(No Model.) 3 Sheets—Sheet 1.

S. A. ROUSE.

PUMP.

No. 545,730. Patented Sept. 3, 1895.

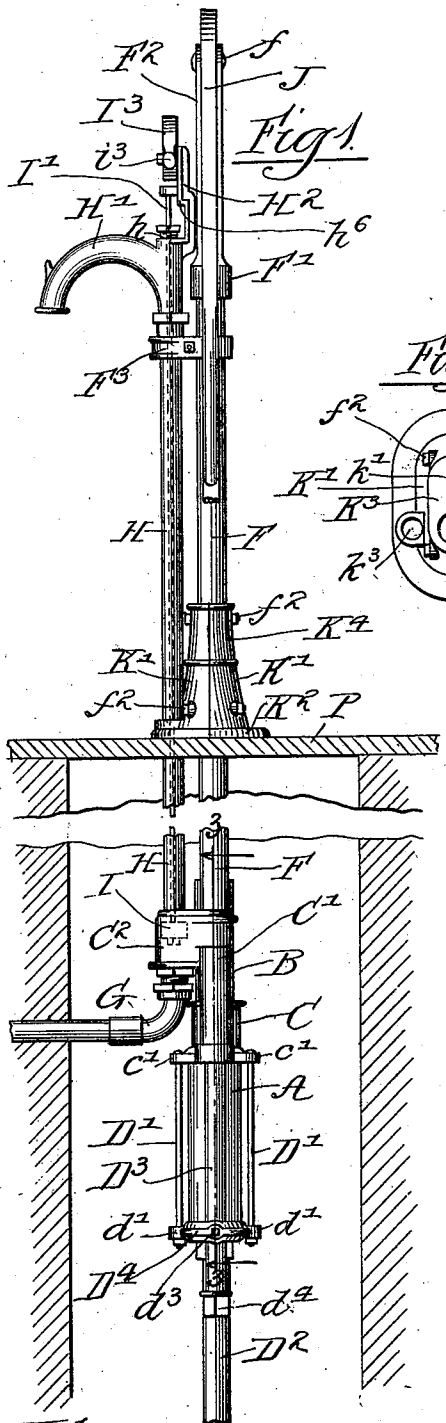

Fig 1.

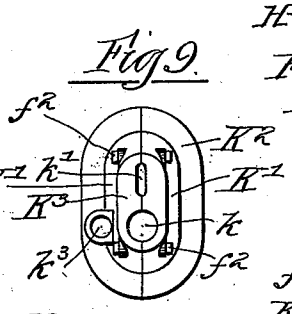

Fig 3.

