(No Model.)

G. R. YOUNG & C. SHAW.

WATER RAISING APPARATUS.

No. 572,850. Patented Dec. 8, 1896.

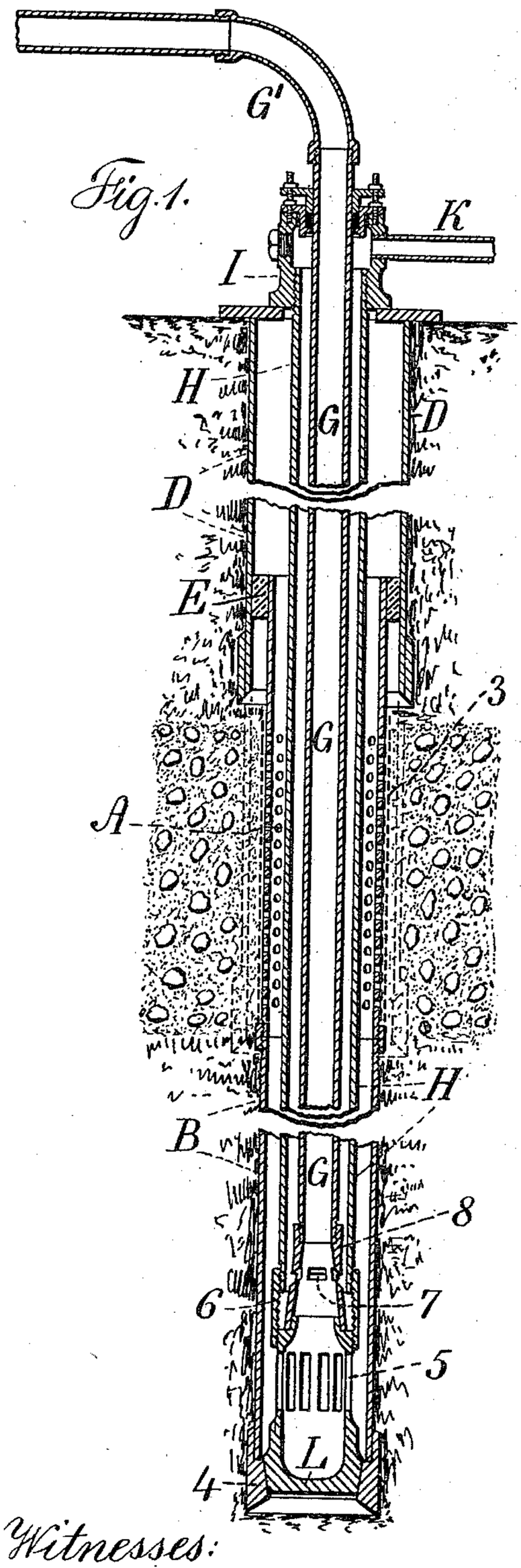

Fig. 1.

