No. 737,928. PATENTED SEPT. 1, 1903.

N. A. HEYMAN.

DEEP WELL PUMP.

APPLICATION FILED FEB. 26, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1

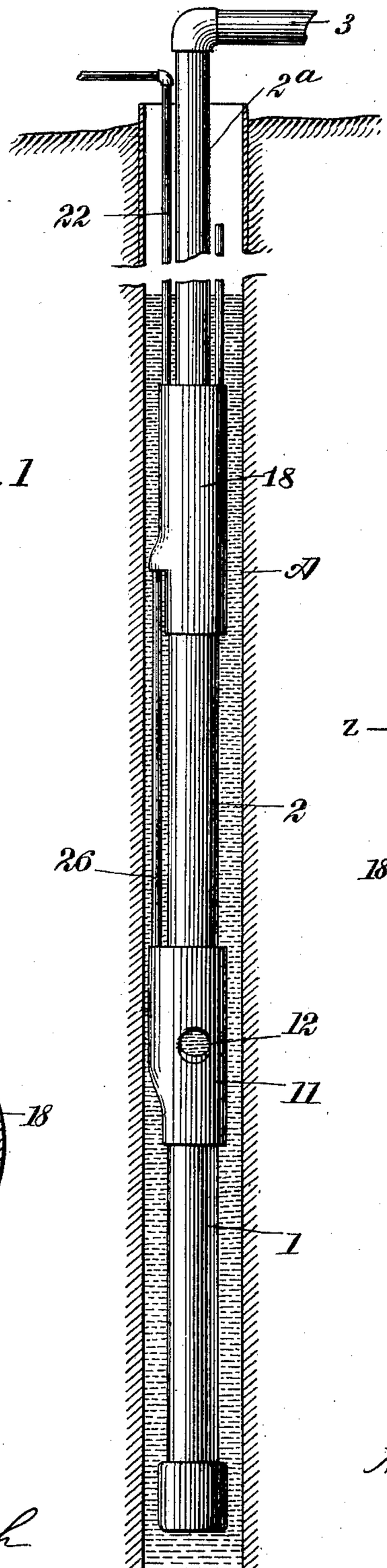


Fig. 5.

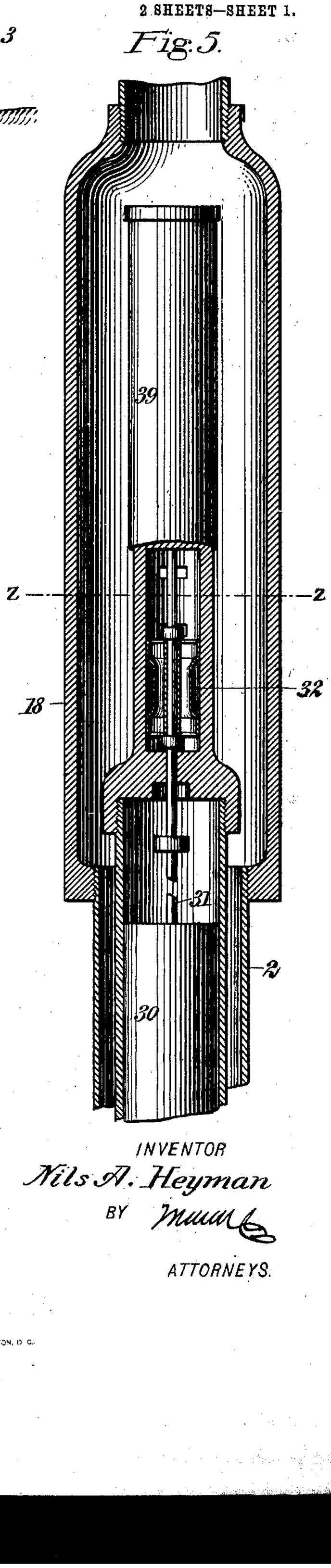
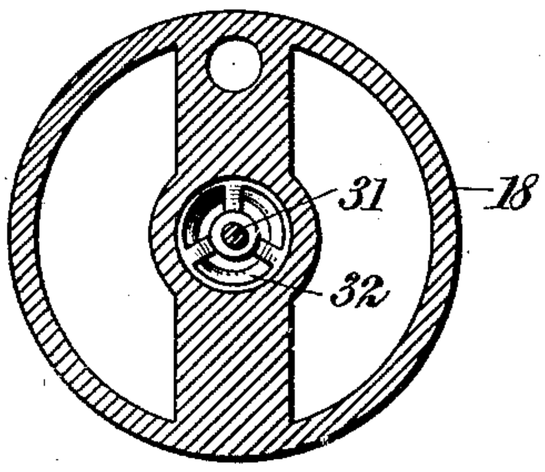