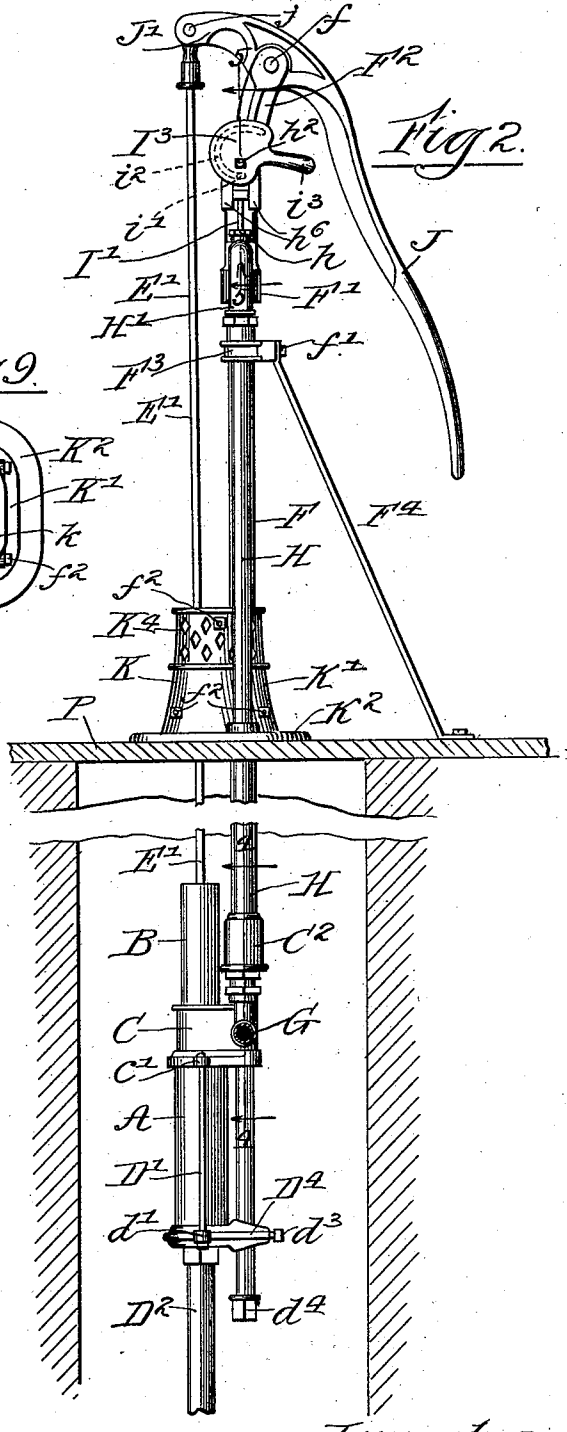

Fig 2.

Witnesses:-
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Wm. N. Rheem.

Inventor:-
Seymour A. Rouse.
by:- Dayton, Poole & Brown his Attys.

(No Model.) 3 Sheets—Sheet 2.

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Fig 5.

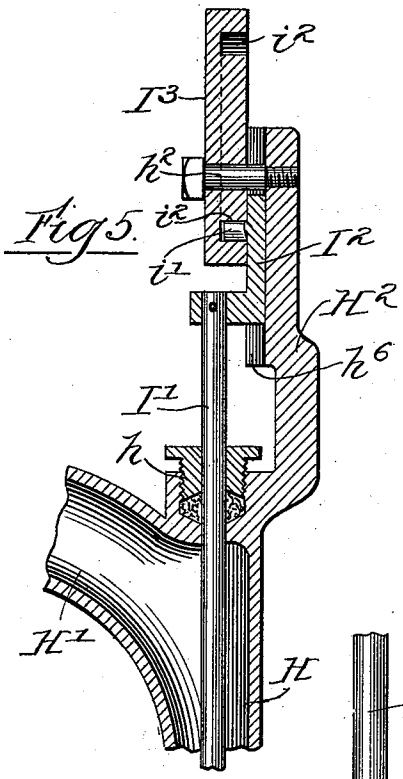


Fig 4.

