

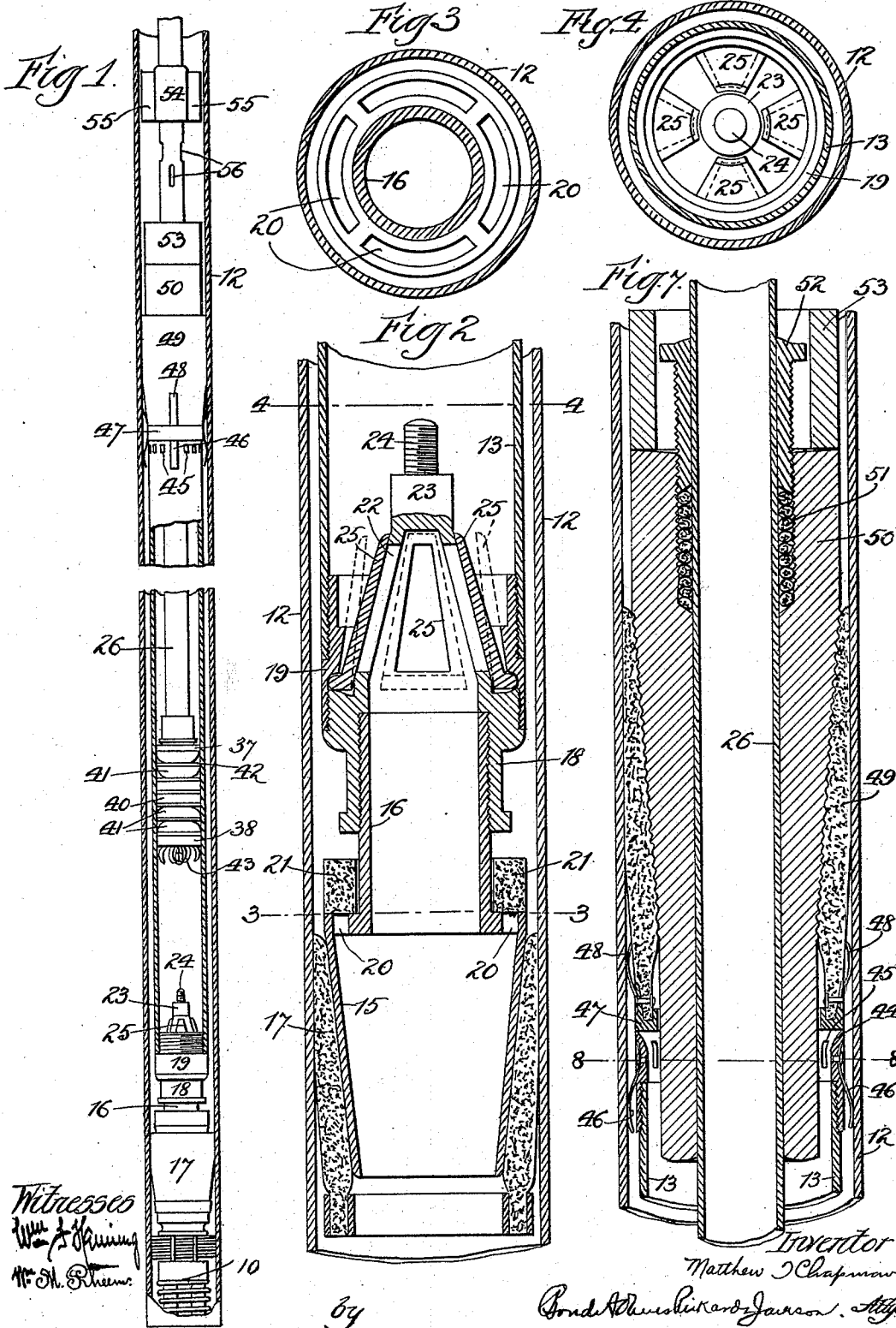
(No Model.)

2 Sheets—Sheet 1.

M. T. CHAPMAN.
PUMP.

No. 573,860.

Patented Dec. 29, 1896.



