B. HASTINGS.

ROCK DRILL.

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916,703.

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Fig. 1.

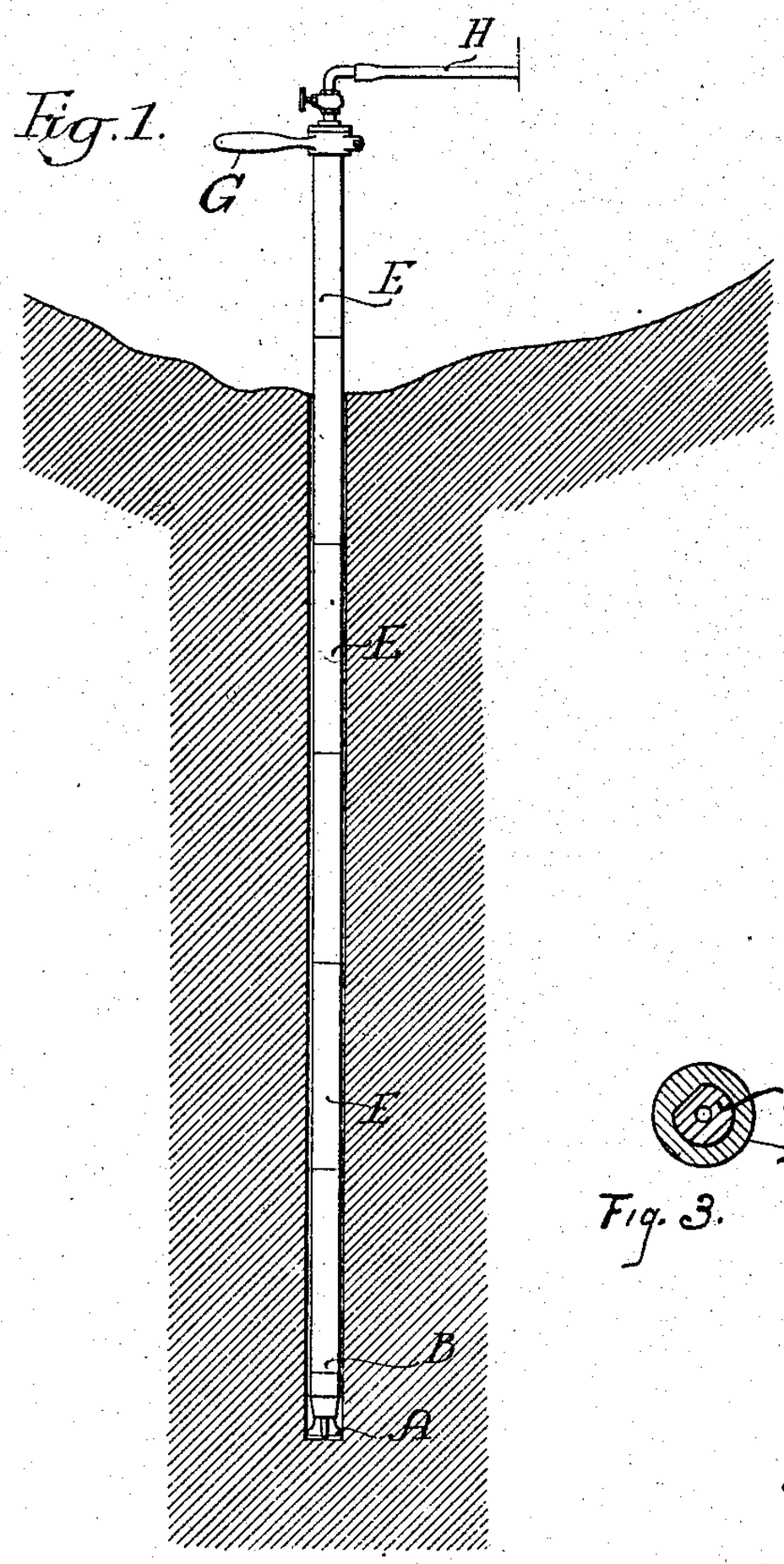

Fig. 2.