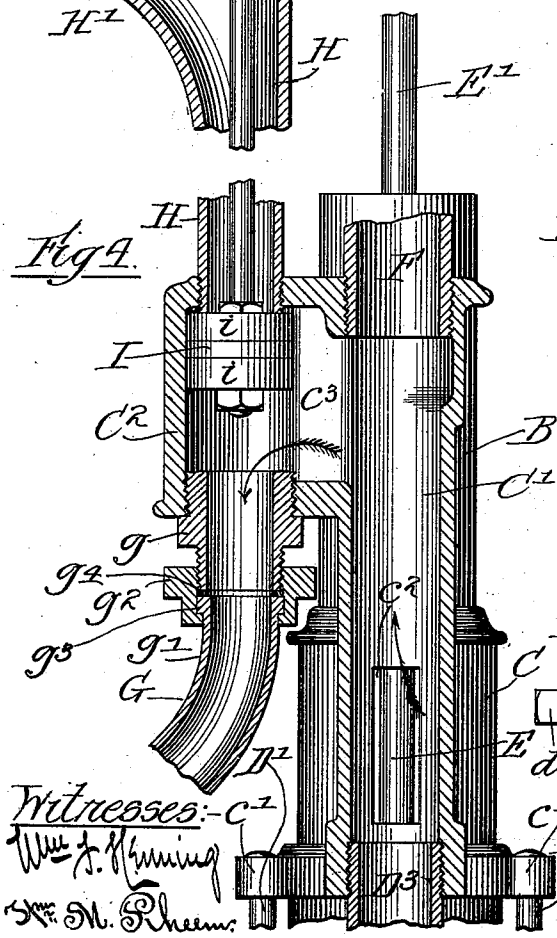
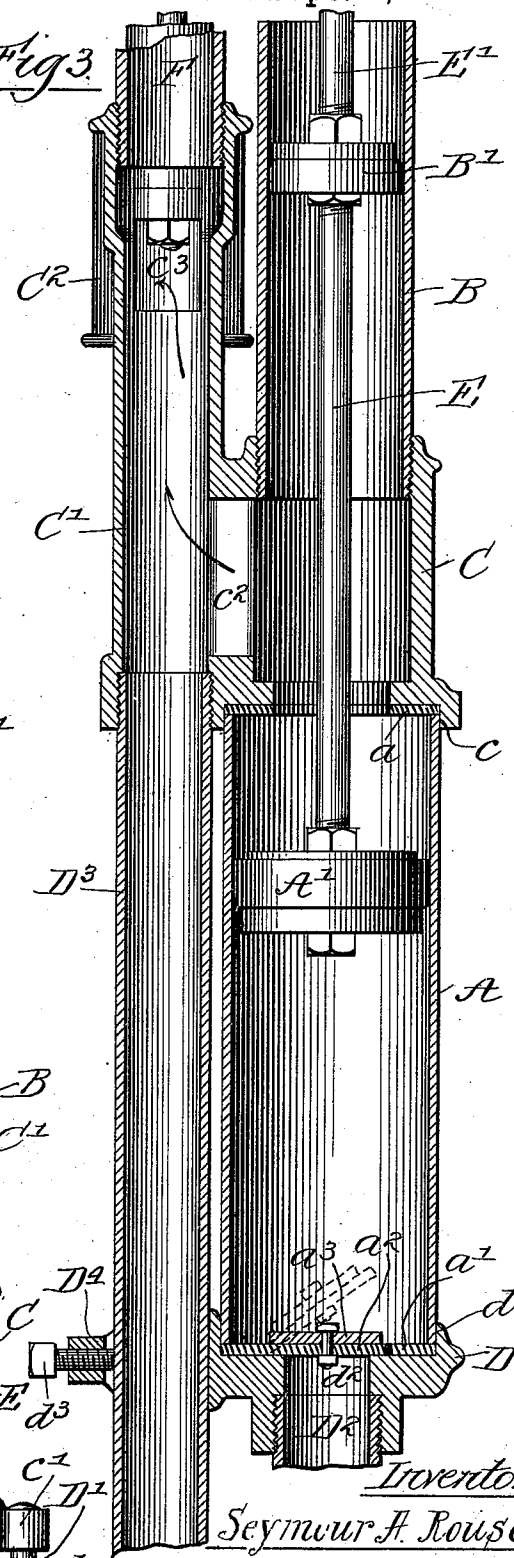


Fig 3.



Witnesses:-
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(No Model.) 3 Sheets—Sheet 3.

S. A. ROUSE.

PUMP.

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Fig 6.

