2 Sheets—Sheet 1.

C. D. PIERCE.

Rock-Drill.

No. 205,901. Patented July 9, 1878.

FIG. 10.

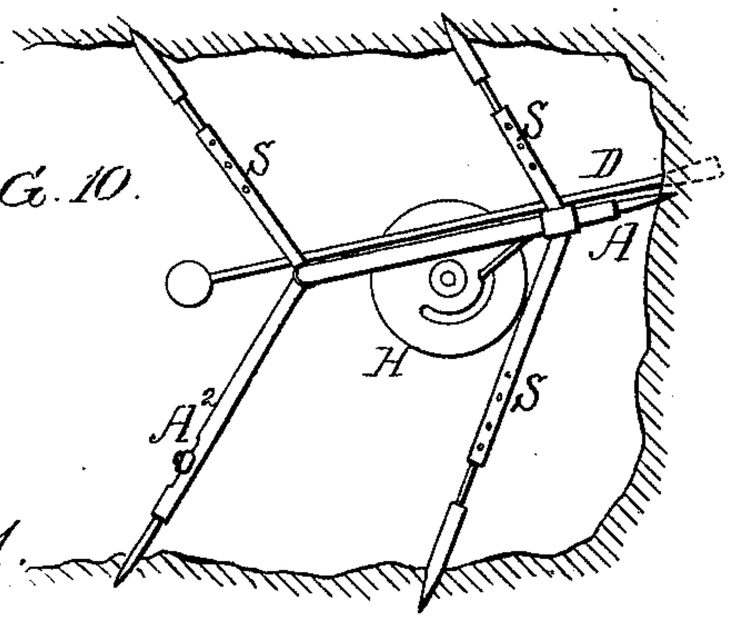
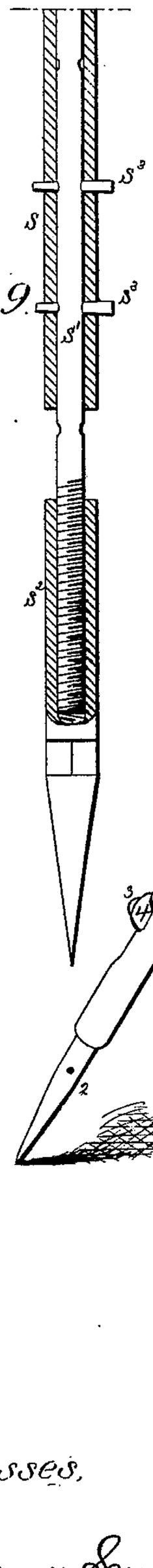
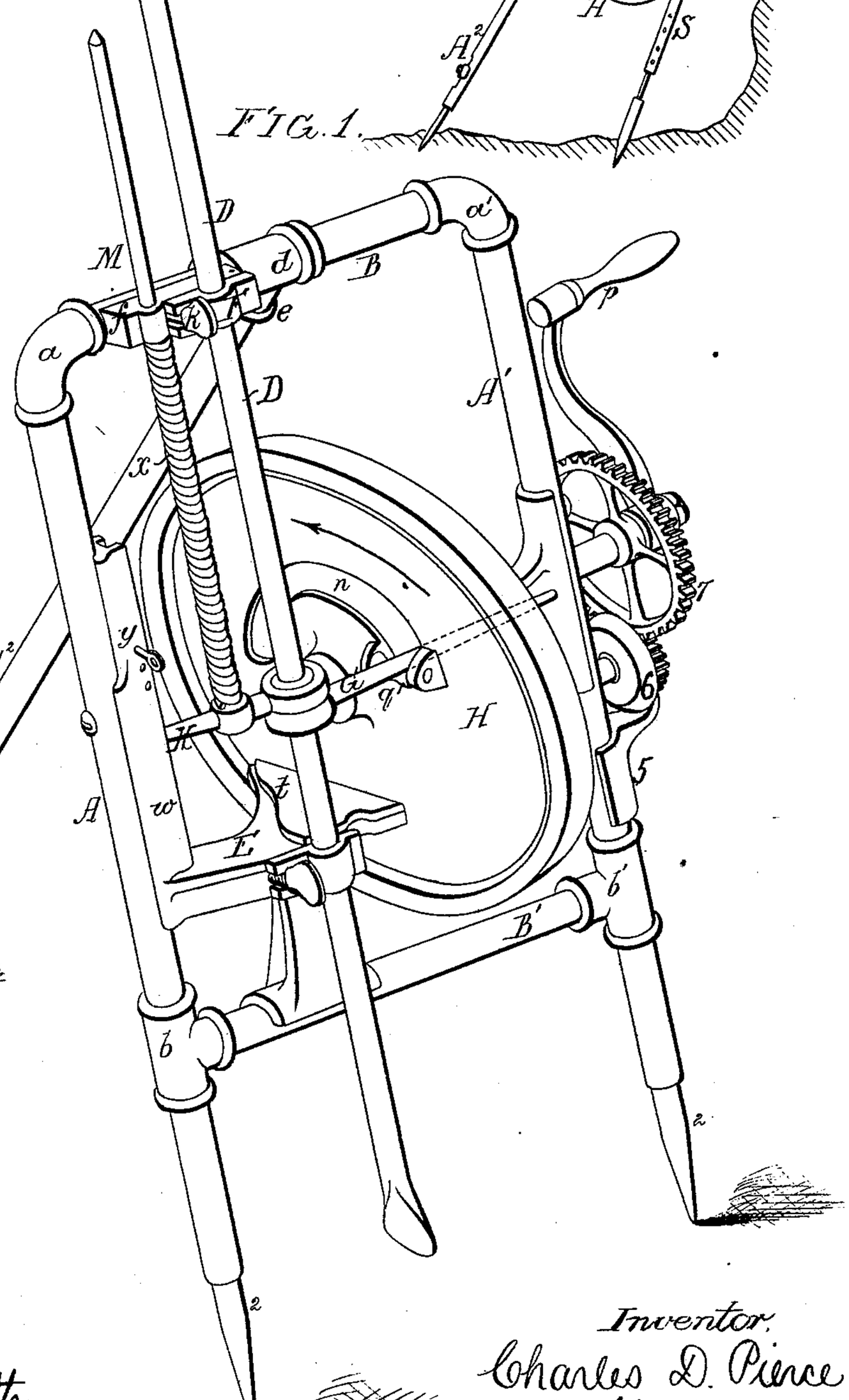