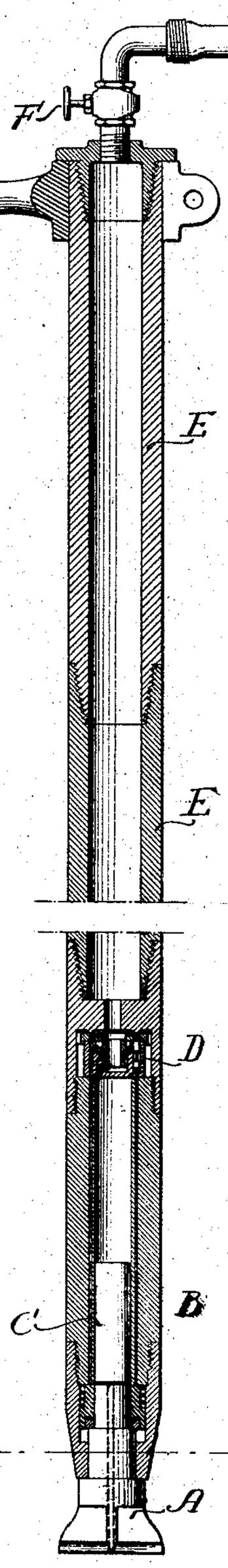

Fig. 3.

Witnesses

Margaret L. Hastings

Louise B. Hastings

Inventor

Benjamin Hastings

UNITED STATES PATENT OFFICE.

BENJAMIN HASTINGS, OF CLEVELAND, OHIO.

ROCK-DRILL.

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To all whom it may concern:

Be it known that I, BENJAMIN HASTINGS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga, and State of Ohio, have invented a new and useful Rock-Drill, of which the following is a specification.

The object of my invention is to provide a form of drill whereby the more economical and expeditious drilling of certain sized holes required in the arts of mining and quarrying shall be rendered possible and to so construct such a drill as to dispense with certain accessory parts hitherto used with all machines intended for drilling such holes. The particular type of hole referred to has a bottom diameter not greater than 1½ inch and a depth exceeding 3 feet and while I have suggested these sizes because my drill is especially efficient in drilling holes of these dimensions, I do not mean to infer that my drill is not suitable for forming holes of other dimensions, though it does not possess such marked advantages over the old types of drills when it is employed in the drilling of holes having a short depth or large diameter. These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1, is a vertical section taken through a body of rock illustrating, in side elevation, a drill constructed according to my invention as employed for drilling a hole, and Fig. 2, is a vertical section, illustrating the detail construction of the upper and lower portions of the structure constituting my improved drill. Fig. 3, is an end sectional view on the line *x*—*y* showing one way in which the drill bit may be held in the casing so that the drill bit must turn with the casing.

Referring to the above drawings, it will be seen that the drill proper is of the ordinary piston hammer type; A being a comparatively short drill bit whose shank is suitably held in the casing B and whose gage is preferably, though not necessarily, greater than the largest outside diameter of said casing. This casing B and its associated parts are preferably made with a smooth uniform exterior surface free from any projections or enlargements. Within the cylinder formed by the casing is a piston hammer C designed to be operated by expansile fluid under pressure and so placed as to impact against the end of the drill bit A.

The operation of the hammer is automatically controlled by the valve D, which governs the entrance of the expansile fluid to the cylinder. This valve D is not, however, an essential part of the device as the control of the fluid may be accomplished by other means as by the piston C itself. The casing B is provided with a straight, tubular handle forming a connecting conduit between the cylinder and a supply pipe H connected to a source of fluid under pressure. In the case illustrated, the handle is shown as made in several sections detachably connected together so as to permit of the addition of successive sections as the hole deepens, or their removal as the drill is taken out of the hole or taken apart for any purpose. The same object may, however, be attained by the use of a plurality of hollow handle sections of varying lengths. The handle may also be formed by the casing being extended to the rear beyond the piston hammer operating mechanism; the chief distinction between my handle and others being that mine is so designed and constructed as to be able to follow the casing into any hole, drilled large enough for the casing to enter. Let it be understood that unless specifically differentiating I use the term handle in its broadest sense to include the coupling member used in securing the body of the supporting means to the casing.

One of the uppermost of the handle sections E is provided with a lever G whereby an operator is enabled to turn the drill bit A in the hole. A valve F is provided for the purpose of controlling the admission of fluid under pressure from the supply pipe H to the handle sections and thence to the casing B.