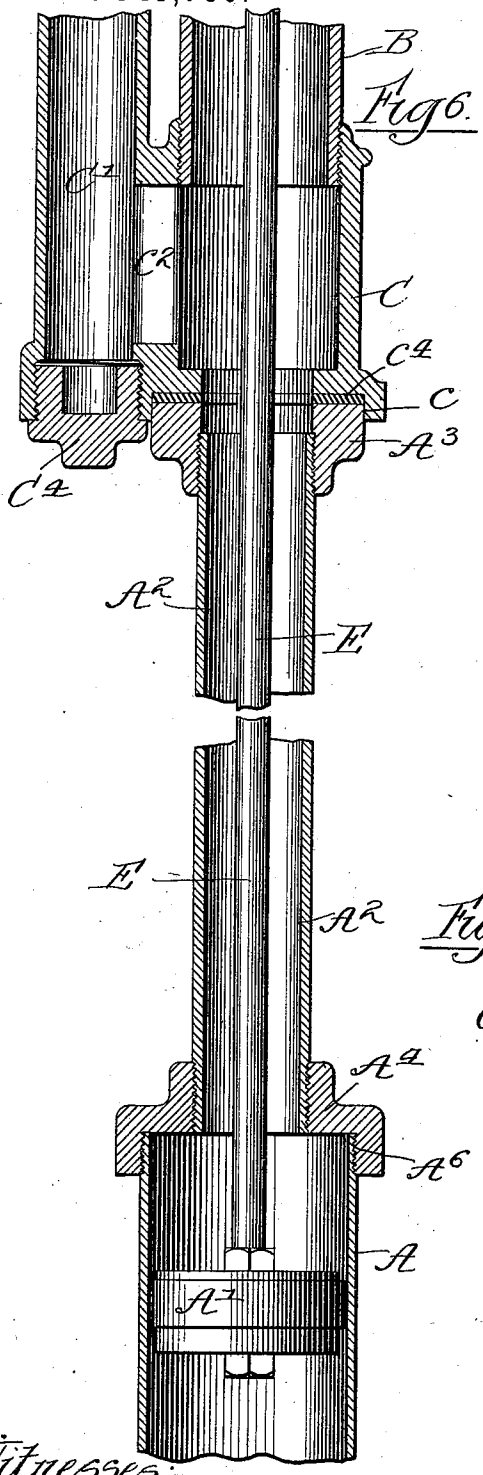


Fig 7.

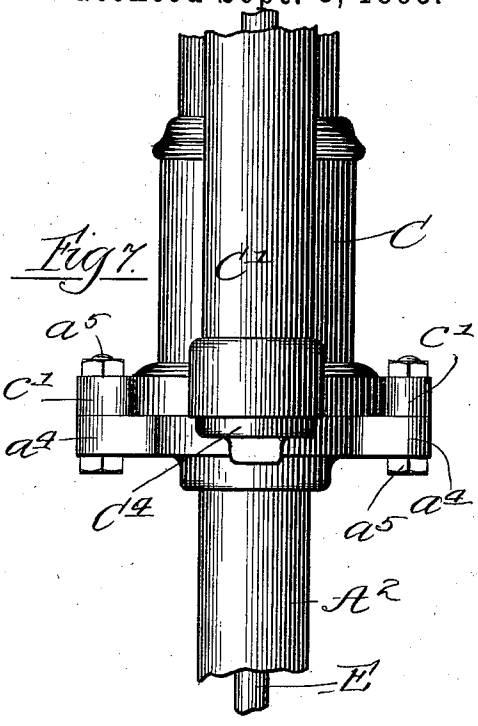
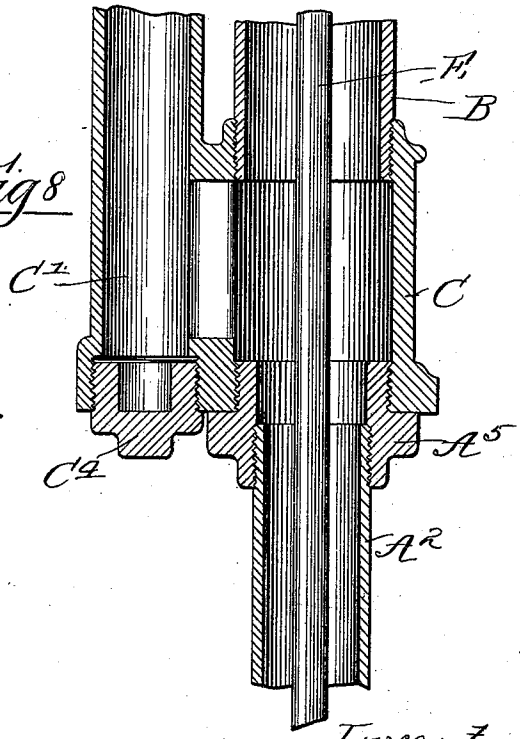


