W. S. BLUNT.

DEEP WELL PUMP.

No. 186,408. Patented Jan. 23, 1877.

FIG. 1.

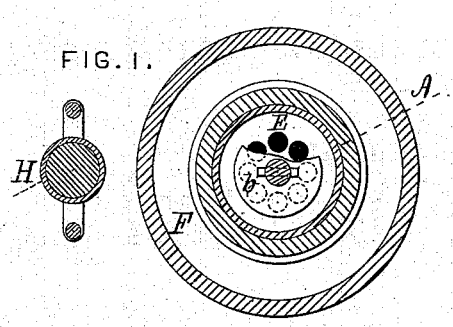


FIG. 2.

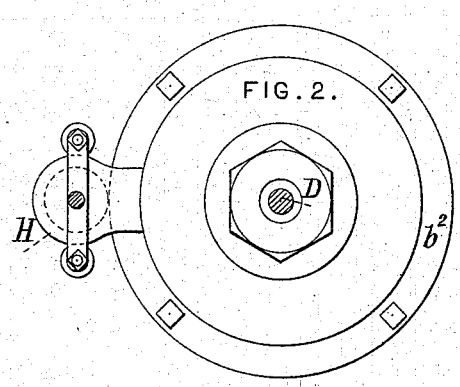


FIG. 3.

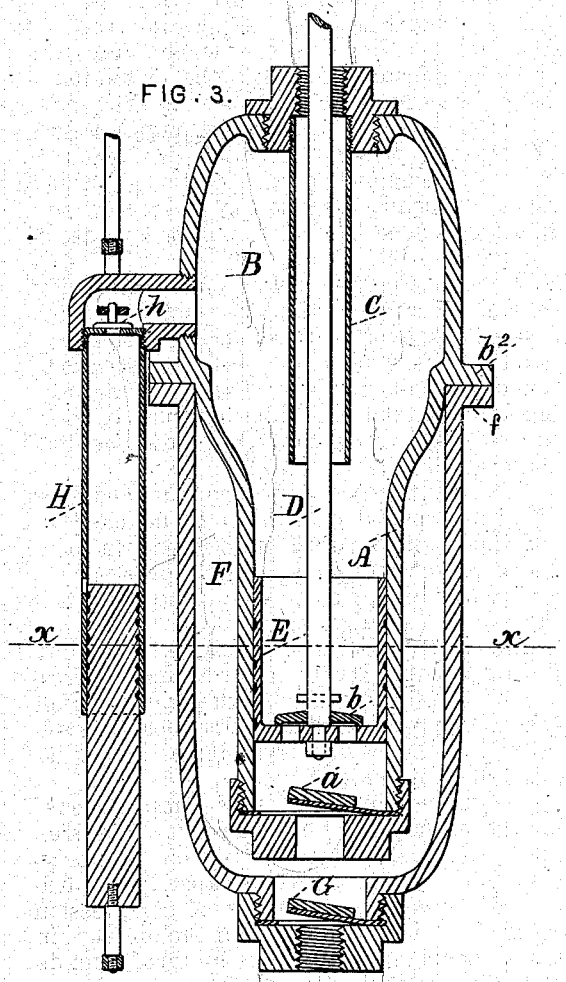
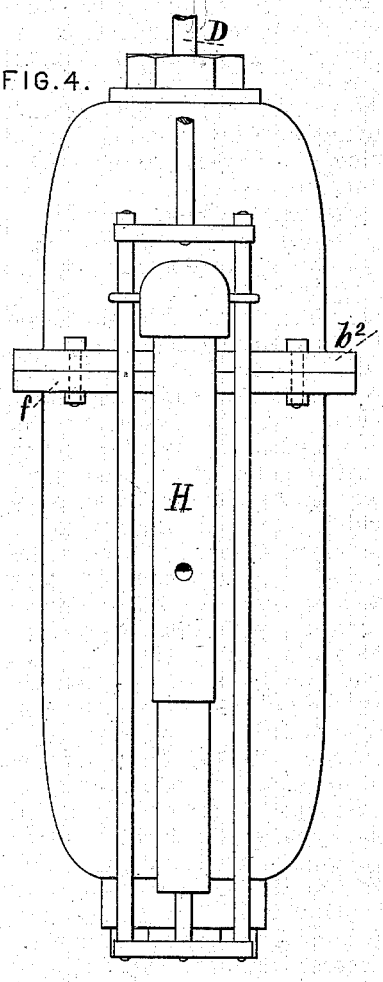


FIG. 4.



WITNESSES.

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UNITED STATES PATENT OFFICE.

WILLIAM S. BLUNT, OF BAY RIDGE, NEW YORK, ASSIGNOR TO KATE S. BLUNT, OF SAME PLACE.

IMPROVEMENT IN DEEP-WELL PUMPS.

Specification forming part of Letters Patent No. **186,408**, dated January 23, 1877; application filed February 19, 1876.

To all whom it may concern:

Be it known that I, WILLIAM S. BLUNT, of Bay Ridge, Kings county, New York, have invented, made, and applied to use Improvements in the Construction of Pumps; and that the following is a full, clear, and correct description of the same, reference being had to the accompanying drawing, making part of this specification, and to the letters of reference marked thereon, in which—

Figure 1 is a section at line *x x* of Fig. 3. Fig. 2 is a top view of my invention. Fig. 3 is a sectional view of my invention. Fig. 4 is a side view of my invention.

In the drawing like parts of the invention are indicated by the same letters of reference.