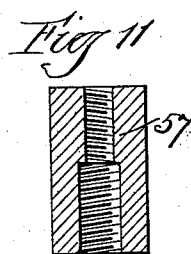
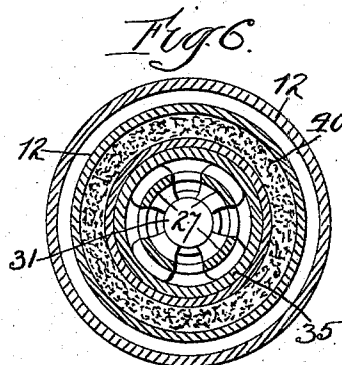
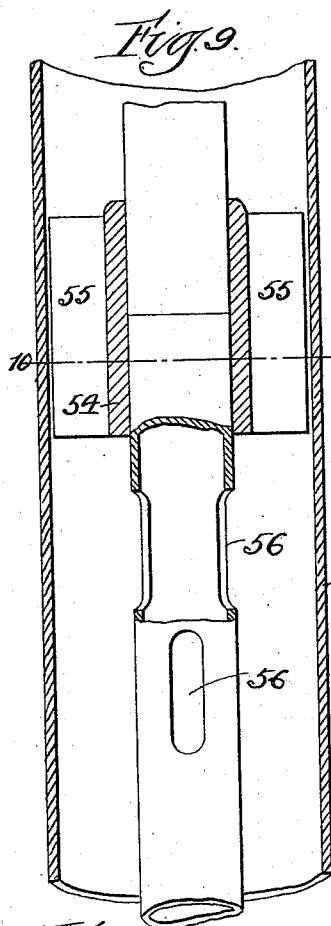
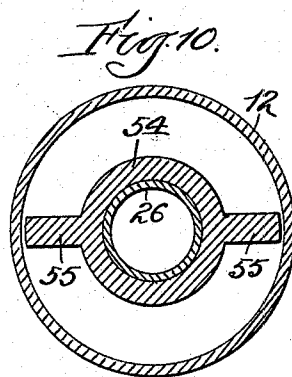
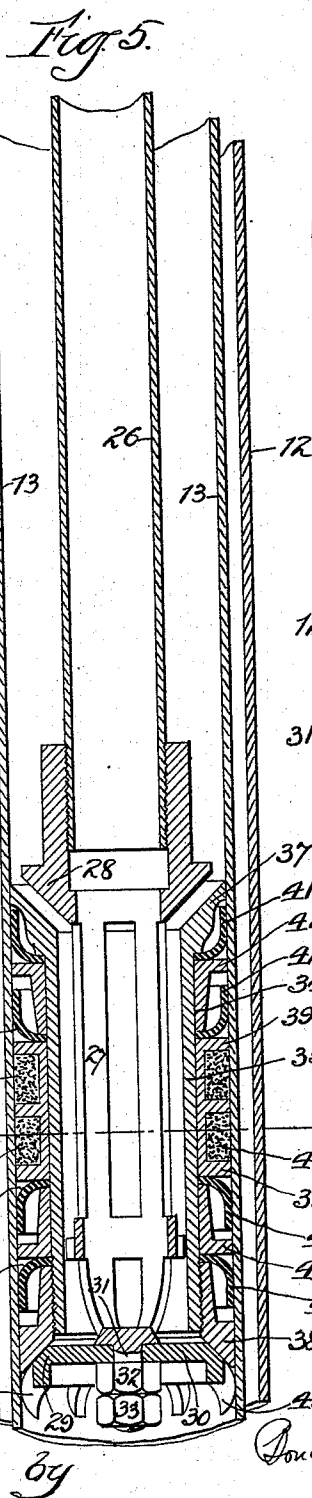
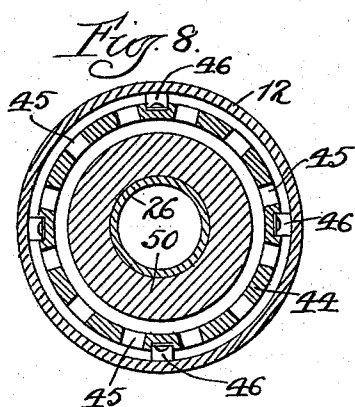
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2 Sheets—Sheet 2.