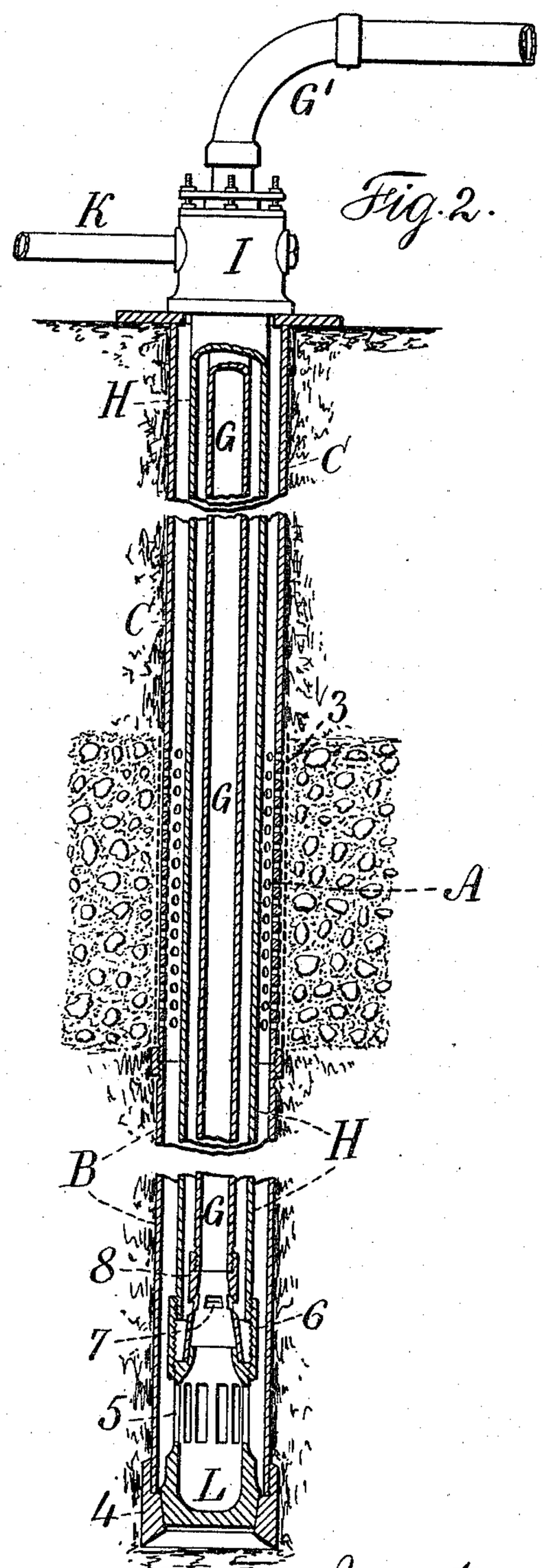

Fig. 2.

Witnesses:
J. Stair
Chas. A. Smith

Inventors:
George R. Young
Clifford Shaw
per Samuel W. Serrell Atty.

UNITED STATES PATENT OFFICE.

GEORGE R. YOUNG, OF RIDGEWOOD, NEW JERSEY, AND CLIFFORD SHAW, OF NEW YORK, N. Y.

WATER-RAISING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 572,850, dated December 8, 1896.

Application filed November 14, 1895. Serial No. 568,925. (No model.)

To all whom it may concern:

Be it known that we, GEORGE R. YOUNG, of Ridgewood, in the county of Bergen and State of New Jersey, and CLIFFORD SHAW, residing at the city of New York, in the county and State of New York, citizens of the United States, have invented an Improvement in Water-Raising Apparatus, of which the following is a specification.

Water has been raised from Artesian wells by the action of air, such air being carried down the well and allowed to issue into the water as the same is within an uptake-pipe, thereby aerating such water so that the column within the uptake-pipe can be of much greater length but of the same weight as the external column.

Numerous wells have been constructed in which the water has been received from a water-bearing strata, the surface of which is at such a depth below the surface of the earth as to require an excavation in which to place the pumps so that such pumps will work to advantage in drawing up the water and raising the same to the desired elevation, and in wells of this character it very frequently happens that the well cannot be sunk below the water-bearing strata without coming into contact with an inferior quality of water or with materials that are objectionable for the water to commingle with.

The object of the present invention is to provide for taking the water from the water-bearing strata and for raising the same to the desired height above the surface of the earth, so as to avoid the necessity of excavations or pits in which to place the pumping apparatus, and at the same time we exclude water from the well except that which is admitted at the desired place from the strata containing the water that is to be made use of.

In carrying out our invention we sink a tube of suitable diameter as far as the bottom of the water-bearing strata, and we provide an extension therefrom or a separate tube passing down into the earth to such a distance that the water in the well will have a column of sufficient height to cause the water to rise above the surface of the earth in an uptake-pipe when aerated by jets of air directed into the water in the uptake-pipe at or near the bottom of the well, and the water from the water-bearing strata is admitted into the well-pipe through suitable openings or strainers, so that only the proper supply is allowed to descend into the well-tube. We also provide for closing the lower end of the well-tube, so that the well-tube may be sunk by the excavation of the sand or earth from below the well-tube in the usual manner by a sand-pump, and then the well-tube can be closed at the bottom to exclude objectionable material, either solid or liquid.

In the drawings, Figure 1 is a vertical section representing the apparatus in the form which is usually advantageous, having an upper well-pipe separate from the lower well-pipe; and Fig. 2 is a similar vertical section in which the well-tube is substantially continuous.