The nature of the present invention consists in certain improvements in the construction of deep-well pumps, as more fully hereinafter set forth; the object of the invention being, by combining with a pump constructed in the ordinary manner an air-chamber, a vacuum-chamber provided with a check-valve, and a suction-cylinder, to raise readily water, under the most favorable known conditions, to a great height, and by combining with the same an air-pump, to insure the full efficiency of the air-chamber, as hereinafter set forth.

To enable those skilled in the art to make and use my invention, I will describe its construction and operation.

A shows the suction-cylinder, formed of iron or any suitable metal, composed of a section of a cylinder, the metal being continued and rising above the upper end of the suction-cylinder, and forming, as it were, a dome, which comprises, with the pipe C, the air-chamber B of my improved pump. This dome is provided with an annular flange, b^2, on its exterior, for the purposes hereinafter set forth. *a* shows a seat-valve, placed at the bottom of the suction-cylinder, as is usual. C shows a pipe, held about centrally in the chamber B, through which pipe the piston-rod D works. The piston-rod D is passed through the piston E, and secured upon the under side of the same, and over it and within the piston is a puppet-valve, *b*.

It will be seen that such a construction of piston-rod and piston allows of the ready disconnecting or repairing of either, if necessary.

The piston E is made hollow, and the rod D is attached on its under side, and not at the top of the piston, so that as the piston-rod is raised the piston is passed around the pipe C of the air-chamber B, and the longest length of stroke of piston is secured with economy of means employed. The piston E is also made unusually long, so that increased suction unattended by corresponding increase of friction results.

F shows the vacuum-chamber, formed of iron or suitable metal, made semi-ellipsoidal, and passed over and around the suction-cylinder A. It is flanged at its upper end, as at *f*, and through this flange *f* and a corresponding flange, b^2, upon the dome are passed bolts, securing the air-chamber B to the vacuum-chamber F.

To the lower end of the vacuum-chamber F, placed centrally, is securely fastened an additional valve, G, serving the purpose of a check or retaining valve. H shows an air-pump, provided with a valve, *h*, and let into the side of the air-chamber B.

The object of this air-pump is to supply the air-chamber B with air, as air under pressure becomes absorbed by the water, which takes its place in the air-chamber, thus depriving the deep-well cylinder of one of its most efficient auxiliaries.

The further object of the air-pump is to enable the air-chamber to perform its functions under the most favorable conditions—namely, supplied with air to its full capacity, regardless of changing conditions of compression therein. It is manifest that if the pressure in the air-chamber be, say, one hundred pounds to the square inch, the air is compressed, say, to one-fourth the space of the air-chamber, the water occupying the balance of the air-chamber. The pump now, by a few strokes, expels this water, and fills the chamber full of air, compressed to the same density as that contained in it before the pump was operated, thus, at all times, giving the full power of the air-chamber.

Such being the construction, the operation

is as follows: The pump is placed in the well in the usual manner, within good suction distance of the water, and is connected to the water by means of a "suction-pipe," and to the surface by a "rising main." The piston-rod, to which the piston is attached, is operated by hand, or otherwise, and as the piston attached to the piston-rod is raised, it draws the water through the suction-pipe and through the check-valve in the vacuum-chamber. At this point the upstroke of the piston is completed, and the piston commences its down-stroke, the valve in the suction-chamber is closed, and the plunger-valve is opened, and a body of water enters the piston, and upon the upstroke of the piston rod is carried up as far as the power exerted will admit, whence it may be supplied to a pipe or pipes connected with the pump. Thus the water passes from the suction-pipe through the pump in a direct line.

The advantages resulting from combining the vacuum-chamber with a pump constructed as set forth are, that the inertia of the water in the suction-pipe is overcome, which, if the vacuum-chamber were not used, would have to be overcome at each stroke of the piston, and, from its shape and the fact that it envelops the suction-cylinder, facilitates the supply of water to the suction-cylinder.

Its operation is as follows: When the piston is first started, the vacuum-chamber and suction-pipe are full of air. Before any water can be drawn up through the suction-pipe this air becomes rarefied, so that the water on arrival at the vacuum-chamber rises up in it to supply the partial vacuum created, and from the shape of the vacuum-chamber the air remaining therein is in the upper part, and of normal density, while the water stands above and around the suction-cylinder. When the piston is again operated, a vacuum is created in the suction-cylinder, and the water held in suspense in the vacuum-chamber by the atmospheric pressure upon the surface of water contained in the well drops of its own gravity, and rises in the suction-cylinder past the seat-valve, to supply this vacuum, aided in its action by the expansion of the air in the upper part of the vacuum-chamber. The column of water in the suction-pipe has, in the meanwhile, been started in motion, and runs steadily into the vacuum-chamber, while the pump supplies itself from the vacuum-chamber. Thus no concussive action results, and economy of power required to operate the pump is gained. The pump being a single-action pump, sucking its water only on the upstroke, as its piston descends for more water, the seat-valve in the suction-cylinder closes, and the column of water flows steadily into the vacuum-chamber, which again supplies the suction-cylinder, as above described; and this operation continues, the water being supplied to the vacuum-chamber, and from the vacuum-chamber to the suction-cylinder.

Having now set forth my invention, what I claim as new is—

1. The combination of a suction-cylinder, A, pipe C, piston-rod D, piston E, puppet-valve *b*, surrounded by a vacuum-chamber, F, provided with a valve, G, constructed and operating substantially as and for the purposes set forth.

2. The suction-cylinder A, pipe C, piston-rod D, piston E, and puppet-valve *b*, surrounded by a vacuum-chamber, F, provided with a valve, G, in combination with an air-pump, H, provided with a valve, *h*, constructed and operating substantially as and for the purposes set forth.

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Witnesses:

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