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PUMP.

No. 573,860.

Patented Dec. 29, 1896.



Witnesses.
Wm. J. Skinning
J. M. Rheems

Inventor
Matthew J. Chapman
Dodd, Adams, Burdett & Johnson.
Atty's.

UNITED STATES PATENT OFFICE.

MATTHEW T. CHAPMAN, OF AURORA, ILLINOIS, ASSIGNOR TO THE
AMERICAN WELL WORKS, OF SAME PLACE.

PUMP.

SPECIFICATION forming part of Letters Patent No. 573,860, dated December 29, 1896.

Application filed June 10, 1895. Serial No. 552,223. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW T. CHAPMAN, a citizen of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Pumps, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a partial vertical section of a well-tube, showing the various parts of the pump. Fig. 2 is an enlarged detail, being a vertical section of the lower part of the well-tube, showing the foundation and check-valve. Fig. 3 is a cross-section on line 3 3 of Fig. 2. Fig. 4 is a cross-section on line 4 4 of Fig. 2. Fig. 5 is an enlarged detail, being a partial vertical section of the well-tube and pump-cylinder, showing the plunger. Fig. 6 is a cross-section on line 6 6 of Fig. 5. Fig. 7 is an enlarged detail, being a partial vertical section of the pump-cylinder, showing the parts immediately above the parts shown in Fig. 5. Fig. 8 is a cross-section on line 8 8 of Fig. 7. Fig. 9 is an enlarged detail, being a vertical section of that part of the pump-cylinder immediately above the parts shown in Fig. 7, part of the pump-rod being in elevation. Fig. 10 is a cross-section on line 10 10 of Fig. 9. Fig. 11 is a vertical section of the nut used in withdrawing the pump-cylinder and foundation from the well.

My invention relates to deep-well pumps; and it consists in the features and in the construction and arrangement of parts hereinafter described, and particularly set forth in the claims following the description.

In the drawings, 12 indicates the well-tube. 13 indicates a pump-cylinder arranged therein. The pump-cylinder is supported upon a suitable foundation placed in the well-tube, which foundation consists of a base 15, conical in shape, from which arises a tube 16, fixedly secured near the upper end thereof. The base 15 fits within a packing 17, as best shown in Fig. 2.

18 indicates a collar which is secured upon the upper end of the tube 16, preferably by screwing it thereto, the pump-cylinder being secured to said collar 18 by means of a coupling 19, said coupling being screwed both to the collar 18 and to the pump-cylinder 13, as

shown in Fig. 2. Between the lower end of the tube 16 and the upper end of the base 15 are water-passages 20, which serve to conduct water from the interior of the base to the space between the tube 16 and the well-tube, which space is in communication with the space between the pump-cylinder and the well-tube, as shown in Fig. 2.

21 indicates a ring-valve which is mounted upon the tube 16 and normally rests over the passages 20, closing them against downward flow of water. The lower edge of the collar 18 acts as a stop to limit the upward movement of the valve 21.

22 indicates a cage which rises from the collar 18, being preferably formed integral therewith, which cage is conical in form, ending in a boss 23, which is provided at its upper end with a screw-threaded portion 24, as shown in Fig. 2.

25 indicates a series of valves, the lower ends of which are mounted upon the collar 18, said valves being loosely mounted, so that they may rock toward and from the cage 22 for the purpose of opening or closing the ports in said cage, and, as shown, the pivotal points of said valves are below said ports. The valves 25 are preferably four in number, but more or less may be used. The position of the valves 25 when thrown back away from the cage is indicated in dotted lines in Fig. 2, and from an inspection of said figure it will appear that water may flow freely upward through the cage 22, but cannot return.

