2 Sheets--Sheet 1.

M. C. BULLOCK.

Expansion Drills.

No. 165,787. Patented July 20, 1875.

Fig: 2

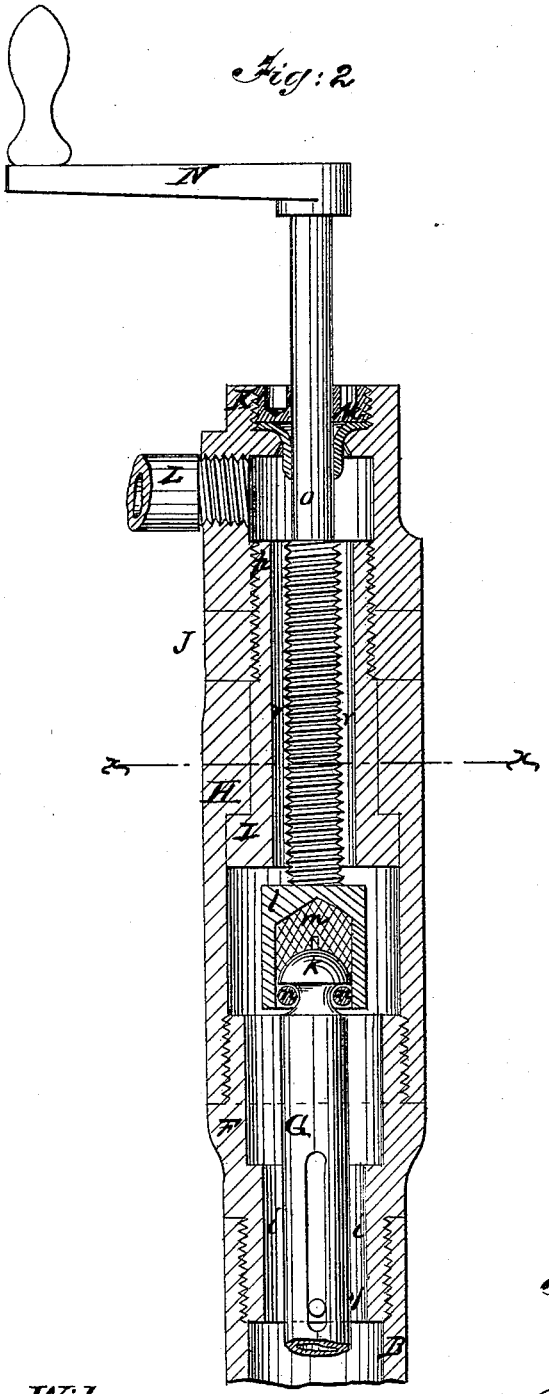


Fig: 1

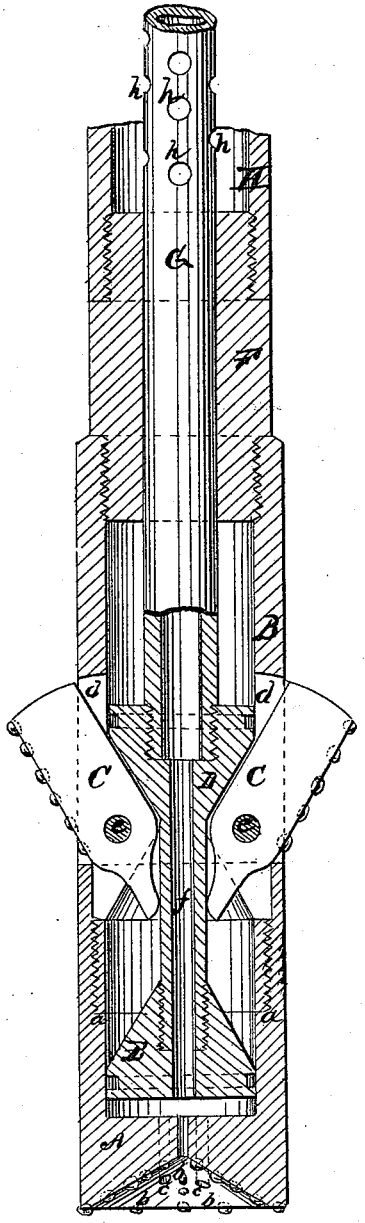
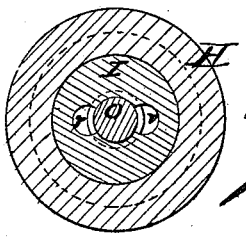


Fig: 3



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2 Sheets--Sheet 2.

