(No Model.) 2 Sheets—Sheet 1.

F. BUSCHMANN.

ROCK DRILL.

No. 402,229. Patented Apr. 30, 1889.

Fig. 1.

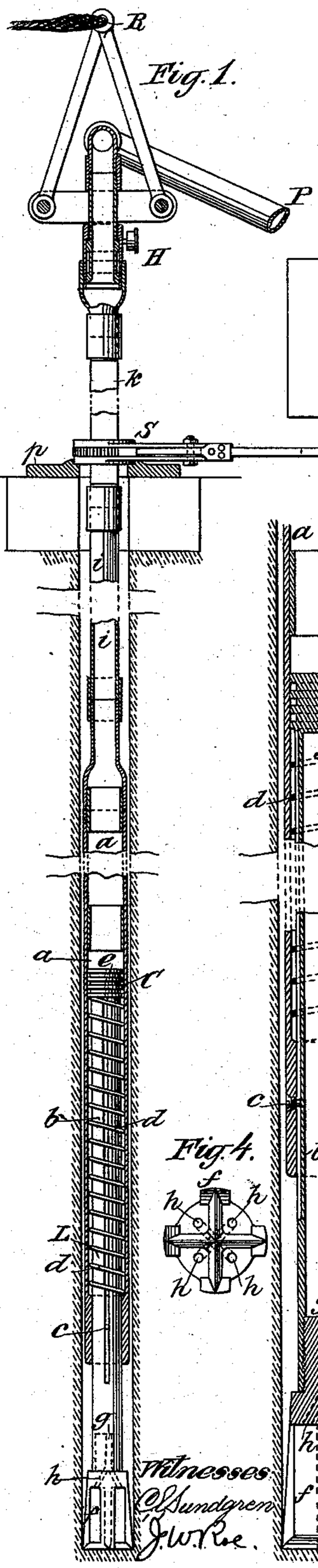


Fig. 2.

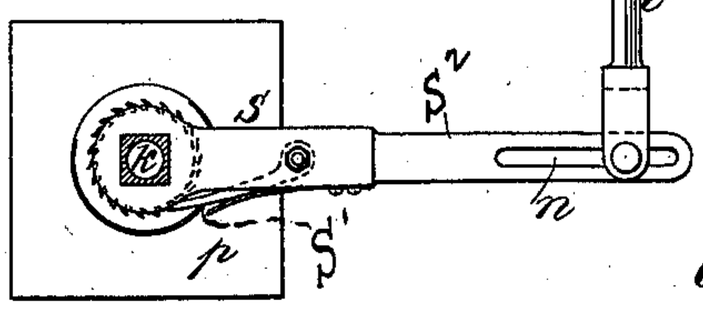


Fig. 3.

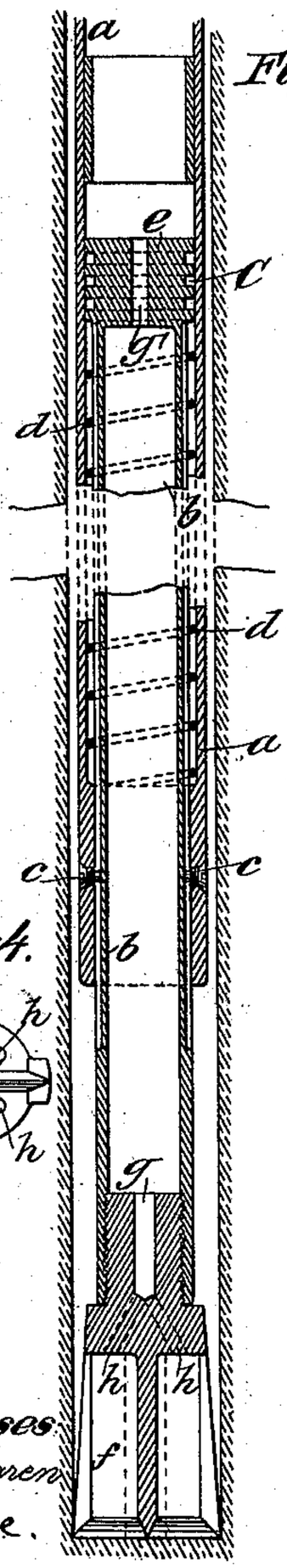


Fig. 4.

