which carries the drill-rod and its appurtenances and is provided with threaded guide-collars *d e* for said rod. D indicates the frame which holds and guides the slidable frame C in its movements, and E indicates the feed-rack for advancing said movable frame and the drill-rod as the depth of the hole being drilled increases.

In the preferred embodiment of my invention the frame D for the sake of convenience in assembling the parts comprises a body *e'* and flange-guides *f*, the said flanges *f* being connected by the screws *g* to the rack-plate E and the said rack-plate being connected in turn to the body *e'* through the medium of screws *h*, as better shown in Figs. 1 and 3 of the drawings.

The frame D is preferably connected to the support A by the bolt *i*, which has a nut *j*, and the hinge-clip *k*, which straddles the support A and has its arms interposed between the nut *j* and the frame, as shown, this construction being preferable because when the nut *j* is loosened it permits of the clip being moved to any desired point on the support and also permits of the frame D being swung on or with the bolt *i* to various positions, while when the nut is tightened the clip is held against movement on the support and the frame D against movement on the bolt. It is obvious, however, that the frame D may be connected with the support in various ways, and I therefore do not desire to be understood as confining myself to the construction shown and described.

The slidable frame C is provided with flanges *l* to engage the flanged guides *f* of frame D, and it is also provided with a spring-pressed pawl F, which engages the rack E, and a plunger G, which impinges against the

said pawl and is designed to disengage the same from the rack for a purpose presently described.

The drill-rod B may be made in one piece, 5 if desired; but I prefer for obvious reasons to provide it with a chuck H, whereby various bits I may be readily connected with it. The said chuck H comprises a tubular body *m*, which is mounted on the drill-rod and receives the bit and is provided with an opening *n* at an intermediate point in its length, 10 a gib *p*, arranged in said opening, and the clamp *q*, which surrounds the body *m* and the gib, as shown. This construction, as will 15 be readily appreciated, permits of the bit I being readily removed from the chuck and as readily replaced by another bit when desirable. The drill-rod B is provided within the frame C with the collar with laterally-extended 20 portion J, designed to strike the plunger G, and it is also provided with a coiled spring K, which surrounds it and is interposed between the collar J and the guide-collar *e*, as shown in Fig. 1. Said rod B is further provided 25 with a collar M, which is forged or otherwise suitably secured upon it. This collar M (see Figs. 1 and 3) is gradually reduced in diameter from its forward to its rear end and is provided in its periphery with longitudinal 30 grooves *r*, and these longitudinal grooves, which have the bottom walls *r'* and the side walls *r''* disposed at an angle to each other, respectively, comprise the end portions *s s'*, which rest in parallel or approximately parallel 35 planes, and the intermediate portion *t*, which is disposed at an angle to the end portions, as illustrated.

The collar M is preferably engaged by a single spring-pressed detent N, although more 40 than one may be employed, if desired. This spring-pressed detent N rests in and is guided by a lateral extension P of the frame C, and it will therefore be seen that with the parts in the position shown in Fig. 1 when the drill-rod is struck by a sledge and moved in the direction 45 indicated by arrow the detent N will first be engaged by the portion *s'* of one groove *r*, then by the portion *t* of the next groove *r* to the left, and then by the portion *s* of the latter groove, this being due to the fact that 50 the drill-rod on its forward or cutting stroke and the collar M on said rod move without turning. On the succeeding or return stroke of the drill-rod, however, it will be seen that 55 the detent N will first be engaged by the wall *r''* of the portion *s* of the groove, then by the wall *r''* of the portion *t* of the groove, and then by the wall *r''* of the portion *s'* of the groove, the result being that the collar M and the drill-rod 60 will be partially turned toward the right. This operation is repeated at each forward and backward movement of the drill-rod, and in virtue of the same the drill-bit is presented in a different position to the rock at each blow. 65 In virtue of the collar M being gradually reduced in diameter from its forward end to its rear end, as described, it will be seen that the