Fig 8



Witnesses:-
Wm. F. Fleming
Wm. M. Sheems

Inventor:-
Seymour A. Rouse.
by:- Clayton, Poole & Brown his Attys.

UNITED STATES PATENT OFFICE.

SEYMOUR A. ROUSE, OF CHICAGO, ILLINOIS.

PUMP.

SPECIFICATION forming part of Letters Patent No. 545,730, dated September 3, 1895.

Application filed May 2, 1894. Serial No. 509,772. (No model.)

To all whom it may concern:

Be it known that I, SEYMOUR A. ROUSE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in pumps of that class ordinarily employed in raising water from cisterns or wells and comprising one or more pistons reciprocating within suitable cylinders located within the well and operated by means of a connecting-rod from a pump-handle or similar device mounted conveniently upon the platform covering the well or cistern.

The object of my invention is to provide an improved construction in several parts or features of pumps of the character referred to; and it consists in the matter hereinafter set forth, and particularly pointed out in the appended claims.

The pump shown in this instance as embodying my invention in one form is a double-acting force-pump of that type in which two cylinders of different diameters are connected with each other so as to be in open communication at their adjacent ends, with the larger cylinder lowermost and connected with the water-supply by valved passage at its lower end, and in which large and small pistons are attached to a common piston-rod, and the larger piston is provided with valve-passages, closing when the pistons are raised and opening when the pistons are lowered, so that on the upstroke of the pistons a discharge of water will take place through an outlet provided between the two cylinders equal to the difference in displacement of the large and small pistons, while on the downstroke of the pistons an additional discharge equal to the displacement of the small piston will occur.

In the accompanying drawings, Figure 1 is a side elevation of a pump embodying my invention in one form. Fig. 2 is a similar view taken at right angles to the view shown in Fig. 1. Fig. 3 is a vertical section taken on line 3 3 of Fig. 1. Figs. 4 and 5 are vertical sections taken on line 4 4 and 5 5, respectively, of Fig. 2. Figs. 6, 7, and 8 are details of features of construction somewhat modified from those previously illustrated. Fig. 9 is a plan view of the base-casting.

A designates the lower and larger cylinder of the pump thus illustrated, B the upper or smaller cylinder thereof, and C a cast coupling-piece serving to connect the cylinders A and B and in open communication with the adjacent ends thereof. The cylinder B is shown as secured to the coupling-piece C by a screw-joint formed between the lower end of the cylinder and a screw-threaded aperture within the upper end of the coupling-piece. The cylinder A is shown as connected with said coupling-piece C by being inserted at its upper end in a recess *c* in the lower end of said coupling-piece and by being inserted at its lower end in a similar recess *d*, provided in the upper face of a head D, which is secured to the coupling C by oppositely-arranged connecting-rods D′ engaging apertured lugs *c′ d′*, projecting, respectively, from the coupling C at the lower edge thereof and from the head D. A washer or gasket *a*, of leather, rubber, or other suitable material, inserted within the recess *c* between the end of the cylinder A and the bottom of said recess serves to prevent leakage at this point, and a similar washer or gasket *a′* is placed within the recess *d* of the head D to prevent leakage at the lower end of the cylinder A. A supply-pipe D^2, connected with the lower end of the head D, discharges through an aperture d^2 in the latter into the cylinder A, said aperture being controlled by any suitable valve a^2 in the bottom of the cylinder A. Such valve is in this instance formed in a usual manner by cutting out a central flap in the washer *a′*, leaving the same connected with the body of the washer at one side, and bolting upon said flap a rigid valve-plate a^3 of sufficient strength to resist the pressure of water upon the valve. Pistons A′ and B′, respectively, are located within the cylinders A and B and are rigidly secured together by means of a connecting-rod E extending through the adjacent open ends on the cylinders and through the coupling-piece C, which connects the same. The larger piston A′ is provided in the usual manner with any suitable valve (not shown) adapted to open on the downstroke of the piston and