FIG. 1.

FIG. 9.





Witnesses.

Harry Smith
John A. Deemer.

Inventor.
Charles D. Pierce
by his Attorneys
Howson and Son

2 Sheets—Sheet 2.

C. D. PIERCE.

Rock-Drill.

No. 205,901. Patented July 9, 1878.

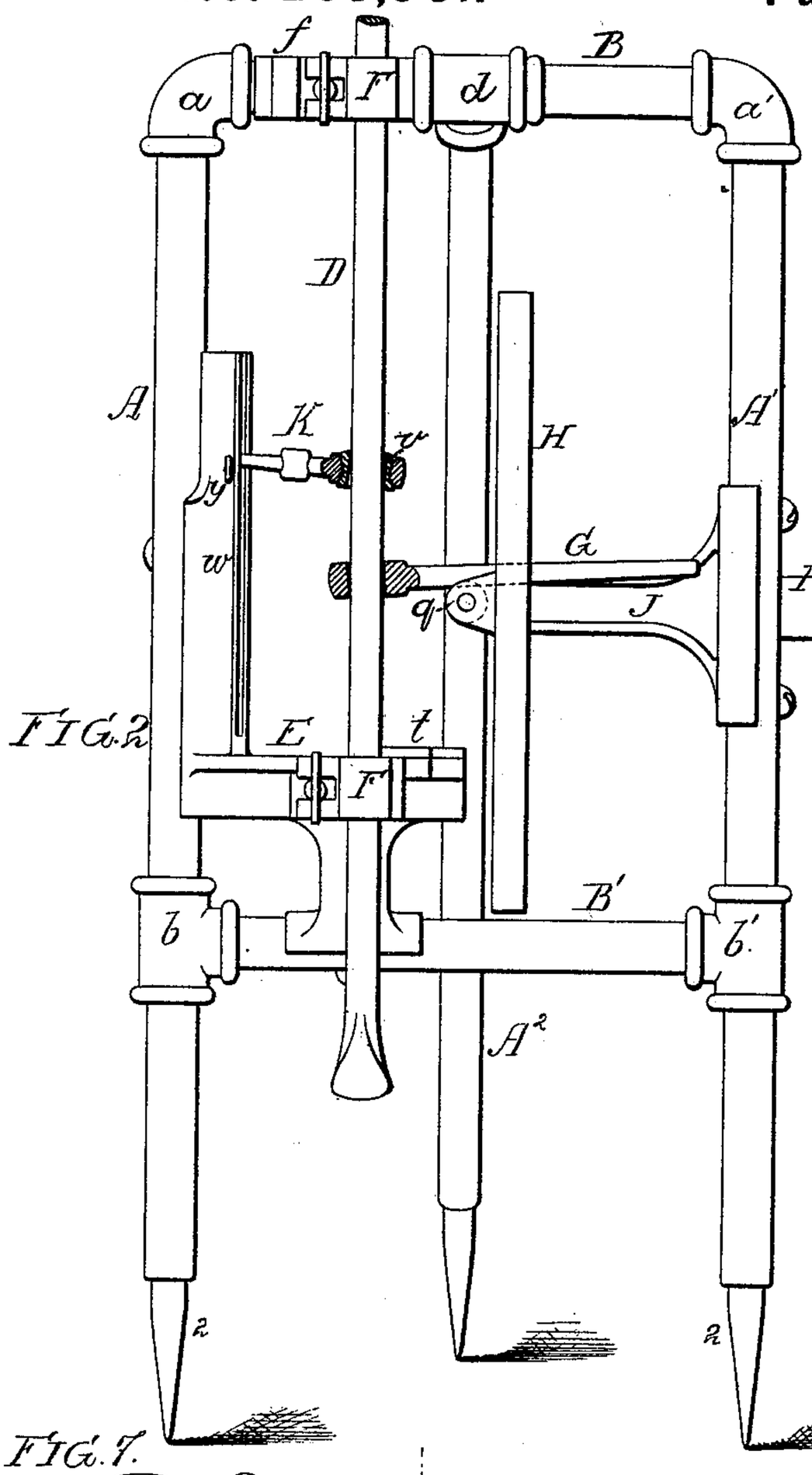


FIG. 2.

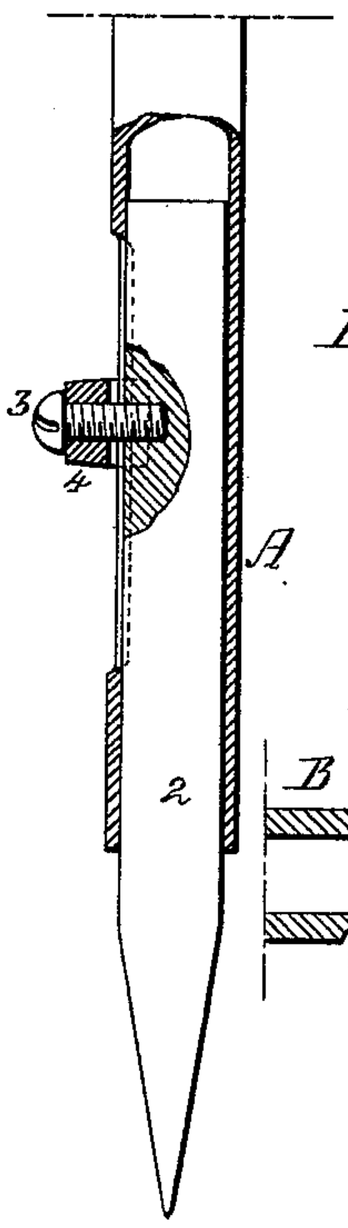


FIG. 4.

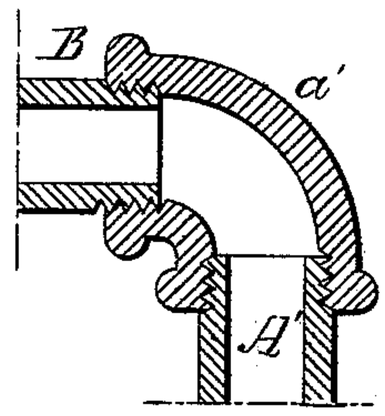


FIG. 5.