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Fig: 5

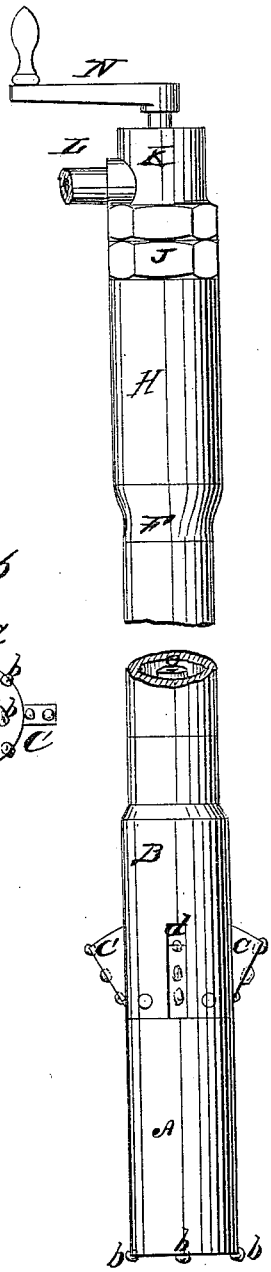


Fig: 4

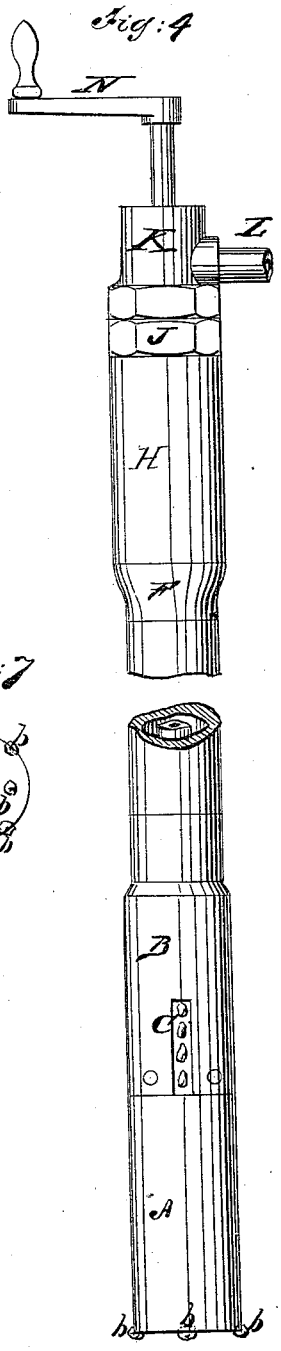


Fig: 6

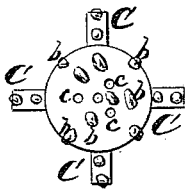
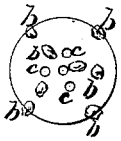


Fig: 7



Witnesses:

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UNITED STATES PATENT OFFICE.

MILAN C. BULLOCK, OF NEW YORK, N. Y.

IMPROVEMENT IN EXPANSION-DRILLS.

Specification forming part of Letters Patent No. **165,787**, dated July 20, 1875; application filed November 28, 1874.

To all whom it may concern:

Be it known that I, MILAN C. BULLOCK, of the city, county, and State of New York, have invented a new and Improved Expansion-Bit; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this invention.

This invention is in the nature of an improvement in drills or bits for perforating rocks for blasting; and the invention consists in a bit or drill for boring holes of unequal diameters in rocks, &c., in which the enlarging or expansion bits are hung in the bit-stock, and held in position by two cones, that are vertically adjustable. It further consists in constructing the drill-rod and stem of the adjusting-screw hollow, and providing the cones, for expanding and holding the bits, with central openings, so as to furnish a conduit for supplying water to the drilling-surfaces, substantially in the manner hereinafter particularly described.

