(No Model.)

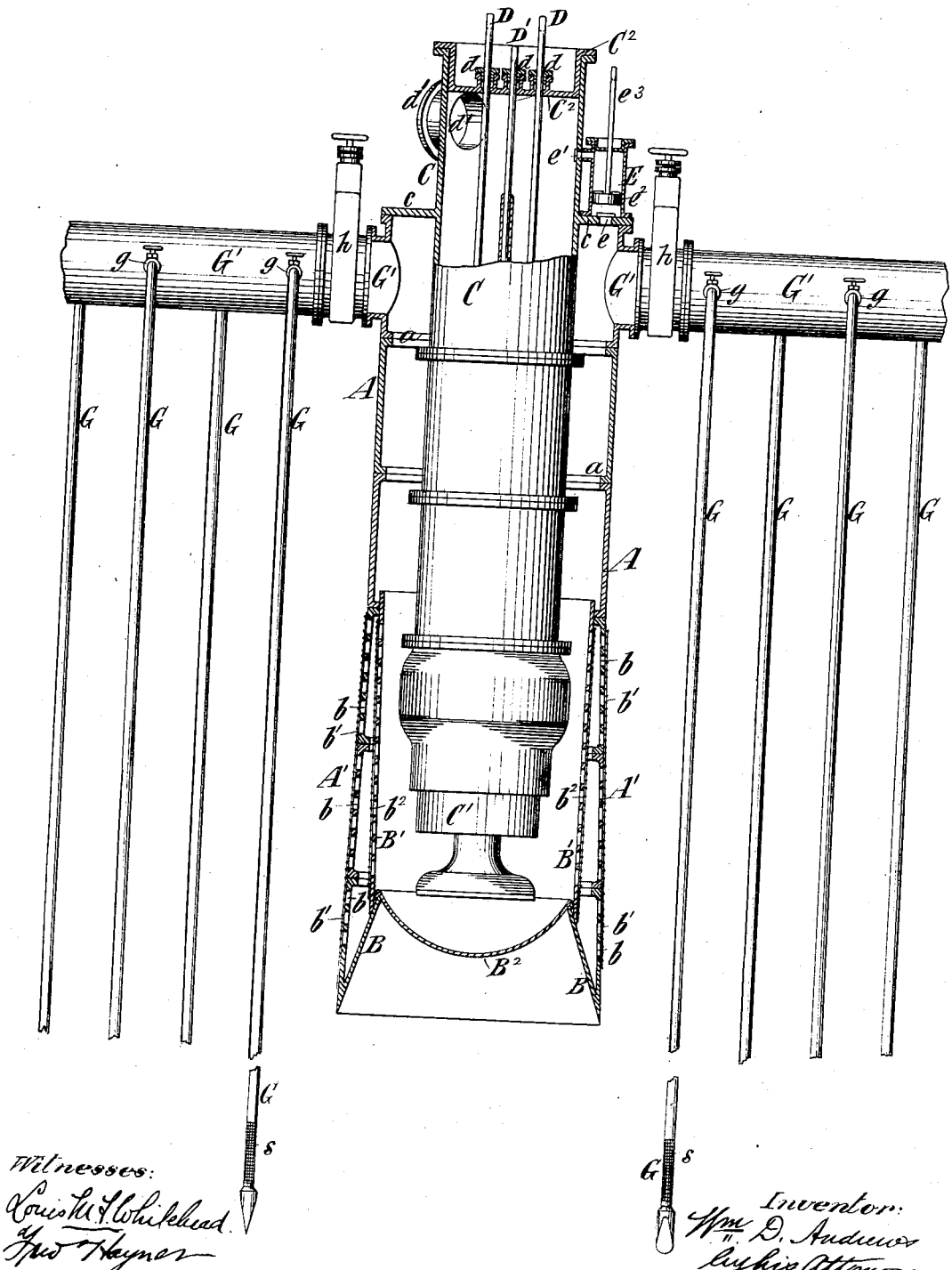
2 Sheets—Sheet 1.

W. D. ANDREWS.

MEANS FOR PROCURING WATER FROM THE EARTH.

No. 306,802. Patented Oct. 21, 1884.

Fig. 1.



Witnesses:
Louis H. Whitehead
Geo. T. Haynes

Inventor:
Wm. D. Andrews
by his Attorneys
Brown & Hall.