to close on the upstroke thereof. The upper piston B′ is made solid and without valves, and in itself serves to prevent any escape of water through the upper end of the cylinder B. Both of said pistons are provided with packing of any suitable sort, by means of which leakage past them is prevented. From the upper piston B′ a connecting-rod E′ leads upward to the pump-handle or other device by which the pistons are reciprocated.

The water is discharged from the cylinders A and B through an orifice c^2 in the side of the coupling C into a vertical pipe C′, cast integral with the coupling C and extending upwardly above the same. The upper end of the pipe C′ is adapted to receive the lower end of a pipe F, which extends upwardly therefrom and forms the air-chamber of the pump. The lower end of the pipe C′, which is flush with the lower end of the coupling C, is tapped to receive a downwardly-extending pipe D^3, passing through an apertured lug D^4 on the side of the head D and rigidly secured within said lug by a set-screw d^3 in substantially the manner shown in my prior patent, No. 451,073, dated April 8, 1891. The object of said pipe is to additionally brace and support the cylinder A and incidentally to serve as a trap, within which much of the sediment contained in the water discharged from the orifice c^2 will collect. Such sediment may be removed by unscrewing a cap d^4 at the bottom of said pipe D^3. At its upper end the pipe C′ is provided with a lateral discharge-orifice c^3, opening into a three-way valve-chamber C^2, cast integral with the pipe C′ and with the coupling C. From the lower end of the valve-chamber C^2 a discharge-pipe G leads off to a tank or any other suitable point of discharge, as desired. From the upper end of said valve-chamber C^2 a discharge-pipe H leads directly upward to the pump-spout H′, which is, as herein shown, secured by a screw-joint to the upper end of said pipe H. A valve I within the chamber C^2 is adapted to cut off the connection between said chamber and either of the discharge-pipes G and H, and is controlled to this end by an operating-rod I′ extending up through the pipe H and out through a suitable stuffing-box h in the upper part of the spout H′. The valve I, as herein shown, is cylindrical in form and is guided by the contact of its sides with the interior of the chamber C^2. It shuts off communication with the pipe G when in its lowermost position by the contact of its lower face with the upper end of a sleeve g, herein shown as connected by a screw-thread with the bottom of the valve-chamber C^2 and acting to connect the same with the discharge-pipe G. In a similar manner it cuts off communication with the pipe H when in its raised position by the contact of its upper face with the lower end of said pipe, which is screwed through the upper wall of said valve-chamber. Leather washers i, forming the upper and lower ends of the valve I, serve to effect a water-tight joint between the valve and the ends of the pipe H and sleeve g when thus brought into contact therewith. When the valve occupies an intermediate position between the upper and lower ends of the chamber, communication is established between said chamber and both of said discharge-pipes G and H.