26 indicates a tubular pump-rod arranged in the pump-cylinder above the cage 22, as shown in Fig. 1. The pump-rod 26 extends up through the well-tube to the surface of the ground, where it is connected to suitable mechanism for reciprocating it. As such reciprocating mechanism is well known and forms no part of my present invention I have not considered it necessary to illustrate it.

27 indicates a cage which is connected to the lower end of the pump-rod 26, as shown in Fig. 5. 28 29 indicate oppositely-inclined bearing-faces arranged at the upper and lower ends, respectively, of the cage 27, the inclined face 29 being formed in a cap 30, which is secured to a downwardly-projecting pin 31 by means of a nut 32, a jam-nut 33 being pref-

erably provided. The pin 31 is preferably formed integral with the cage 27.

34 indicates a valve consisting of a cylinder 35, having inclined flanges 37 38 at its ends, 5 which flanges are adapted to bear against the inclined faces 28 29 of the cage 27. The cylinder 35 is, however, slightly shorter than the distance between the faces 28 29, so that when said cylinder is at its lowermost position a 10 passage will be opened at the upper end thereof, and vice versa.

Around the cylinder 35 is placed packing sufficient to enable the cylinder to act as a pump-piston. Such packing preferably consists of metallic rings 39, carrying some suitable packing material 40, said rings being 15 placed about midway of the cylinder 35. At each side thereof are rings 41, of rubber or other suitable material, and between the adjacent rings 41 are placed metallic rings 42. 20

43 indicates guides which are placed at the lower end of the cage 27 for the purpose of guiding the piston when it is inserted into the pump-cylinder after having been withdrawn 25 for the purpose of renewing the packing or for any other reason. The piston is thereby prevented from catching at the top of the pump-cylinder.

44 indicates a ring which is arranged at the 30 upper end of the pump-cylinder 13, being preferably screwed thereupon, as shown in Fig. 7. The ring 44 is provided with slits or other perforations 45, affording communication between the well-tube and the interior of the 35 pump-cylinder.

46 indicates springs connected to the ring 44 and bearing against the well-tube, which springs serve to guide the ring as it is being inserted in the well.

47 indicates a packing-ring arranged above the ring 44, which ring 47 also carries springs 48. 40

49 indicates packing arranged above the packing-ring 47 and connected thereto, as 45 shown in Fig. 7.

50 indicates a wedge for spreading the packing 49 and wedging it tightly against the well-tube. The wedge 50 is provided with a suitable recess near its upper end around the 50 pump-rod 26, in which recess is arranged suitable packing 51, a sleeve 52 being provided which screws down upon the packing 51, thereby forming a stuffing-box, in which the pump-rod 26 moves.

53 indicates a ring which rests upon the 55 wedge 50.

54 indicates a collar which is secured upon the upper portion of the pump-rod above the ring 53, which collar carries lugs 55, adapted 60 to engage the upper edge of the ring 53 when the piston-rod is moved down, the object of which arrangement will be hereinafter set forth.

56 indicates slits or other perforations in 65 the pump-rod 26, affording communication between the interior of the pump-rod and the well-tube above the wedge 50.

The well-tube 12 extends to the surface of the ground and is adapted to conduct the water pumped by the operation of the valve 34 to the surface, as will be hereinafter set forth. 70

In lowering the pump into the well the foundation-packing 17 is lowered to the desired depth, resting upon a suitable foundation 10, which is placed immediately below it in the well-tube 12, as shown in Fig. 1. 75 (The foundation is preferably of the construction shown in the application of myself and M. C. Chapman, filed April 6, 1894, Serial No. 506,645, but I do not limit myself to the use of such foundation.) The base 15 and the cage 22 are then lowered, the pump-cylinder 13 being connected to the coupling 19. These parts are lowered by means of 85 the pump-rod, which is connected to the cage 22 by a nut 57, as shown in Fig. 11. When the above-described parts have been lowered to the desired point, the base 15 fits within the foundation-packing 17, expanding it 90 tightly into contact with the well-tube. The pump-rod is then disconnected from the cage 22 by unscrewing it therefrom, and the packing 49 and wedge 50 and the ring 53 are inserted, the lugs 55 on the collar 54 serving, when the pump-rod is reciprocated, to strike the ring 53, driving the wedge 50 into place and expanding the packing 49. The adjustments 95 are such that when the wedge 50 has been driven down into place the upper edge of the ring 53 will be at the downward limit of the movement of the collar 54.