(No Model.) 2 Sheets—Sheet 2.

W. D. ANDREWS.

MEANS FOR PROCURING WATER FROM THE EARTH.

No. 306,802. Patented Oct. 21, 1884.

Fig 2.

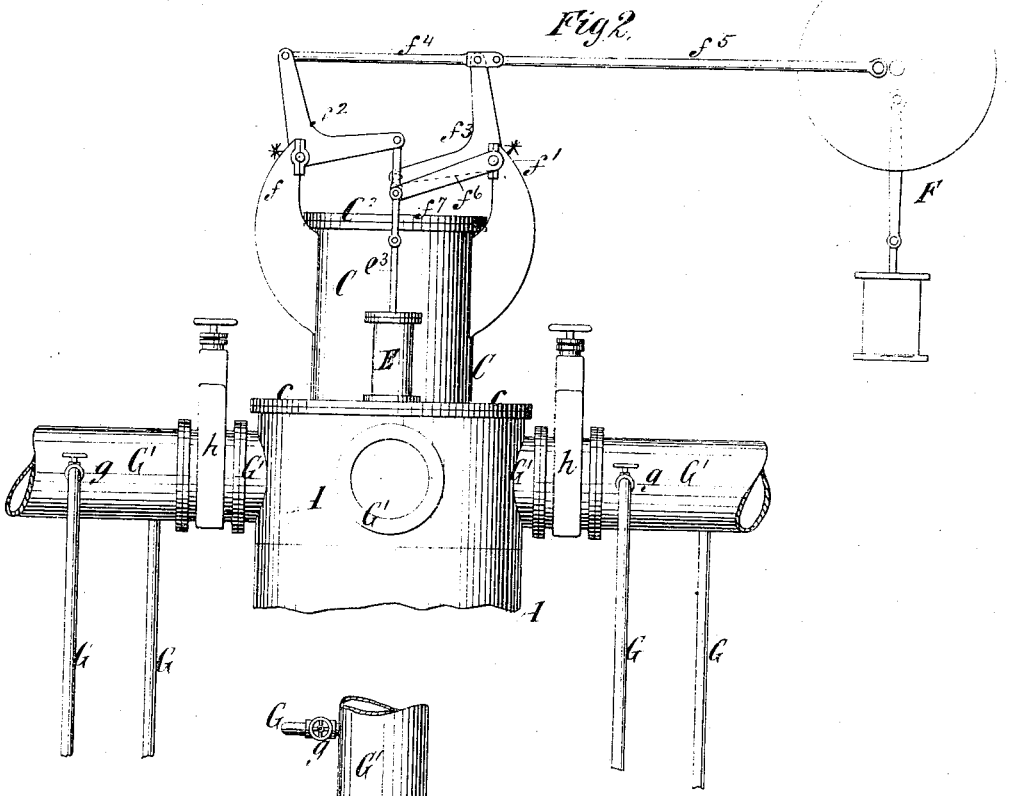
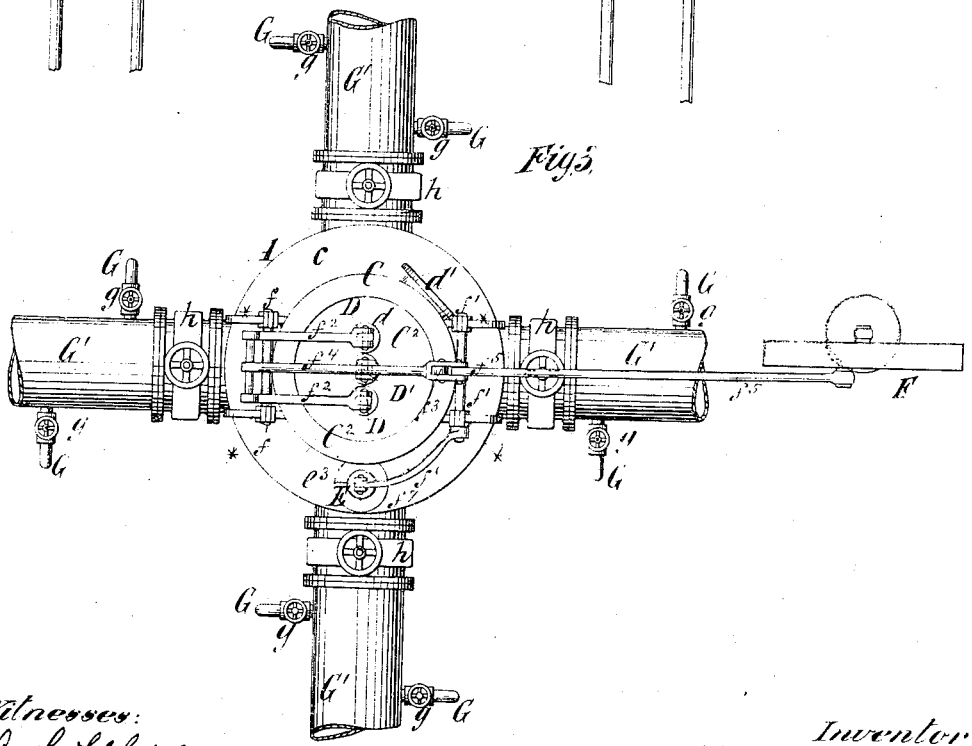