Fig. 6.



WITNESSES:

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NO MODEL. 2 SHEETS—SHEET 2.

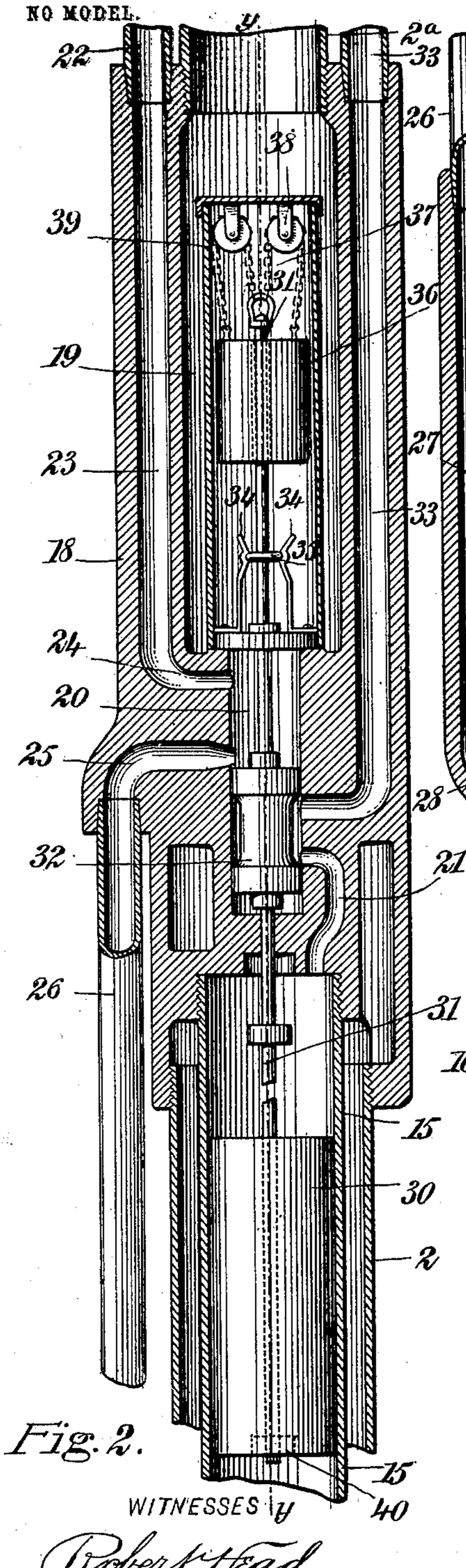

Fig. 2.