The portion A of the well-tube is perforated or slotted for the passage of water into the well-tube. The openings may be of any desired size and character and may be protected by wire netting or gauze around upon the outside of such tube, as shown at 3, and the lower closed portion B of the well-tube extends down to the proper depth to be efficient when employed, as hereinafter described, and at the lower end of this well-tube B is a shoe or annular casting 4, having an exterior cutting edge and a central opening through which a sand-pump may be employed, as usual, for the removal of the materials as the well-tube is sunk or driven down.

The interior surface of the shoe 4 is of smaller diameter than the interior of the well-tube B, and it forms a seat for the removable plug L, hereinafter referred to.

The upper end C of the well pipe or tube may be a continuation of the perforated portion A, as seen in Fig. 2, but we prefer to sink a larger well-tube D from the surface of the earth to the bottom of the water-bearing strata, and then proceed to insert the well-tube B with the strainer A, and after these have been driven down to place the larger well-tube D can be drawn up sufficiently to uncover the perforated portion A of the well-tube to allow the water to run into the well, and a packing E of any suitable character is

introduced between the upper portion of the well-tube A and the interior of the larger well-tube D.

Any suitably-arranged pipes may be made use of for aerating the water and causing the same to rise from the bottom of the well in an uptake-pipe to the surface of the earth or other place of discharge.

We have represented an uptake-pipe G surrounded by an air-pipe H, there being a head I connected to the upper end of the air-pipe and fitting tightly around the uptake-pipe G, and a pipe K, through which air from a suitable compressor is introduced and passes down in the annular space between the pipe H and the uptake-pipe G, and such air escapes at the lower part of the well into the uptake-pipe G to aerate the column of water and cause the same to rise by the weight of the column of water in the well to the place of delivery. We have represented a bend at G′ for the delivery of the aerated water.

We find it advantageous to make the lower end of the pipe H with a conical plug L to close the lower end 4 or shoe of the well-pipe, so as to exclude water or other materials and prevent the same passing into the lower end of the well-tube B, and by making this conical plug L with a cylindrical upper portion 5, having a reducer or coupling 6 by which the same is connected to the pipe H, the plug and the cylinder can be drawn out whenever the pipe H is raised, and the cylinder 5 should be slotted sufficiently to allow the water to pass freely into such cylinder, and it is also advantageous to make use of a reducer 8 at the lower end of the uptake-pipe G, so that the parts may be held in their proper relative positions, and the air may issue from the air-space between the pipe H and the pipe G into this uptake-pipe G through any suitable openings 7, either annular or in the form of jet-nozzles or numerous perforations.

Under all circumstances the column within the uptake-pipe G is elongated, by the bubbles of air in the water, to the desired extent without being any heavier than the column of water within the well, and by having reference to the height to which the water is to be raised by the action of the air and the level of the water from the water-bearing strata, as it may stand in the well, so the parts are to be proportioned for delivering the water by one lift at the desired elevated position.

In some instances a second air-lift is made use of in Artesian wells, but we have found it generally unnecessary to make use of such a device by properly proportioning the depth of the column of water in the well to the height required of the aerated column between the bottom of the well and the point of discharge.

We claim as our invention—

1. A well-tube passing through the water-bearing strata to the desired depth and having perforations at such water-bearing strata, the lower end of such tube having a contracted seat, in combination with a plug fitting such seat and closing the lower end of the well-tube, an uptake-pipe and an air-pipe extending down to near the bottom of the well, there being an opening or openings for the air to pass with the water into the uptake-pipe, substantially as set forth.

2. A well-tube passing through the water-bearing strata to the desired distance, closed at the bottom and perforated at such water-bearing strata for the passage of water, an uptake-pipe and an air-pipe descending to near the bottom of the well, openings for the discharge of the air into the water in the uptake-pipe, a larger well-tube extending from the surface to the water-bearing strata or nearly so, and a packing between the same and the well-tube, substantially as set forth.

3. A well-tube passing through the water-bearing strata to the desired depth and having perforations at such water-bearing strata, in combination with a plug for closing the lower end of the well-tube and an air-pipe connected with such plug and an uptake-pipe extending down to near the bottom of the well, there being an opening or openings for the air to pass into the water within the uptake-pipe, substantially as and for the purposes set forth.

Signed by us this 12th day of November, 1895.

GEO. R. YOUNG.
CLIFFORD SHAW.

Witnesses:
GEO. T. PINCKNEY,
S. T. HAVILAND.