Fig 3.



Witnesses:
Louis M. Whitehead.
Geo. Taylor

Inventor:
Wm. D. Andrews
by his Attorneys
Brown & Hall

UNITED STATES PATENT OFFICE.

WILLIAM D. ANDREWS, OF BROOKHAVEN, NEW YORK.

MEANS FOR PROCURING WATER FROM THE EARTH.

SPECIFICATION forming part of Letters Patent No. 306,802, dated October 21, 1884.

Application filed February 25, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. ANDREWS, of Brookhaven, in the county of Suffolk and State of New York, have invented a new and useful Improvement in Means for Procuring Water from the Earth, of which the following is a specification.

In my application for Letters Patent of the United States filed February 28, 1884, and of which the serial number is 122,276, I have shown and described a well which consists of a cylinder or tube sunk in the earth to a point below the level of water therein, and a pump extending downward into said cylinder, the well having water-inlets either through the sides of its lower portion or through supplemental drive-wells extending downward from the closed lower end of the cylinder, or both through the sides of the cylinder and said supplemental drive-wells, and in said application it is stated that the top of the pump-cylinder may be either open and the water discharged directly from it, or closed and a discharge-pipe connected, through which to convey the water from the pump.

A well and pump combined as above described will answer well for some or many localities; but where a large quantity of water is required it is desirable to drain the water from as large a horizontal area of ground as is possible, and to this end a number of small tube or drive wells arranged in gangs have been connected at their upper ends directly with a pump-cylinder.

My present invention consists, essentially, in combining with a main well, consisting of an air-tight cylinder sunk below the level of water in the earth, and having water-inlet openings at its lower part, a number of supplemental tube or drive wells, also sunk below the level of water in the earth, and connected in an air-tight manner with the upper portion of the main well, and a pump for delivering or raising water from the lower portion of said main well. This pump will preferably be arranged within the main well and have its upper portion and discharge-pipe above the closed upper end of the main well; but in lieu of arranging the pump in the said main well, the suction-pipe of a pump may be extended downward through the upper head and into the lower part of the said main well.

The invention further consists in combining with the main and supplemental wells constructed and connected as described, and with the pump for taking water from said main well, an air-pump or an auxiliary pump connected with the closed upper portion of the main well, and serving to exhaust air from said main well and supplemental wells, said air-pump being preferably operated continuously, and connected with the discharge of the pump, so that after the air has all been exhausted from the well the auxiliary pump will work water, and thus insure the maintenance of a vacuum in said main well and supplemental wells. The air-pump, in combination with the main well and a pump for delivering water therefrom, also forms a feature of my invention.

The invention also consists in a novel combination, with the main and supplemental wells, of connections which provide for disconnecting any one or more of the supplemental wells, when desired, so that such well or wells can be repaired or replaced by another or others, or differently connected, without impairing the operation of the main well and remaining supplemental wells.

In the accompanying drawings, Figure 1 is a partly-sectional elevation of a main well, a pump arranged therein, and supplemental drive-wells connected with the upper part of said main well, for operation as hereinafter described. Fig. 2 is an elevation of the upper portion of the apparatus in a direction at right angles to the plane of the sectional view, Fig. 1, including mechanism for operating the pump, and which is connected with the extreme upper part of the closed main well; and Fig. 3 is a plan of the mechanism shown in Fig. 2.