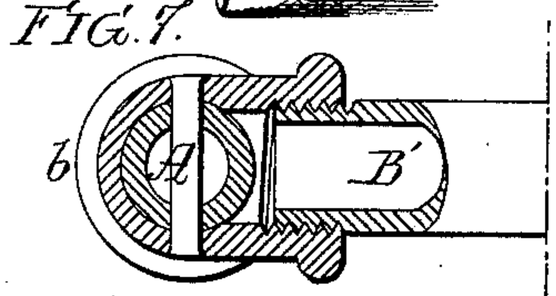


FIG. 7.

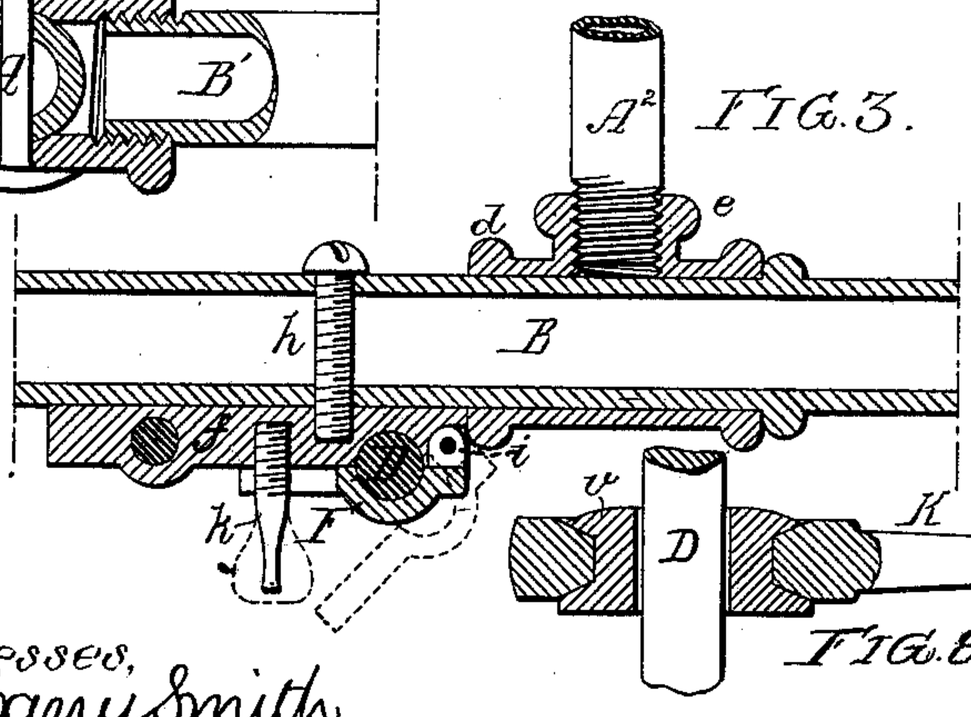


FIG. 3.

FIG. 8.

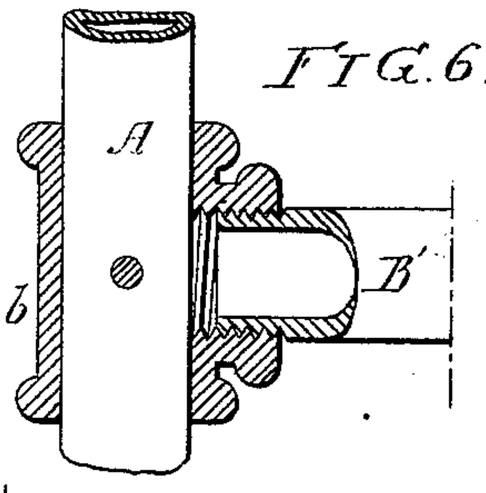


FIG. 6.

Witnesses,
Harry Smith
John A. Reimer

Inventor:
Charles D. Pierce
by his Attorneys
Howson and Son

UNITED STATES PATENT OFFICE.

CHARLES D. PIERCE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN ROCK-DRILLS.