Various devices may be employed for operating the valve-rod I′; but as a further improvement I connect the upper end of said rod with a slide I^2, which is movable vertically between guides h^6, provided on an arm H^3, cast integral with the pump-spout H′ and extending upwardly therefrom. Said slide I^2 is provided near its upper end with a laterally-projecting pin i', engaging a cam-slot i^2 in a rotary cam-plate I^3, which is mounted on a pivot h^2 at the upper end of said arm H^2. A handle i^3, projecting from one side of the cam-plate I^3, permits said plate to be rotated on its pivot h^2, and the cam-slot i^2 is so shaped that the passage of the pin i' through it in the rotation of the cam-plate will raise or lower the valve-rod I′ sufficiently to cause the valve I to close either pipe G or H. The cam-slot i' is, furthermore, so shaped that the cam-plate I^3 may be placed in position to hold the valve I at any desired point in its throw and cannot be moved from the position in which it is placed by any pressure upon the valve. The cam may, therefore, be turned so as to regulate the relative flow of water through the pipes G and H in any desired proportions, or to entirely cut off the flow through either, and when so placed will maintain the valve rigidly in such position until the latter is shifted by further manipulation of the cam The provision of the guides h^6 for the upper end of the valve-rod insures the smooth and certain movement thereof under the action of the cam I^3 and prevents the latter from deflecting the rod laterally. The pipe G is herein shown as connected with the coupling g by an elbow g', bent on such radius as to bring its horizontal end above the level of the lower face of the coupling C. The joint between the elbow g' and the coupling g is made in the usual manner by means of a sleeve g^2, having a central aperture contracted at its lower end to fit beneath an annular flange g^3, provided on the upper end of the elbow g', and screw-threaded at its upper end to receive the lower end of the coupling C. A packing-ring g^4 is inserted between the adjacent ends of the coupling g and the elbow g', so that when the sleeve g^2 is screwed up said packing is compressed and affords a tight joint between the coupling and elbow.

In the approved construction shown the air-pipe F forms the supporting-standard for a pump-handle J, and to this end is extended upward the desired distance and closed at its top by a cap F′, having upwardly-extended forked arms F^2, cast integral therewith, between which arms the pump-handle J is pivoted upon a bolt f. The handle J is arranged

in the common plane of the axes of the cylinders A and B and of the air-pipe F, upon which it is mounted, and its short upper end J′ extends directly above said cylinders A and B and is connected by a pivot-bolt *j* with the upper end of the connecting-rod E′ of the pistons.

The pump as a whole is supported upon the platform P of the well or cistern to which it is applied by means of a hollow cast-iron base K, through which pass the air and discharge pipes F and H, and which rigidly engages said pipes to secure the same in their upright position. In the approved form shown said base K is made of oblong shape in cross-section with rounded ends, as shown in Fig. 9, and of an interior width at its top equal to the exterior diameter of the pipe F, the side walls K′ of the casting flaring downwardly to a base-flange K^2. The top wall K^3 of the casting is provided at one end with a circular aperture *k*, through which the pipe H passes, and at its other end with an elongated slot *k′* for the pump-rod E′. Said base-casting is further shown as divided upon a vertical plane through the openings *k* and *k′* into two separate sections, which are placed in position on opposite sides of the air-pipe F and pump-rod E′, and which are secured together by bolts f^2, so as to rigidly embrace said air-pipe. As herein shown, the three-way valve-chamber C^2 is located on the side of the pipe C′ at right angles with the coupling C, so that the pipe H is offset laterally with regard to the pipe F and pump-rod E′ in position to extend upwardly through an aperture k^3 in the base of the flange K^2 of the casting outside of the walls K′ thereof, as shown in Fig. 9. The upper part K^4 of the casting is made of open-work or is provided with a plurality of apertures, by which ventilation of the well or cistern is secured without liability of the admission of dirt thereto, and the entrance of dirt is further guarded against by providing for the admission of the pump-rod E′ through the aperture *k′* in the top K^3 of the casting, upon which no considerable amount of dirt can accumulate, instead of at the bottom of the casting, where such accumulations are liable to occur in position to fall or to be swept into said aperture.

