No. 665,807. Patented Jan. 8, 1901.

G. A. STARR.

BALANCE PUMP.

(Application filed July 26, 1899.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

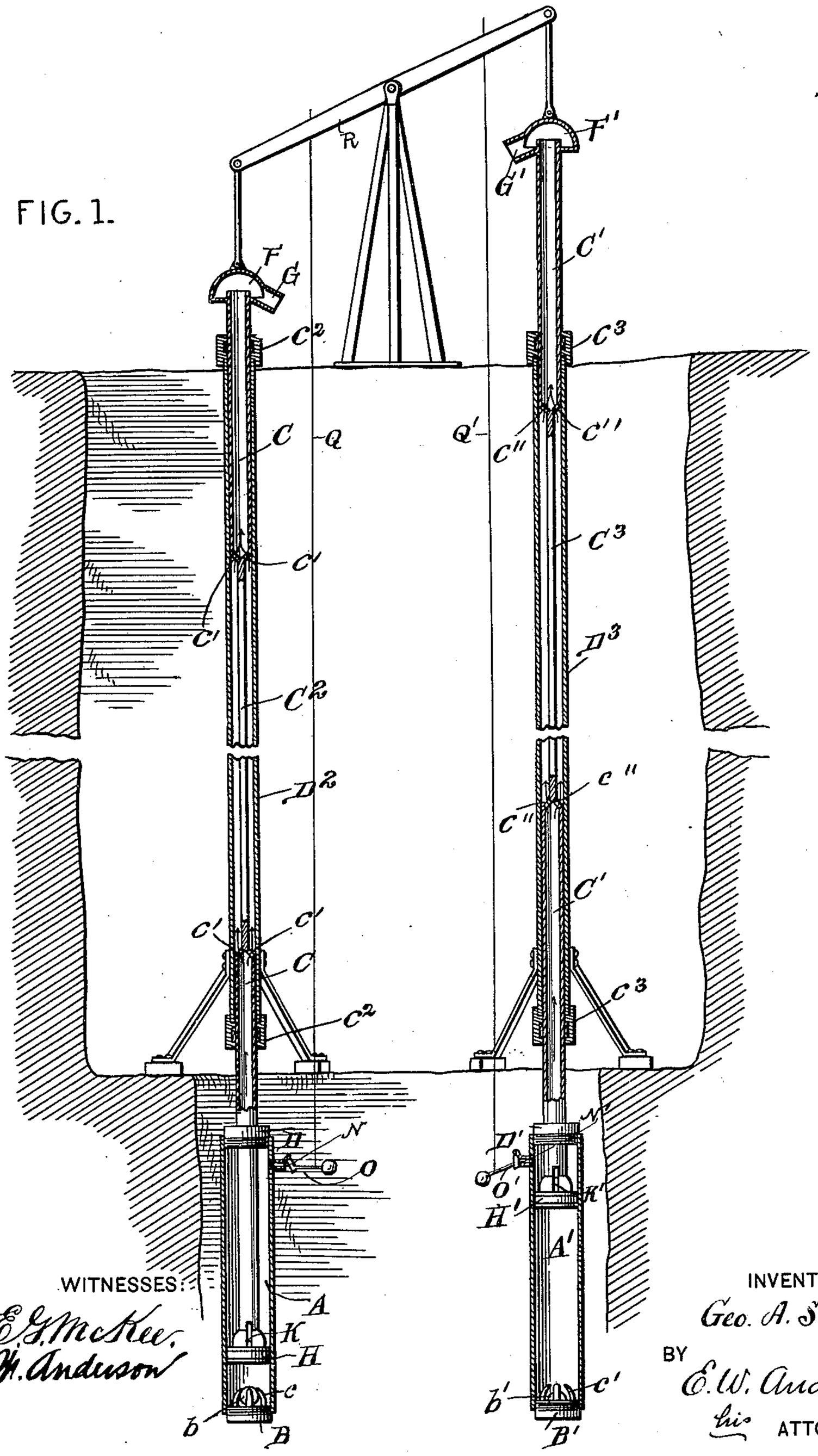

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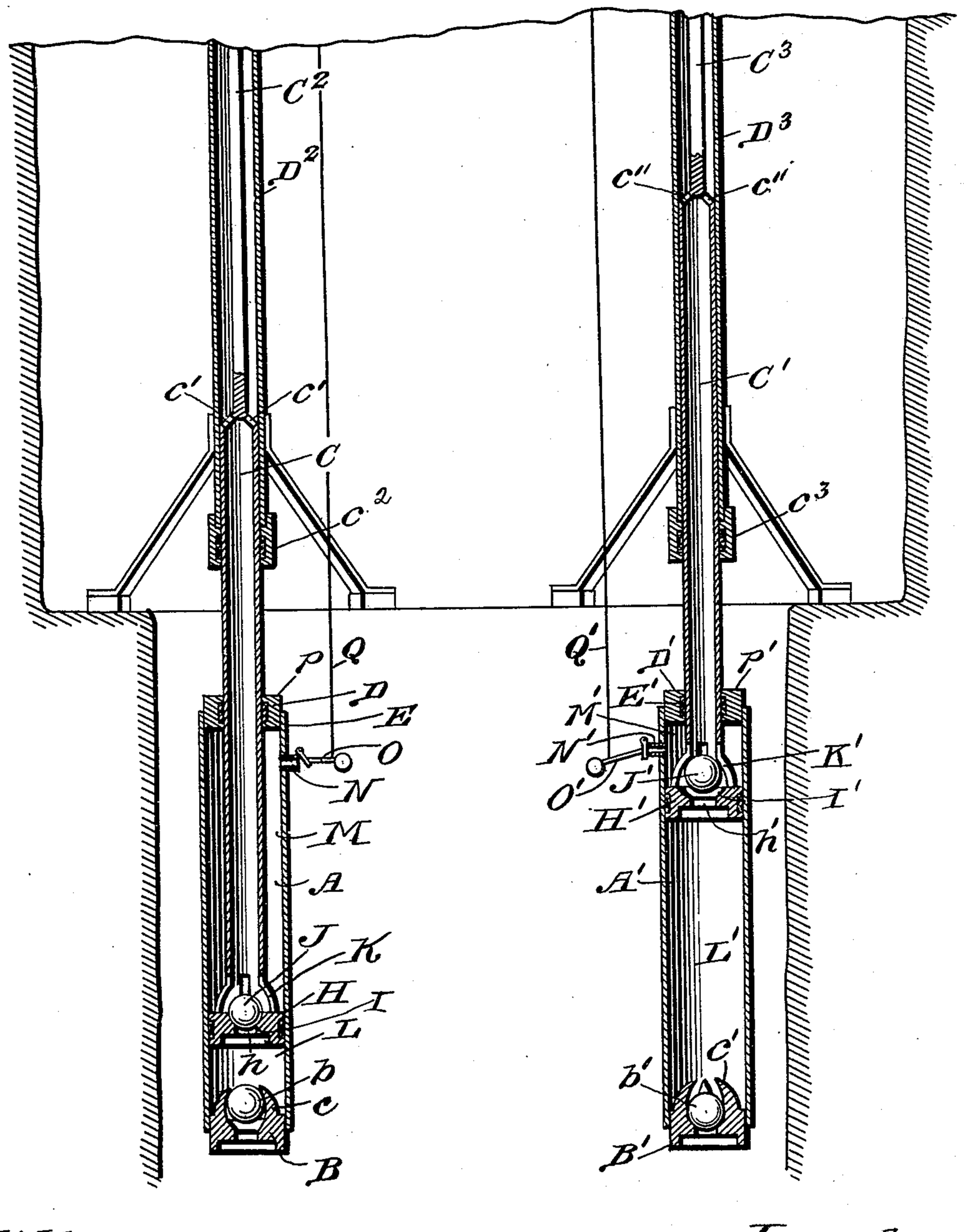
FIG. 2.



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UNITED STATES PATENT OFFICE.

GEORGE A. STARR, OF WHITEWATER, COLORADO.

BALANCE-PUMP.

SPECIFICATION forming part of Letters Patent No. 665,807, dated January 8, 1901.

Application filed July 26, 1899. Serial No. 725,142. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. STARR, a citizen of the United States, and a resident of Whitewater, in the county of Mesa and State of Colorado, have invented certain new and useful Improvements in Balance-Pumps; 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, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

Figure 1 is a central vertical section through my pump, the pistons and piston-rods thereof being unsectioned. Fig. 2 is a longitudinal section through my pump on a larger scale, showing the relative positions of the piston and inlet valves in the operation thereof.

This invention has relation to pumps, and is designed to provide a pump for use in deep shafts or wells.

With this object in view the invention consists in the novel construction and combination of parts, all as hereinafter described, and pointed out in the appended claims.