pressure of the detent N against the collar M decreases as the collar moves forward with the drill-rod, so as not to retard the forward 70 movement of said rod, and increases as the collar moves rearwardly or backward with the drill-rod, so as to prevent a too rapid rebound of the rod, which is an important advantage. As long as the normal distance between the base of the hole being drilled and 75 the point of the drill-bit remains less than the distance between the plunger G and the loose collar J the blows on the drill-rod will simply tend to drive the same and impart an intermittent rotative movement thereto; but 80 when the distance between the point of the drill-bit and the base of the hole being drilled becomes greater than the distance between the plunger and the collar J said collar will 85 impinge against the plunger G, and by disengaging the dog or pawl F from the rack E will allow the frame C to slide in its bearings and the dog or pawl to engage the next tooth of the rack, thus advancing the drill, so that 90 in addition to a reciprocatory and intermittent movement the drill-rod has a step-by-step forward movement. The pawl F does not have a tendency to release itself or ride over the teeth of rack E during backward 95 strain on the frame C. When, however, the drill has been advanced as far as desired, the frame C may be disengaged from the rack E by inserting a suitable implement through an opening in the side of frame C and pressing 100 the pawl G forwardly, so as to release the pawl from the rack. The frame C, with its appurtenances, is then free to be moved in either direction on the frame D.

As is well known, the force required to cut 105 hard rock is greater than that required to cut soft rock, and yet the force required to withdraw the drill-rod is less in hard rock than in soft rock. The tendency of the spring should therefore be such as to exert greater 110 pressure in withdrawing the drill from soft rock than from hard rock, and for this purpose the guide-collar *e* is made adjustable, so that the tension of the spring may be increased or diminished through the medium of the 115 same.

Having thus described my invention, what I claim is—

1. In a rock-drill, the combination of a frame, a reciprocatory drill-rod loosely mounted 120 in said frame, means for retracting the drill-rod, a longitudinally-grooved collar fixed on the drill-rod and gradually reduced in diameter from its forward to its rear end, and a spring-pressed detent arranged in the frame 125 and continuously impinging against the grooved collar, substantially as specified.

2. In a rock-drill, the combination of a frame, a reciprocatory drill-rod extending longitudinally through and loosely mounted in 130 said frame, a coiled spring interposed between the frame and the drill-rod and adapted to retract said rod and normally hold it with one of its ends extending in rear of the frame so

as to permit of it being struck by a hammer, a longitudinally-grooved collar fixed on the drill-rod and gradually reduced in diameter from its forward to its rear end, and a spring-pressed detent arranged in the frame and continuously impinging against the grooved collar, substantially as specified.

3. In a rock-drill, the combination of a frame, a reciprocatory drill-rod mounted in the frame so as to permit it to turn, means for retracting the drill-rod, a collar fixed with respect to the drill-rod and gradually reduced in diameter from its forward end to its rear end and having longitudinal grooves with their bottoms beveled in cross-section and respectively comprising the end portions arranged in parallel planes and the intermediate portion disposed at an angle to the end portions, and a spring-pressed detent arranged in the frame and impinging against the collar, substantially as specified.

4. In a rock-drill, the combination of a guide-frame provided with a longitudinal rack having teeth inclined toward the rear of the frame, a slidable frame arranged on and movable lengthwise with respect to the guide-frame, a spring-pressed dog or pawl pivoted

in the slidable frame and normally engaging the rack of the guide-frame, a drill-rod loosely mounted in the slidable frame and having its rear end extended beyond the rear end of the slidable frame, a spring for retracting the drill-rod, a reciprocatory plunger mounted in a guide in the slidable frame and impinging at one end against the dog or pawl, a projection on the drill-rod adapted to strike the other end of said plunger when the drill-rod is driven forwardly, a collar fixed with respect to the drill-rod and gradually reduced in diameter from its forward to its rear end and having longitudinal grooves with their bottoms beveled in cross-section and respectively comprising the end portions arranged in parallel planes and the intermediate portion disposed at an angle to the end portions, and a spring-pressed detent arranged in the slidable frame and impinging against the collar, substantially as specified.

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

JOSEPH WARREN DE CAMP.

Witnesses:

DAVID GOSS,
HENRY METCALF.