Fig. 5.

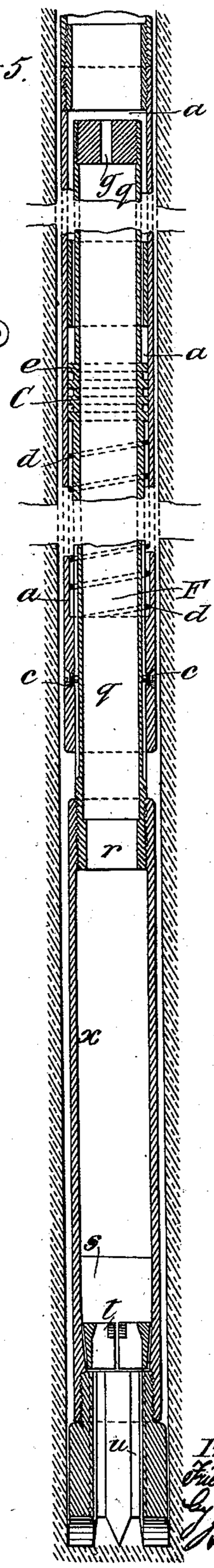


Fig. 7.

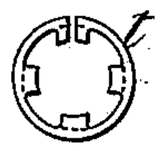
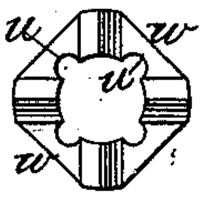


Fig. 6.



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Inventor:
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Brown & Ball

(No Model.)

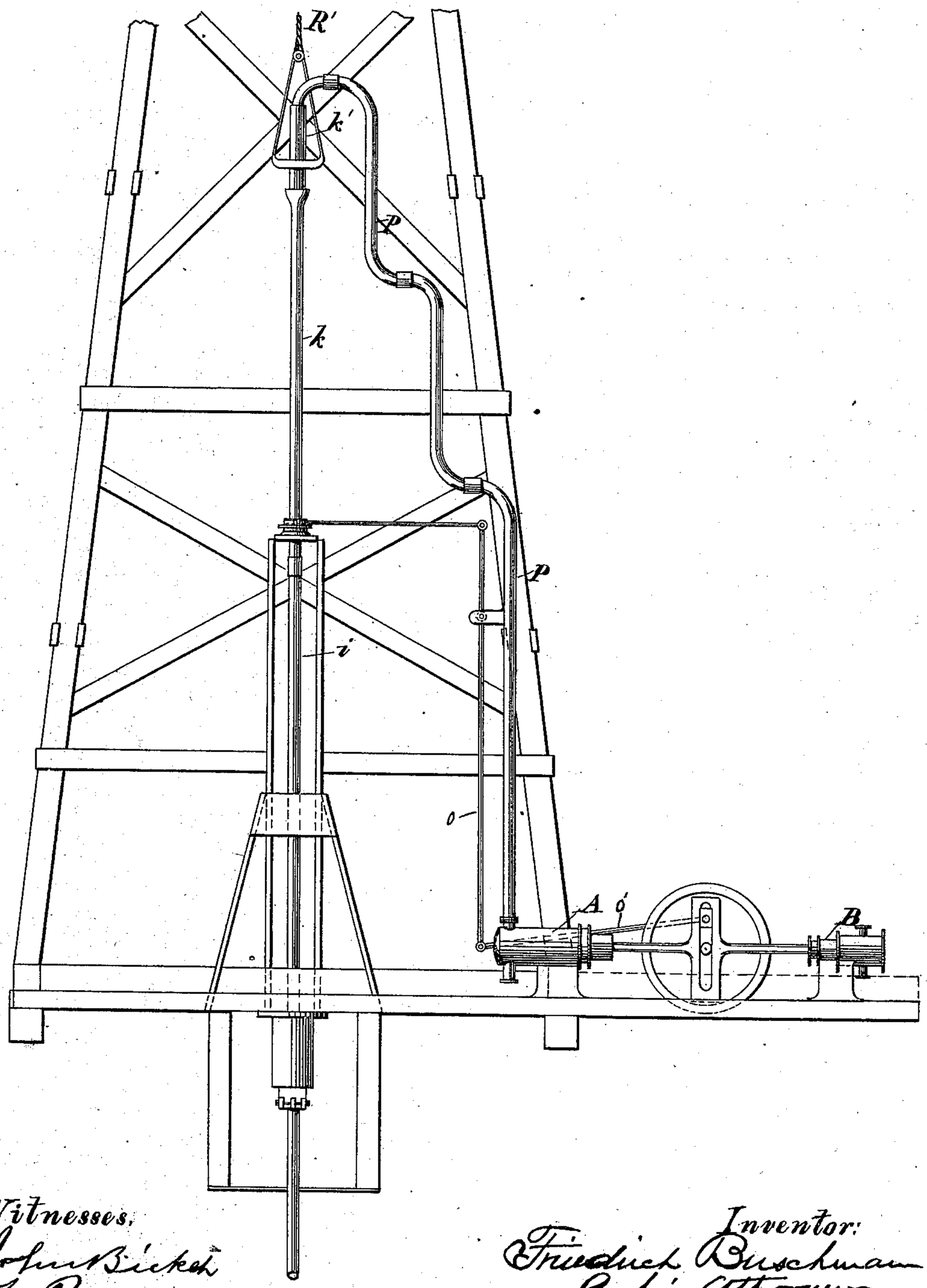
2 Sheets—Sheet 2.