Referring to the accompanying drawings, the letters A A′ designate two parallel vertical cylinders of the pump. These two cylinders are both of the same construction, as are also their pistons, valves, and other parts, and the description will be confined to the cylinder A and its parts, corresponding parts of the cylinder A′ for convenience of reference being denoted by similar letters of reference, but differentiated by the exponent 1. The lower end of the cylinder is provided with a valve-seat B for an inlet-valve *b*, which in the present instance is a ball-valve. *c* designates the cage for said valve. C designates a tubular piston-rod which is extended up through the head D of the cylinder and the stuffing-box E thereof and is made in two separated sections connected by a solid rod C^2 and communicating through ports *c′ c′* thereof. The portions of these sections outside of the cylinder fit snugly and are arranged to work in a stand-pipe D^2, suitably supported and braced and provided with stuffing-boxes c^2 at its extremities. The piston-rod sections should be each of a length a few inches longer than the stroke, the extra length being for the purpose of supporting the said sections in the stand-pipe at the limits of the stroke. It is obvious that the length of the rod C^2 may be varied in accordance with the depth of the well or shaft. At the upper end of the upper tubular rod-section is provided an enlarged receiving-chamber F, from which extends the discharge G. This piston-rod is of considerably less diameter than the cylinder in which it is concentrically placed. It is provided at its lower end with the head H, which works neatly in the cylinder, and is provided with a port *h*, valve-seat I, and valve J. Just above the valve the piston-rod is provided with a lateral port or ports K, formed by a slotted or foraminated connection of said piston-rod and head, the slots or the like extending above the valve in its highest position and immediately surrounding the valve.

L designates the chamber of the cylinder below the piston, and M designates the chamber above the piston.

N designates a waste outlet and cock with which the cylinder is provided just below the head D. O is a weighted arm which normally holds said cock closed, and Q is a rope or the like connected to the said arm and leading to some point where it may be conveniently operated to open said cock when desired. This arm O is pivoted to the cylinder through the valve attached thereto and is weighted at its outer end.

R designates a walking-beam to which the piston-rods are connected and which may be actuated by any suitable power.

The operation is as follows: In the drawings the piston-rod C is supposed to be on the upstroke and the rod C′ on the downstroke. Valve *b* is opened to fill the chamber L and valve *b′* is closed. The upstroke of the piston-head H forces the water in the chamber M into the chamber of the tubular rod C through the port or ports K and through said rod into the receiving-chamber F at its upper end and from thence into the discharge G, to which a hose may be attached. At the same time the valve J′ in the piston-head H′ is open and the water in the chamber L′ is forced past said valve into the rod C′ and through its ports K′ into the chamber M′. Both piston-rods are constantly kept full, and

where the cylinders are partially or wholly submerged the moving parts are very nearly balanced, which also effects a large saving in power.

In sinking a well or shaft where there is a large volume of water and it is also necessary to blast rocks the cylinders need not be placed in the water, but may be secured as far above the water as is necessary within the limit of atmospheric action, and flexible suction-hose may be connected to the lower ends of the cylinders. When it becomes necessary to blast, the hose may be removed. After the blast the cylinders may be submerged to any depth.

The waste-cocks N N′ may be opened from the surface by means of the ropes Q Q′ and the pistons and cylinders thereby drained to prevent freezing or when the pump is to be removed or repaired.

For drilled wells or for light domestic purposes but one of the cylinders may be employed. In the case of drilled wells, especially where the bore is not large enough to admit two cylinders, a single cylinder-pump of this character with a counterbalance attachment will be found of great value.

It will be noted that owing to the hemispherical character of the receiving-chambers F the stream of water rising in the hollow piston-rods will be deflected or spread radially and downwardly in all directions toward the bottom wall of the receiving-chamber, which is taken advantage of by the discharge-passages inclined downwardly from the bottom walls of said chambers to increase the force of the delivery of the water. At the same time, owing to the fact that the hollow piston-rods extend a considerable distance beyond the bottom walls of said chambers F and to the fact that said chambers are of considerably greater diameter than said rods, any tendency of the water to return to the piston-rods from said chambers is avoided, which also results in increased force of delivery of the water.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a pump, the combination with a cylinder having an inlet port and valve, of a piston-head working in said cylinder, and a tubular piston-rod having communication with the cylinder upon both sides of said head, said rod being formed in two separated communicating sections, connected together, and working in a stand-pipe, the upper of said sections having a discharge-opening, substantially as specified.

2. In a pump, the combination with the cylinder, the piston-head, and the hollow piston-rod working in said cylinder and having outlet-ports at its upper end, of a second hollow rod separated from said piston-rod, having inlet-ports at its lower end, and a receiving-chamber at its upper end provided with a discharge-opening, a connecting-rod for said hollow rods, and a stand-pipe in which said rods work, and through which said hollow rods communicate, together with the self-closing waste-cock, and means for opening said cock, substantially as specified.

3. In a pump, the combination with the cylinder, the piston-head and the hollow piston-rod communicating with said cylinder, of a second similar tubular rod having a discharge-opening and connected and communicating with said first-named rod, but separated therefrom, and a stand-pipe in which said rods work and through which they communicate, said pipe having stuffing-boxes at its extremities, substantially as specified.

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

GEORGE A. STARR.

Witnesses:
W. C. MESERRE,
W. G. RAMEY.