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

A designates the main well, which consists of a cylinder composed of sections, which may be of cast metal, and which are united by flange-joints *a*. The lower portion, A′, of the cylinder is flared slightly downward, and is perforated with water-inlet openings *b*, protected by a brass or other reticulated or perforated strainer, *b*′.

At the extreme lower end of the flaring perforated portion A′, is a shoe or tip, B, which is upwardly contracted; and B′ designates a

perforated tube extending upward from the exterior of the shoe B to a point above the perforations *b* in the flaring portion A′, and also protected by a strainer, b^2.

The perforated tube B′ and strainer b^2 may be readily removed for repairs or to be replaced by a new one, and the said tube and strainer are supplemental to the main strainer *b′*, which may become impaired by abrasion or decay. The lower end of the cylinder A is closed by a head or bottom, B^2, which may be bolted or otherwise secured to the upwardly-contracted shoe B, and from which supplemental drive-wells may be extended downward into the earth, if desired.

The construction and advantages of the well here shown and the manner of sinking it are fully set forth in my application for Letters Patent filed February 25, 1884, Serial No. 122,025, and no further description thereof is here necessary, as I do not herein make any claim to the well, broadly. It is therefore only necessary to say, further, that the main well A is sunk to such a depth that its lower end will be below the level of water in the earth.

To the top of the main well A is fitted in an air-tight manner a head, *c*, and through this head extends a pump cylinder or casing, C, or the suction-pipe of a pump, which is carried downward near to the bottom of the main well. As here shown, the head *c* is formed integral with the cylinder or casing C of the pump.

A pump of any well known or suitable character may be employed to deliver water from the main well A; but that here shown is similar to the one which forms the subject of my application for Letters Patent filed February 25, 1884, and of which the serial number is 122,023, and only a brief description thereof is necessary. The cylinder or casing C extends downward within the well to a point below the water-level therein, and has at its lower end a working-barrel, C′, which is preferably removably fitted in the cylinder C, so that it can be readily removed therefrom.

Within the working-barrel C′ are fitted two annular pistons, which are moved simultaneously toward and from each other by suitable mechanism acting through the rods D D D′, which work through stuffing-boxes *d* in the head C^2, which closes the upper end of the cylinder C in an air-tight manner. The two piston-rods D D are connected with and operate the upper piston, and the single piston-rod D′ is connected with and operates the lower piston.

Immediately below the head C^2 and above the closed top of the well A is the discharge-pipe *d′*, and as the upper side of this discharge-pipe is coincident with the under side of the head C^2, air cannot accumulate in the pump cylinder or casing C.

E designates a small air-pump or auxiliary pump-cylinder, which communicates by a suction-opening, *e*, with the top of the well A, and by a discharge-opening, *e′*, with the pump cylinder or casing C.

In the cylinder E is a valvular piston, e^2, which is operated through a piston-rod, e^3. This auxiliary pump serves to keep the well free from air, and if operated continuously will do this, and will also pump water when there is no air in the well. The said auxili ry pump E discharges into the cylinder C, and both water and air escape through the pipe *d′*.

The mechanism for operating the two pump-pistons is similar to that shown and described in my aforesaid application, Serial No. 122,023, and is shown in Figs. 2 and 3, as is also the mechanism for operating the air or auxiliary pump E.

Above the pump cylinder or casing C are two rock-shafts, *f f′*, mounted in bearings *.

On the shaft *f* are two bell-crank levers, f^2, the horizontally-extending arms of which are connected with the piston-rods D, and on the shaft *f′* is a bell-crank lever, f^3, the horizontally-extending arm of which is connected with the piston-rod D′. The upwardly-extending arms of the bell-crank levers f^2 f^3 are connected by a link, f^4, and are operated in unison through a connecting-rod, f^5, by an engine, of which I have here shown only an arbitrary representation, F.

On the rock-shaft *f′* is arm f^6, which is connected by a link, f^7, with the piston-rod e^3 of the auxiliary pump E.

By the mechanism described, or any other mechanism of suitable character, the two valvular pistons of the main pump are moved simultaneously toward and from each other.