F. BUSCHMANN.

ROCK DRILL.

No. 402,229. Patented Apr. 30, 1889.

Fig. 8.



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UNITED STATES PATENT OFFICE.

FRIEDRICH BUSCHMANN, OF HEILBRONN, GERMANY, ASSIGNOR TO THE SALZWERK HEILBRONN, OF SAME PLACE.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 402,229, dated April 30, 1889.

Application filed October 26, 1887. Serial No. 253,411. (No model.) Patented in England August 16, 1887, No. 11,210; in Belgium August 31, 1887, No. 78,614; in France December 2, 1887, No. 185,296; in Austria-Hungary January 23, 1888, No. 31,704 and No. 64,920; in Germany June 8, 1888, No. 43,306, and in Spain June 12, 1888, No. 8,005.

To all whom it may concern:

Be it known that I, FRIEDRICH BUSCHMANN, a subject of the Emperor of Germany, residing at Heilbronn, Germany, have invented a certain new and useful Improvement in Rock-Drills, of which the following is a specification.

The same has been patented to me in the following countries, to wit: England, No. 11,210, dated August 16, 1887; Germany, No. 43,306, dated June 8, 1888; France, No. 185,296, dated December 2, 1887; Belgium, No. 78,614, dated August 31, 1887; Austria-Hungary, No. 31,704 and No. 64,920, dated January 23, 1888; and Spain, No. 8,005, dated June 12, 1888.

My improvement relates to rock-drills in which the boring-tool is forced downwardly and its lifting produced by a column of water forced into and out of a bore-hole.

I will describe a rock-drill embodying my improvement in detail, and then point out the novelty in claims.

In the accompanying drawings, Figure 1 is a vertical section of a rock-drill embodying my improvement and portions of the apparatus employed for operating the same. Fig. 2 is a plan or top view of certain means for rotating the boring apparatus. Fig. 3 is a view similar to Fig. 1, but showing only the boring apparatus, the same being on a larger scale than Fig. 1. Fig. 4 is a bottom view of the chisel. Fig. 5 is a longitudinal section similar to Fig. 3, but showing a modification. Fig. 6 is a bottom view of the chisel shown in Fig. 5. Fig. 7 is a detail of gripper-jaws shown in the example illustrated in Fig. 5. Fig. 8 is a side elevation of pumping apparatus which may be employed in connection with the drill.

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

A designates a pump, which may be of any desired kind to operate as a force and suction pump. It may be driven by an engine, B.