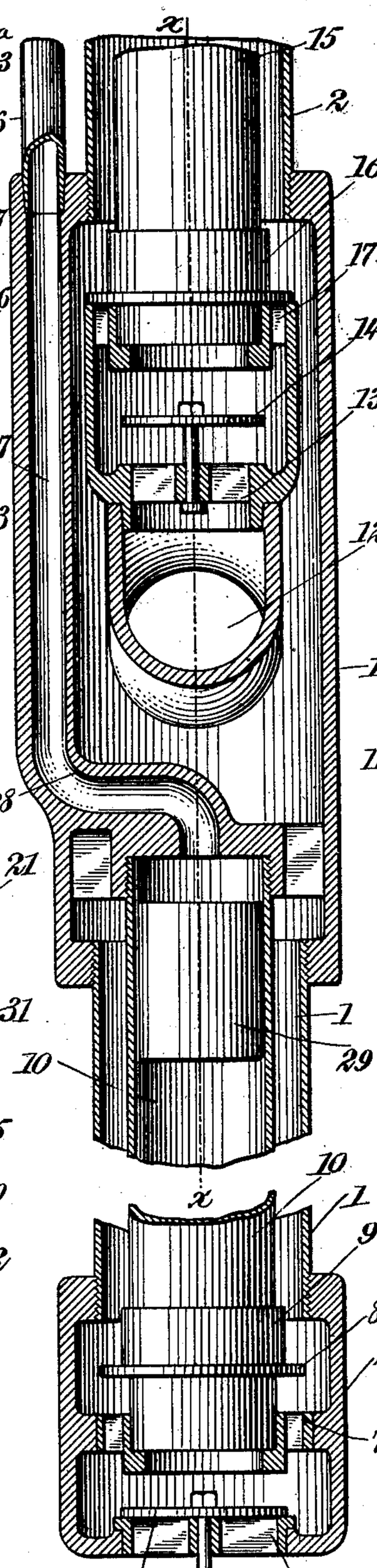

Fig. 3.

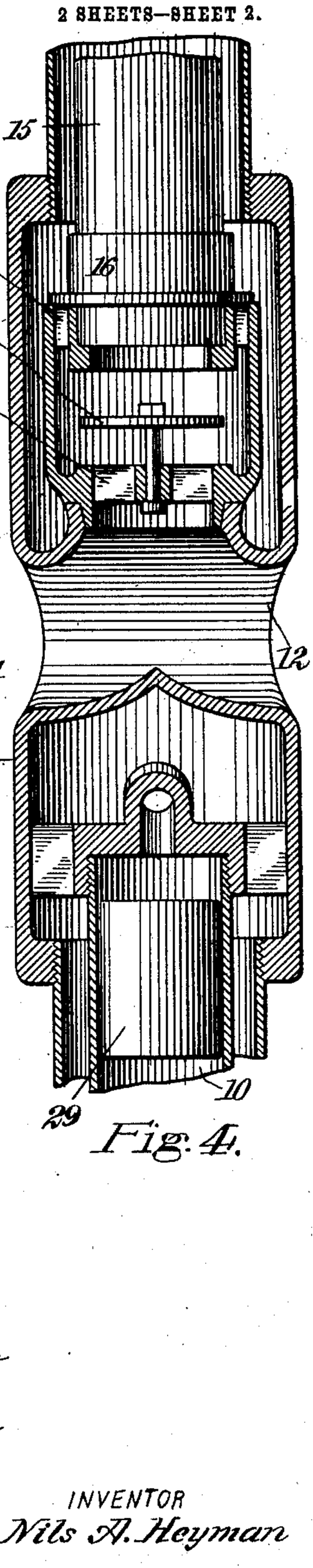

Fig. 4.

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No. 737,928. Patented September 1, 1903.

UNITED STATES PATENT OFFICE.

NILS AUGUST HEYMAN, OF LOS ANGELES, CALIFORNIA.

DEEP-WELL PUMP.

SPECIFICATION forming part of Letters Patent No. 737,928, dated September 1, 1903.

Application filed February 26, 1903. Serial No. 145,144. (No model.)

To all whom it may concern:

Be it known that I, NILS AUGUST HEYMAN, a citizen of the United States, and a resident of Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Deep-Well Pumps, of which the following is a full, clear, and exact description.

This invention relates to certain novel and useful improvements in pumps, and has particular relation to a pump for raising water from deep wells, mines, or the like by means of compressed air.

In carrying out the present invention I have particularly in view the construction of an apparatus through the medium of which a steady regular flow of water from the well or mine will be maintained, such apparatus also embodying the essential and desired features of simplicity and durability.

A further object of the invention is to provide a pump with a series of chambers having therein a suitable valve mechanism and to provide passage-ways for the water to be elevated from the well, so that said valve will alternately close the air-passages and the water-passages at stated intervals.