The invention relates more particularly to rock bits or drills, the cutting-surfaces of which are composed of diamonds. The desirability of increasing the diameter of the drill-holes at certain places or intervals will be apparent—as, for instance, when, after driving a hole of the ordinary diameter through a comparatively soft rock, an underlying stratum of harder rock is encountered. In such a case a hole of larger diameter, admitting a greater charge of powder, will be found very efficacious. There are many other occasions when an adjustable expanding bit may be used to advantage. To derive these advantages I construct an adjustable expanding bit, as recited in the following description and accompanying drawings, wherein—

Figure 1 is a vertical section of my drill with feed or adjusting-screw removed, showing expanding bits. Fig. 2 is a vertical section with the feed or adjusting screw in position, and showing the manner of supplying water to the cutting-surfaces. Fig. 3 is a cross-section taken in the line *x x* of Fig. 2. Fig. 4 is a side elevation with expanding bits retracted; Fig. 5, a side elevation with bits expanded. Fig. 6 is a plan view of drill with bits expanded, and Fig. 7 a plan view of bits retracted.

Similar letters of reference indicate like parts in the several figures.

A represents the lower section of my drill. This section is cylindrical, and, for about three-fourths of its distance, it is hollow, with a screw-thread formed in a portion of this hollow interior, and with a shoulder, *a*, also formed therein. The remaining fourth of the length of this section is solid, and the under surface or bottom thereof is concave or of any suitable form. This concave lower surface may be fitted with diamonds *b*, or other suitable cutting-points, as shown in Fig. 1. This concave surface is also perforated with a series of holes, *c*. Firmly secured to the upper end of the section A, by screw-threads or otherwise, is a section, B. If it is intended that this section should be secured to the section A by screw-threads, the lower end of this section B will have formed upon it screw-threads that shall correspond with the screw-threads in the section A. For this purpose the lower part of the section B, with the screw-threads thereon, is made of somewhat less diameter than the other part of the same, so that when the two sections are screwed together, the two sections will come together with a tight joint and with smooth and uniform surfaces. Into the section B are formed two or more slots, *d*. These slots are preferably at right angles to each other, and are cut entirely through the sides of the section. Fitting into these slots are wings C. These wings are secured near their lower ends to the sides of the section B by pins *e*, and fitted within the interior of the section B (which is hollow) are two cones, D and E. These cones are arranged within the section B, so that the apex of each cone will point toward the apex of the other one, and they are connected together by a hollow stem, *f*, in such manner that the cone D will be above the pins *e*, that secure the wings in position, and the cone E will be below the inner ends of the wings C. These cones are constructed so as to slide readily within the interior of the section B, and the upper one, D, of these cones has formed in its upper surface a recess with screw-threads cut into it; and into the upper end of the cone

E are likewise formed screw-threads. Into the upper end of the section B is screwed, or otherwise secured, one end of a coupling, F. This coupling has a passage-way passing through it in the direction of its length, and into the sides of this passage-way are cut a series of channels, *i;* and the upper half of this coupling is counterbored to a diameter that will correspond with the interior diameter of the section B. Passing through the passage-way is a tubular stem, G. This stem has cut upon its lower end screw-threads to correspond with the screw-threads cut in the recess formed in the upper surface of the cone D, into which it is screwed and thus secured. Through the sides of the tube G are perforations *h*, and into the outer surface of said tube are affixed keys or fins *j*, these fins entering into one of the channels *i* when the tubular stem is within the coupling. The upper end of the tubular stem G is formed with a rounded head, *k*, which is received into the lower end of a small coupling, *l*, abutting against a wooden bearing, *m*, the under surface of which snugly fits the rounded head of the tube G, in which position it is retained by two pins, *n*, which pass through the small coupling *l*, and under the shoulder of the rounded head *k*, thus forming a ball-and-socket joint.