Specification forming part of Letters Patent No. **205,901,** dated July 9, 1878; application filed May 31, 1878.

To all whom it may concern:

Be it known that I, CHARLES D. PIERCE, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Rock-Drills, of which the following is a specification:

My invention consists of certain improvements, too fully described hereinafter to need preliminary explanation, in machines for drilling holes in rocks.

In the accompanying drawing, Figure 1, Sheet 1, is a perspective view of the drilling-machine; Fig. 2, Sheet 2, a front view of the machine; Figs. 3, 4, 5, 6, 7, and 8, Sheet 2, and Fig. 9, Sheet 1, views of detached parts, drawn to an enlarged scale; and Fig. 10, Sheet 1, a diagram showing the instrument arranged for tunneling.

The main frame of the machine consists of the legs A A^1, connected together above by the upper cross-bar B and below by the cross-bar B′. These legs and cross-bars are wrought-iron tubes, preferably lap-welded tubes, and the connections are made by elbows and T-couplings. Thus the upper cross-bar B is connected to the tubular legs by the elbows *a a′*, one of which is represented on an enlarged scale in Fig. 5, and the cross-bar B′ is connected to the legs by T-couplings *b b′*, one of which is shown in Figs. 6 and 7.

A third tubular leg, A^2, of wrought-iron, is hinged to the cross-bar B through the medium of the T-piece *d*, through which the said bar B passes, the upper end of the leg A^2 being screwed into the branch *e* of the said T-piece, as shown in Fig. 3.

D is the drill-rod, arranged to slide and turn in two bearings, one on the cross-bar B of the frame, the other in a bracket, E, secured to the leg A as well as to the cross-bar B′. For the upper bearing a block, *f*, preferably of cast-iron, is fitted to the cross-bar B of the frame, and secured to the same by a set-screw or screws, *h;* and to this block is hinged, at *i*, Fig. 3, a lug on the clamp-plate F, which is adapted to the drill-rod D, and forms part of the bearing of the same, and is retained in place by a set-screw, *k*, on turning the flat head of which to such a position that it will coincide with a slot in the clamp-plate the latter can be turned outward, as shown by dotted lines in Fig. 3. A precisely similar clamp-plate is hinged to the bracket E, so that, if the two clamp-plates be moved outward, the drill-rod will be released.

The drill-rod passes through an eye in an arm, G, the latter projecting through a curved slot, *n*, in a wheel, H, secured to a shaft, I, which has its bearings in a bracket, J, projecting inwardly from and secured to the leg A^1, the shaft being provided with a suitable handle, P; or, if the drill-rod has to be operated by power, a pulley for receiving a belt may be secured to the said shaft.

On rotating the wheel H, an anti-friction roller, *q*, hung to projections at one end of the curved slot *n*, will be brought in contact with the under side of the arm G, and will raise the latter, and as the eye in the arm is somewhat larger in diameter than the rod the latter must be griped by the arm and raised with the same, the rod being at the same time turned, owing to the course pursued by the anti-friction roller which controls the arm, until the said roller, owing to the continued movement of the wheel, reaches a position where the arm G will be released from the control of the said roller, when the rod will fall, either by its own or by additional weight or by the action of a spring referred to hereinafter, the arm G at the same time falling onto a platform, *t*, on the bracket E.

The drill-rod also passes through a sleeve, *r*, so fitted, as shown in Fig. 8, to an eye in an arm, K, as to turn freely, but so as to be confined vertically therein, the outer end of this arm being adapted to a vertical guide, *w*, forming, in the present instance, part of the bracket E and secured to the leg A of the frame.

The lower end of a rod, M, fits loosely in an eye or recess in the arm K, the upper portion of the rod passing through and being guided by the block *f*, between which and the arm intervenes a spiral spring, *x*, the effect of which is to depress the said arm.

Just as soon as the arm G is released from the control of the anti-friction roller of the wheel H, and the drill-rod is consequently released from the control of the said arm G, it comes under the control of the arm K, for the latter, depressed by the spring, gripes the rod, and the spring, through the medium of the arm, forces the rod downward, the arm falling

onto the arm G, which is supported by the platform *t* of the bracket, and here the two arms will remain until, as the wheel revolves, the arm G is again raised and carries with it the arm K.