The operation of the pump is as follows: When the pump-rod 26 is lifted, the cage 27 will be lifted until the lower bearing-face 29 comes into contact with the flange 38, thereby closing the passage at the lower end of said cage and opening that at the upper end thereof, as shown in Fig. 5. The cage and the valve 34 will then act as a piston of an ordinary suction-pump, and as the pump-rod is moved upward will cause the water in the well to rise into the pump-cylinder 13, the check-valves 25 being lifted by the inflowing water. At the same time the ring-valve 21 will also be lifted, permitting the water to flow upward into the space between the well-tube and the pump-cylinder. When the reverse or downward movement of the pump-rod commences, the valves 25 will fall back 12 into their seats, preventing the reverse flow of water. At the same time this downward movement of the pump-rod will cause the cylinder 35 to move longitudinally of the cage 27, closing the passage at the upper end thereof and opening that at its lower end. 12 Therefore by the downward movement of the pump-rod the water in the pump-cylinder between the cage 27 and the cage 22 will be caused to flow into the cage 27 through 13 the passages formed at the lower end thereof and will thence rise through the pump-rod 26. The water thus forced up through the pump-rod 26 may either be conducted

through said rod to the surface or it may be permitted to flow through the openings 56 into the well-tube above the packing 49. I prefer the latter arrangement. When the former is desired, the openings 56 in the pump-rod should be closed.

During the downward movement of the pump-rod the fact that the passages at the upper end of the cage 27 are closed will create a suction in the pump-cylinder above said cage, thereby causing the water in the space between the pump-cylinder and the well-tube to flow through the passages 45 into the pump-cylinder. Upon the next upward movement of the pump-rod the passages at the upper end of the cage 27 being again opened will permit the water above said cage to flow thereto, whence it will be carried upward through the pump-rod 26 and discharged in the same manner as above stated.

It will be seen from the above description that the cage 27 and the valve carried by it constitute, in effect, a plunger or piston-head, which is arranged to present passages for the flow of the water alternately at opposite ends, thereby permitting the water to flow thereinto alternately from above and below. The result of this construction is that the water is delivered both on the upward and downward strokes of the pump, that portion delivered on the downward stroke being somewhat in excess of that delivered on the upward stroke. This is advantageous for the reason that the weight of the pump-rod and other operating parts assists in lifting the water on the downward stroke. The difference between the quantities of water delivered on the upward and downward strokes will be equal to the space occupied by the pump-rod 26.

I do not wish to limit myself to the specific details of construction shown, as numerous variations may be made without departing from the spirit of my invention.

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

1. The combination with a well-tube, of a conical base 15 seated in a correspondingly-shaped packing arranged in the lower end of the well-tube, a check-valve arranged above said base, a pump-cylinder 13 arranged over said valve, a double-acting plunger operating in said pump-cylinder, and a valve 21 arranged over the base, substantially as described.

2. The combination with a well-tube, of a base 15 seated in a packing arranged in the lower end of the well-tube a tube 16 secured at its lower end to said base, a sleeve 18 attached to the upper end of the tube 16, a cage connected to said sleeve and provided with valves, a tubular coupling 19 attached at its lower end to said sleeve, and a pump-cylinder attached to the upper end of said coupling, substantially as described.

3. The combination of a well-tube 12 and a pump-cylinder 13 arranged therein, of a wedge-shaped tubular base 15 connected to the lower end of the pump-cylinder, the packing 17 expanded within the well-tube by said wedge-shaped base, a check-valve arranged above the base, a plunger operating in the pump-cylinder, and a valve 21 for regulating the admission of water to the space between the pump-cylinder and well-tube, substantially as described.

MATTHEW T. CHAPMAN.

Witnesses:

PERCY R. WILSON,
WALLER J. LUNDY.