Extending upward from the coupling *l* is a stem, *o*, the lower half of which is provided with a screw-thread. The tubular stem G is inserted through the coupling F, and its lower end is screwed into the cone D, before described; and when this tubular stem is in this position the under surface of the small coupling rests upon the surface of the shoulder formed by the counter-bore of the interior of the coupling F. Screw-threads being formed on the upper portion of this last-mentioned coupling, a section, H, is screwed thereon. This section is in the form of a hollow cylinder, and within it is fitted a nut, I. This nut accurately fits the interior of the section, so that it may freely turn therein, and its upper end protrudes through the top of the section H. The part *p*, that so protrudes, is provided with screw-threads. The nut I has drilled through it a central opening, through which the stem *o* passes, and parallel with this opening, and opening into the same, are two channels, *r r*. These channels extend entirely through the nut. The central opening or hole has screw-threads formed in it, into which work the threads on the stem *o*.

The section H being screwed or otherwise secured to the upper end of the coupling F, the nut being placed in it, as before described, and the stem *o* passing up through said nut, a jam-nut, J, is screwed upon the projecting part *p* of the nut I, holding the nut securely in position, and onto such portion of the projecting part of the nut I that projects above the jam-nut J is screwed or otherwise secured a cap, K. This cap is in the form of a hollow cylinder, and has fitted near its upper end a pipe, L, and into its upper end is formed a packing-box, M, and to the end of that portion of the stem *o* which projects beyond the packing-box is fitted a crank, N.

Having now described the construction of my adjustable expanding drill, its operation is as follows: Being placed in position, it is caused to revolve. The diamonds or other cutting appliances, which are secured to the concave surface of its lower end, speedily cut the rock, so that as the drill is fed downward the ordinary drill-hole is formed. When this hole has been driven as far as is thought desirable the stem *o* is turned by means of the crank N, which causes it to freely turn within the nut, the stem freely revolving by reason of the ball-and-socket joint before named, and as the screw is thus turned the tubular stem G is forced downward, and the cones D and E are also forced downward. The conical surface of the cone D, coming in contact with the inner edges of the wings C, forces them outward from the sides of the section B, so that as the drill revolves these wings (their outer edges being armed with diamonds) will at once commence to enlarge the diameter of the original drill-hole, which will thereafter be continued of the enlarged diameter until the wings C are withdrawn within the section B, when the original diameter of the drill-hole will be continued by the diamonds on the lower concave surface of the drill, and so on. If desired, the drill-hole may be made in sections of alternate openings having greater and less diameters, the wings C being withdrawn within the section by simply turning the screw *o* in a reverse direction, when the cone E will be brought in contact with the inner ends of said wings, forcing the wings inward as they turn on the pins *e*.

To supply water to the cutting-surfaces as the drill revolves, the water is admitted through the pipe L, passes into the section H through the channels *r r*, (lubricating, at the same time, the screw on the stem *o*,) into the coupling F, through the channels *i i* therein, into the tubular stem G, and thence into the section B, to the cutting-surfaces, through the slots into which said wings work, and also through the tubular stem G, through the perforations *h*, and thence through the openings in the upper cone, and through the hollow stem *f*, through the lower cone, and through the perforations *c* in the concave under cutting-surface, so that the cutting-surfaces of the wings and of the foot of the drill or bit are well supplied with water.

Having thus described the construction and operation of my adjustable expanding bit or drill, what I claim as new, and desire to secure by Letters Patent, is—

1. A rock drill or bit constructed with cutting-wings C, for enlarging the diameter of the bore, operated by adjustable cones D E, substantially as shown and described.

2. In a rock drill or bit, the combination of a nut, I, adjusting-screw *o*, tubular stem G,

and cones D E with hinged cutting-wings, substantially as and for the purpose described.

3. The combination, with the screw *o* and stem G, of the coupling *l*, substantially as and for the purpose described.

4. In a rock drill or bit, the combination of the connected cones, recessed centrally, stem G, tubular nut I, and perforated base A, forming a conduit for supplying water to the cutting-surfaces, substantially as specified.

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