With these and other objects of a similar nature in view my invention consists in the construction, combination, and arrangement of parts as is described in this specification, illustrated in the accompanying drawings, and set forth in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional view taken through a well, my improved pump being shown therein in elevation. Fig. 2 is a central vertical sectional view taken through the upper chamber and showing the arrangement of the piston-valve and float therein. Fig. 3 is a similar view taken through the lower enlarged chamber of the pump, showing the arrangement of the water-inlet, the bottom of the well, and the arrangement of the valves therein. Fig. 4 is a vertical sectional view taken on the line $x\,x$ of Fig. 3. Fig. 5 is a sectional view on the line $y\,y$ of Fig. 2, and Fig. 6 is a sectional view on the line $z\,z$ of Fig. 5.

Referring now to the accompanying drawings in detail, A designates a well in which is inserted my improved pump.

As will be seen, the pump comprises the relatively long body-casings 1, 2, and 2^a, which lead upward to a point of discharge 3. The construction and arrangement of the various tubes, casings, and chambers will be clearly seen in Figs. 2, 3, and 4. In Fig. 3, it will be seen, at the bottom of the pipe or casing 1 there is formed a housing or water-chamber 4, an opening 5 in the bottom of the chamber being controlled by the disk valve 6. A valve-seat 7 is formed transversely centrally of this housing 4, upon which valve-seat is adapted to rest an annular flange-valve 8, formed at the bottom of a collar 9, which slides upon the cylindrical tubing 10, arranged concentrically within the casing-section 1, a chamber being formed between said casing-section and the tubing 10. At the upper end of the casing-section 1 is arranged an enlarged chamber 11, having an orifice or bore 12 extending entirely through the same. Arranged above this bore or orifice is a valve-seat 13, designed to form a bearing for the disk valve 14, which is similar in construction to the valve 6. From the upper portion of the chamber 11 extends the casing-section 2, and within said section is arranged a cylindrical tubing 15, which is similar to the tubing 10 and has a flanged collar-valve 16 slidably mounted thereon, the flanged portion of which valve is adapted to rest upon the seat 17.

Connecting the portion 2 of the well-casing with the portion 2^a, extending above the same, is an enlarged chambered portion 18, similar in shape to the chamber 11, this chamber 18 having an enlarged vertical extending bore 19, which communicates with the casing 2^a, and a reduced vertical bored portion 20, communicating with the tube 15 through the medium of a small port 21.

From the upper surface portion of the well and into the chamber 18 leads an air-pipe 22, and an air-duct 23, extending vertically parallel with the enlarged bored portion of said chamber, is turned parallel, as at 24, to communicate with the reduced bored portion 20, heretofore mentioned. A second passage-way 25 communicates with this reduced bored

portion, and through a pipe 26 air is carried to the vertical passage-way 27, formed in the lower chamber 11, said passage-way being turned or goosenecked, as at 28, to communicate with the tubular chamber 10.

From the construction thus far described it will be seen that air passing in through the pipe 22 enters the small reduced bored portion 20, from which portion it passes through the pipe 26, through the duct 27, and into the water-tube 10. Water is at this period supposed to have filled the chamber 10, which chamber contains a float 29. The compressed air pushes down the float 29 and closes the valve 6 at the bottom of the housing 4, at the same time opening the collar-valve 8, and the water passes up in the space between the tube 10 and the casing 1 and enters the chamber 11, from whence it rises to the discharge-pipe 3. When the float 29 is at the bottom of the tube or cylinder, it acts to prevent the air escaping in the water-discharge. In the meantime the tube or cylinder 15 has filled with water entering the opening 12 of the chamber 11, and the pressure of fluid causes the valve 14 to be lifted from its seat, and simultaneously a float 30, which slides freely upon a piston-rod 31, is elevated and moves upward the piston-valve 32. When the piston-valve is thus raised, the air-inlet port 25 will be opened to the exhaust 33 and air from the port 24 will pass through the inside of the piston-valve 32 into the port 21 and will force down the water and the float 30 in the cylinder 15. The piston-valve is maintained in its upright position through the means of spring clamping-arms 34, which clamp a ring 35 upon the piston-rod 31. At the upper portion of said rod 31 is mounted a counterweight 36, suspended by chains 37 and passing over pulleys 38, the springs, counterweight, chains, and pulleys being encased in a housing 39. When the piston-valve is in its elevated position and the air is exhausting through a passage 33, the water from the well will again rise in the lower water-tube until the float 29 is raised against the air-inlet 28, and the entrance of water will be prevented. In the meantime the pressure of air in the cylinder 15 has forced the water therein down until the float 30 strikes a collar 40 at the end of the valve-stem and pulls the piston-valve down again, permitting the air to enter through the intake 22 and 26, as before described.