P designates a pipe, which may consist of flexible hose. This pipe connects at its upper end with a vertically-extending metallic pipe, *k*. The pipe *k* is supported from a link, R, to which is secured a rope or cable, R′, by which the pipe *k* and the boring apparatus may be lifted and lowered. The pipe *k* is coupled near its upper end to a coupling-piece, *k′*, by a swivel-connection, so that it may be rotated therein. The pipe *k* is rectangular in cross-section and is coupled to a pipe, *i*. The pipe *i* has secured to it, near its lower end, the boring apparatus proper. The pipes *k i* and the boring apparatus may all be turned during the operation of boring. This is accomplished by a ratchet-wheel, S, mounted on the pipe *k* and actuated by a pawl, S′, mounted upon a lever, S^2, having a swivel-connection with the hub of the ratchet-wheel S. The lever S^2 may be actuated by a rod, *o*, operated by a lever, *o′*, deriving motion from the engine B, or in any other suitable manner. The boring apparatus comprises a plunger-cylinder, *a*, in which the plunger for the boring-tool operates.

C designates a packing-ring constituting a plunger, and arranged upon the upper end of the shank *b* of the chisel to prevent the turning of the boring-tool during its longitudinal movement. The tool is provided with longitudinal grooves *c*, into which extend pins or projections extending from the inner surface of the plunger-cylinder *a*. A coil-spring, *d*, arranged between the plunger C and an annular rim or flange, C^2, upon the inner side of the plunger-cylinder *a*, assists in moving the boring-tool in one direction.

F designates the chisel, which, in the example of my improvement shown in Figs. 1 and 3, is adapted for full boring. Through the head of the chisel extend passages *h*, communicating with a passage, *g*, which latter communicates in turn with the interior of the shank *b* of the boring-tool. Another passage, *g′*, affords communication between the interior of said shank and the upper part of the plunger-cylinder.

In the example of my improvement shown in Figs. 5, 6, and 7 the parts are like those shown in the previous example, except that a

chisel for core-boring is employed and that the shank of the boring-tool is made in sections, the lower section, X, of which is screw-threaded on the upper section, *q*, at *r*. The section *q* also extends in this instance somewhat above the plunger C, and is provided at its upper end with a head, through which extends the aperture *g'*. The lower portion of the interior of the section X is made conical, and within it is arranged a core-cutter, *t*, adapted, when the chisel is raised, to operate upon the conical surface just referred to, and so cut and break the core.

Water is forced downwardly through the pipes *k* and *i* into the plunger-cylinder, forcing the chisel down to make its stroke. If suction be then applied, it, with the assistance of the spring *d*, will again raise the chisel. A very rapid operation of the chisel may thus be occasioned. When water is forced downwardly, a portion passes into the interior of the shank *b* of the tool, and thence through the chisel through the passages *h*, or, as in the example shown in Fig. 5, through the center of the chisel to wash the blades. This rinsing-water will be forced upwardly around the exterior of the plunger-cylinder and the pipe *i* to above ground. As the work proceeds, the boring apparatus may be lowered in any suitable manner in order to feed the tool.

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

1. In a hydraulic boring apparatus, the combination, with a pump, of a plunger-cylinder, pipe-connections between the same, a plunger within the said cylinder, and a boring-tool connected with the plunger, all being so arranged and combined that the pump will cause the lifting and forcing downward of water in the bore-hole to elevate or depress the boring-tool, substantially as specified.

2. In a hydraulic boring apparatus, the combination, with a pump, of hollow connecting-rods, a cylinder connected to one of said rods, a plunger within said cylinder, a boring-tool, and a spring for assisting in the elevation of the plunger, substantially as specified.

3. In a hydraulic boring apparatus, the combination, with a pump, of hollow connecting-rods, a cylinder connected to one of said rods, a hollow plunger within said cylinder, and a boring-tool, said plunger and boring-tool being provided with apertures for the passage of water, substantially as specified.

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

FRIEDRICH BUSCHMANN.

Witnesses:
CHR. HOSER,
H. RAUPF.