So far as I am aware no drills of the piston hammer type have heretofore been constructed in such manner as to permit of their entering a hole drilled; it having been the custom to employ drill bits of successively increasing length as the hole deepened. It will be understood that these longer bits, having greater inertia, absorb more of the energy of the hammer blow because of the relative inelasticity of the steel and therefore require the use of a larger piston hammer when it is required to expeditiously drill holes of any depth. The requirement for a

larger piston hammer involves added weight, in addition to which the reaction of the device necessitates the use of a tripod, tunnel bar, column, or other mechanical holding device.

My device, on account of the small length of bit employed, does not require any larger piston hammer for deep holes than for shallow ones, and the weight and reaction of the device under operating conditions are not too great to allow of its being held in the hand of the operator. Hence, it will be seen that by my invention I dispense with the holding device heretofore required for all drills employed in forming holes exceeding 3 feet in length. Under operating conditions, the operator starts a hole in the manner usual with the so-called pneumatic hammer drills, but instead of substituting a longer drill bit for the shorter one as the hole deepens, he permits the casing B to enter the hole drilled and from time to time adds handle sections E to said casing. A blast of expansile fluid passing out through the bit forces the cuttings up on the outside of the casing and attached handle to the surface of the rock being drilled. The drill-bit shank has a polygonal or equivalent section and fits into a like hole in the lower end of the casing as shown in section Fig. 3 whereby the bit is permitted an axial but not rotative movement relative to the casing.

What I claim is:

1. The combination with a piston hammer drill, of a drill bit whose diameter of cut is wider than the largest outside diameter of said piston hammer drill, said piston hammer drill being adapted for entrance into the hole made by it, substantially as described.

2. The combination with a piston hammer drill, of a straight hollow handle attached to and forming a communication with said drill, and a drill bit of wider diameter of cut than the outside dimensions of said drill and handle, substantially as described.

3. The combination with a piston hammer drill, of a plurality of hollow handle sections adapted to be attached to each other and to the piston hammer drill to form a conduit from an expansile fluid supply to the piston hammer drill, and a drill bit of sufficient gage to allow the entrance of said piston hammer drill and attached handle sections into the hole being drilled, substantially as described.

4. The combination with a piston hammer drill, of a hollow holding device having an attached drill bit of sufficient gage to allow the entrance of the drill and the holding device into the hole being drilled, and a suitable lever on said hollow holding device whereby said device and its attached piston hammer drill and bit may be turned in the hole being drilled, substantially as described.

5. The combination of a series of tubular, detachably connected handle sections, with a casing removably connected to one of said sections and a piston hammer drill operating mechanism inclosed by said casing, said casing adapted to receive a drill to be operated upon by said drill operating mechanism, substantially as described.

6. The combination of a series of tubular, detachably connected handle sections, with a casing removably connected to one of said sections and a piston hammer drill operating mechanism inclosed by said casing, said casing adapted to receive a drill and being of substantially the same diameter as said sections throughout its length, substantially as described.

7. The combination of a series of tubular, detachably connected handle sections, with a casing removably connected to one of said sections and a piston hammer drill operating mechanism inclosed by said casing, said casing adapted to receive a drill, said sections and casing being of substantially the same diameter throughout their length, one of said sections having a lever whereby the sections may be axially turned, substantially as described.

8. The combination of a series of detachably connected tubular handle sections of substantially uniform diameter connected at one end to a source of fluid under pressure, an operating lever on said section adjacent to said end, a casing of substantially the same diameter as said series of sections removably connected to the opposite end thereof, and piston hammer drill mechanism in said casing, substantially as described.

9. A piston hammer drill having a casing containing drill operating mechanism, said casing being extended to the rear of said mechanism and forming an extended tubular handle capable of entering the operating mechanism into the hole formed by the drill, substantially as described.

10. A piston hammer drill including a casing containing drill operating mechanism, a handle section, and rigid coupling means for uniting said casing and the handle section, said coupling means comprising a structure of a diameter to permit of its following said casing into any hole drilled large enough for the said casing to enter, substantially as described.

BENJAMIN HASTINGS.

Witnesses:
FRANK S. BAKER,
WINIFRED A. BRENNAN.