From the above description it will be seen that I have provided an exceedingly simple pump and one which is especially advantageous for use in mines or in very deep wells. For shallow wells the cylinders and discharges may be larger in diameter and may be placed side by side instead of one above the other, as in the present instance, and under some circumstances it may also be desirable not to have the cylinder inside of the discharge-valve; but the principle of the invention will not be effected by these changes.

While I have shown and herein described one particular embodiment of my invention, I wish it to be understood that I do not limit myself to the precise details of construction shown herein, as there may be modifications and variations in some respects without departing from the principle of the invention or sacrificing any of the advantages thereof.

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

1. The combination of a casing, a fluid-chamber within said casing, a valve mechanism for controlling the admission of fluid to the chamber, a piston-valve movable vertically at predetermined times for controlling the admission of air to the chamber, a housing mounted above the piston-valve into which housing the rod of the piston-valve extends, and a counterweight mounted on the piston-rod and suspended from chains passing over pulleys in the housing and connected to the piston-rod, substantially as set forth.

2. The combination of a casing, a tubular fluid-chamber within said casing, a valve controlling the admission of fluid, a float within said chamber, a duct for admitting air to the chamber to force water therefrom, a piston-valve for controlling the air-admission duct, a float at the lower end of the rod of the piston-valve, said valve being operated when the float is moved by the fluid in the chamber, a counterweight for the valve at the opposite end of the piston-rod, an outlet for the fluid, and an exhaust for the air, substantially as set forth.

3. The combination of a casing, a fluid-chamber within the casing, an enlarged chamber formed on the casing, a valve at the bottom of the fluid-chamber, a collar-valve slidable on the casing, a float in said fluid-chamber, means for admitting air to the fluid-chamber, to force the water therefrom into the casing, a vertically-movable piston-valve for controlling the admission of air, a counterbalancing-weight for the piston-valve, clamping-arms adapted to hold the piston-valve in an elevated position at predetermined times, an outlet for the water from the casing, and an outlet for the escape of air, substantially as set forth.

4. The combination of a casing, a fluid-chamber therein, a valve controlling said chamber, an enlarged chamber communicating with the casing, said enlarged chamber having a port for the admission of fluid, a valve into said enlarged chamber, a second fluid-chamber situated above said valve, a cylindrical casing surrounding said second chamber, a second enlarged chamber mounted above the second casing, air inlet and exhaust ports for the fluid-chambers and enlarged chambers, and a float-actuated piston-valve for controlling said ports, substantially as set forth.

5. The combination of a casing, a valve-controlled fluid-chamber within said casing, an

enlarged chamber on said casing, air-inlets for the enlarged chamber and leading into the fluid-chamber, exhaust-passages for the air, and a piston-valve movable in the enlarged chamber for opening and closing the inlet and exhaust ports alternately, whereby the fluid in the fluid-chamber may be forced therefrom into the casing and thence to a point of discharge, substantially as set forth.

6. The combination of a casing, a valve-controlled fluid-chamber within said casing, an enlarged chamber on said casing, air-inlets for the enlarged chamber and leading into the fluid-chamber, exhaust-passages for the air, a housing within said casing, a piston-valve for controlling the air inlet and exhaust ports, a float in the fluid-chamber adapted when elevated to move said piston-valve to close the air-inlet ports and open the exhaust, means in the housing for holding the piston-valve in its elevated position, and counterweights for said valve, supported in said housing, substantially as set forth.

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

NILS AUGUST HEYMAN.

Witnesses:

FRANK M. DAVIS,

BUELL H. JONES.