When the drill-rod D is turned by the lateral movement of the arm the sleeve *c* will turn freely with the rod in the eye of the arm K, and this prevents the abrasion of the rod, which would take place in the absence of the sleeve, the latter thus serving as an anti-friction medium.

When, in drilling a deep well, it becomes necessary to withdraw from the latter a drill-rod of great length, consisting of sections screwed together, I remove the rod M and spring *x*, and retain the arm K by a pin, *y*, in the elevated position shown in Fig. 2, in which case, on turning the wheel, there will be repeated upward movements of the rod, the arm K serving as a pawl to retain the rod between each movement.

Fig. 4 represents a section of the lower portion of one of the legs of the frame, a rod, 2, pointed at the lower end, being fitted snugly, but so as to slide freely in the leg when a set-screw, 3, is loosened, this screw passing through a clamping-washer, 4, and through a longitudinal slot in the leg into the rod 2, so that when the screw is tightened the rod 2 will be firmly secured to the leg. The rear leg A^2 is provided with a similarly-adjustable rod.

When desired, I attach a drill-grinding device (shown in Fig. 1) to the machine, this device consisting, in the present instance, of a bracket, 5, secured to one of the legs of the frame, and having a spindle carrying a grinding-wheel, 6, a pinion on which is driven by a wheel, 7, on the driving-shaft I.

In Fig. 10, Sheet 1, I have shown the apparatus arranged for tunneling. In this case the pointed ends of the rods A A^1 rest against the face of the tunnel, and the end of the rod A^2 against the floor of the same. Additional bracing-rods S extend from the roof of the tunnel to the cross-piece B, and from the cross-piece B′ to the roof and floor of the tunnel, so as to effectually steady the frame of the machine. In order to permit the ready adjustment of these bracing-rods, I prefer to make them of three parts—namely, the tube *s*, central rod s^1, and adjustable point s^2, adapted to the threaded end of said rod s^1.

The latter rod is secured to the tube *s* by means of pins s^3 passing through openings in the tube and rod, so that upon removing these pins the rod s^1 can be rapidly adjusted to a position approximating to that desired, and then secured by reinserting the pins, the final accurate adjustment being effected by means of the adjustable point s^2.

It should be understood that the ends of the tubes *s* merely rest against the cross-pieces, and are not secured thereto, so that the extra braces can be readily applied or removed, as circumstances may demand.

I claim as my invention—

1. The within-described rock-drill frame, consisting of the tubular legs A A^1, tubular cross-bars B and B′, and T and elbow pieces, by which the said legs and bars are connected together, as specified.

2. The said frame, consisting of the legs A A^1, cross-bars B B′, and connections, in combination with a third tubular leg, A^2, hinged to the cross-bar B through the medium of a T-piece, *d*, all substantially as set forth.

3. The combination of the drill-rod and its arm G, the slotted wheel H, by which the within-described movements are imparted to said arm G, and the arm K, adapted to the drill-rod, and having a guided rod, M, and spring, all substantially as specified.

4. The combination of a drill-rod, a spring-arm, and a sleeve embracing the rod and arranged to turn in the arm.

5. The combination of the drill-rod, the slotted wheel H, the arm G, the arm K, and a device for supporting the said arm when it has to be used as a pawl for retaining the drill-rod, as herein specified, and shown in Fig. 2.

6. The combination of the frame with a bracket, E, secured to the frame and forming a guide, *w*, for the arm K, and having a platform for receiving the arm G, all as set forth.

7. The combination of the tubular slotted leg of a drill-rod frame with a pointed rod, adjustable in the leg and confined thereto by a set-screw, 3, and clamping-washer 4, carried by the rod, as described.

8. The combination of the frame of a rock-drilling machine with a grinding-wheel driven from the main shaft I of the machine, substantially as specified.

9. The combination of the cross-bars B B′ of the machine with detachable bracing-rods S, interposed between said cross-bars and the roof or floor of a tunnel, as specified.

10. The bracing-rods S, each composed of a tube, *s*, adjustable rod s^1, and adjustable point s^2, as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES D. PIERCE.

Witnesses:

HARRY A. CRAWFORD,

HARRY SMITH.