G designates supplemental drive-wells, of which a number are connected in any suitable air-tight manner with the upper part of the main well A, and the perforated lower ends of which are protected by strainers *s*. As here shown, these supplemental wells G are connected with main pipes G′, which extend from the main well A to any desired distance. Four main pipes G′ are shown in Fig. 3; but any number may be used.

The supplemental wells G are connected alternately with opposite sides of the main pipes G′, and in each supplemental well is a stop-valve, *g*, whereby that well may, when desired, be cut off from communication with the main pipe G′.

In each main pipe G′, near its point of connection with the main well A, is a straight-way or sluice valve, *h*, whereby that main pipe and all its supplemental wells G may be cut off from communication with the main well A when desired. I can therefore cut off any one or more of the supplemental wells G or any one or more of the main pipes G′, with all the supplemental wells therewith connected, when necessary for repair or for any other purpose, without stopping the pumping apparatus and without impairing the operation of the other wells.

When air is exhausted from the main well

and supplemental wells, a siphon-like action takes place, each supplemental well constituting one leg of a siphon, and the annular space between the interior of the main well and the pump-cylinder constituting the other leg of the siphon.

In soils where water may be obtained from different strata at varying depths I sink the supplemental wells G to varying depths for the purpose of controlling a horizontal supply of water through a greater depth of soil and decreasing the rapidity of its flow through the earth.

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

1. The combination, with a main well consisting of an air-tight cylinder or tube sunk below the level of water in the earth, and having water-inlet openings at the lower part, of supplemental tube or drive wells having an air-tight connection with the upper part of said main well, and a pump for delivering water from said main well, substantially as herein described.

2. The combination, with the air-tight main well having the flaring perforated lower portion which is sunk below the level of water in the earth, of a pump extending downward through the closed head of the well and below the level of water therein, and a number of supplemental drive-wells connected with the upper part of the main well, substantially as herein described.

3. The combination, with a main well consisting of an air-tight cylinder sunk below the level of water in the earth and having water-inlet openings at the lower part, of a pump extending downward through the closed upper end of the well, supplemental drive-wells connected with the upper part of the main well, and an air-pump connected with the upper part of the main well, substantially as herein described.

4. The combination, with a main well, A, having water-inlet openings at the lower part, of a pump extending downward through the closed head of the well, and having a discharge-outlet above said head, a number of supplemental drive-wells connected with the upper part of the main well, and an auxiliary pump having its suction connected with the upper part of said main well and its outlet connected with the discharge from said pump, substantially as herein described.

5. The combination, with the main well consisting of an air-tight cylinder, A, having water-inlets at the lower part, of a pump extending downward through the closed head of the well, and an auxiliary pump connected with the upper end of the well, substantially as herein described.

6. The combination, with the well consisting of an air-tight cylinder, A, having the downwardly-flaring perforated and strainer-protected lower portion, A′, of a pump cylinder or casing extending downward through the closed upper end of the well to a point below the water-level therein, substantially as herein described.

7. The combination, with a main well consisting of an air-tight cylinder sunk below the level of water in the earth, and having water-inlet openings at its lower part, of a pump for delivering water from said main well, a main pipe extending from the upper part of said well, and a number of supplemental drive-wells connected with said main pipe, substantially as herein described.

8. The combination, with a main well consisting of an air-tight cylinder sunk below the level of water in the earth, and having water-inlet openings at the lower part, of a pump for delivering water from said main well, a main pipe, G′, extending from the upper part of said main well, and supplemental drive-well G, connected with said main pipe, and each provided with a valve, *g*, substantially as herein described.

9. The combination, with a main well consisting of an air-tight cylinder sunk below the level of water in the earth, and having water-inlets at its lower part, of a pump for delivering water from said main well, a number of main pipes, G′, extending from the upper part thereof, and each provided with a valve, *h*, and supplemental drive-wells G, connected with said main pipes, substantially as herein described.

10. The combination, with a main well, A, consisting of an air-tight cylinder having openings in its lower part, of a pump for delivering water therefrom, a number of main pipes, G′, each provided with a valve, *h*, and supplemental drive-wells G, connected with said main pipes G′, and severally provided with valves *g*, substantially as herein described.

WM. D. ANDREWS.

Witnesses:
SARAH N. PARSHALL,
FREDK. HAYNES.