By making the base of elongated form and dividing it longitudinally on a line passing through the openings *k k′* for the air-pipe and pump-rod several advantages are gained. One is that by this arrangement the parts of the base are so located as to most effectively resist the lateral strain which comes on the air-pipe when the pump-handle is operated. In the construction described lateral pressure of the air-pipe, due to the inward and outward movement of the pump-rod, comes longitudinally on the parts of the base. Such strains, therefore, come on the parts of the base in a direction least likely to overthrow them or detach them from the platform, because their elongated form gives them an extended bearing lengthwise on the platform, by which they are rendered stable and may be strongly secured by a few bolts. Furthermore, the strains produced by the movements of the pump-handle come equally on both parts of the base, so that pressure of the air-pipe thus caused does not tend to move laterally or separate the parts of the base, and strain on the connecting-bolts of the base or lateral pressure on the parts of the base in a direction to tip them on their narrow bases is therefore avoided, it being clear that if the pump-handles were arranged to swing in a plane at right angles to the line dividing the base actuation of the handle would produce pressure of the air-pipe against the parts of the base in a lateral direction, or in a direction in which they are least adapted to resist such pressure, unless made unduly wide and heavy. Moreover, the engagement of the air-pipe by the parts of the base at a point considerably above the pump-platform affords a rigid support for the air-pipe at such point and makes the air-pipe much stiffer and stronger than it would otherwise be. The splitting of the base-casting through the holes for the air-pipe and pump-rod has the further advantage of enabling the parts to be easily assembled and taken apart, the separation of the parts of the base obviously enabling the air-pipe and pump-rod to be easily taken out and removed.

The upper part of the pump is further supported and braced by means of a clip F^3, connecting the pipes F and H near the upper ends thereof, and from the middle of which a brace-rod F^4, secured by a bolt *f′*, extends downwardly and is bolted to the platform P.

In the operation of the pump thus described it is obvious that as the pump-handle J is oscillated to reciprocate the pistons A′ and B′ water will be forced from the cylinders A and B in the manner before described and will pass up through the pipe C′ to the valve-chamber C^2. If the valve I has been raised by means of the cam I^3, so as to close the pipe H, the entire discharge will then pass off through the pipe G to the tank or water system connected therewith, and will continue so to pass until the cam I^3 is rotated to lower the valve I and establish communications between the valve-chamber C^2 and the pipe H, whereupon water will flow through the pipe H and out of the spout H′. If the valve I be depressed sufficiently to close communication with the pipe G, the entire discharge will obviously take place through the pipe H and spout H′; but said valve may, if desired, be moved only sufficiently to permit a portion of the discharge of the pump to pass out through the pipe H and spout H′, and the remainder will then be forced through the pipe G, as before.

In pumps of this character intended for use in wells of great depth and in which the suction alone cannot be depended on to supply the lower cylinder A with water as the pistons are raised said cylinder A may be

lowered as far as desired and connected with a coupling C by an intermediate pipe A^2 of sufficient diameter to permit the passage of the rod E, which connects the pistons A′ and B′, and provide for the easy flow of the discharge from the lower cylinder A through said pipe around the rod E, as shown in Figs. 6, 7, and 8. In Figs. 6 and 7 said pipe A^2 is shown connected with the coupling C by being screwed into an intermediate bushing A^3, which is adapted to fit within the recess *c*, and is provided with outwardly-projecting ears a^4, corresponding with the ears *c*′, short bolts a^5, which pass through said ears a^4 and *c*′, serving to secure the bushing in place. A gasket c^4 is applied to prevent leakage between the coupling and bushing. The pipe A^2 is shown as connected with the cylinder A at its lower end by being screwed into a head A^4, provided on its under side with a screw-threaded recess A^6, in which the upper end of the cylinder A is screwed. In Fig. 8 I have shown a slightly-modified form of connection between the pipe A^2 and the coupling C, in which said pipe is screwed into a bushing A^5, which, in turn, is screwed into the lower end of the coupling C. When the lower cylinder is thus separated from the coupling by an intermediate pipe A^2 of considerable length, the brace-pipe D^3, hereinbefore described, will ordinarily be omitted, and the lower end of the pipe C′ in such case will be closed by a suitable plug C^4.

The casting of the coupling-piece C, vertical pipe C′, and three-way valve-chamber C^2 in a single integral part with the valve-chamber at the upper end thereof provides a simple and convenient connection by the use of which the lower discharge-pipe G may be led off at a considerably higher level than in other forms of integral connections in which the valve-chamber is substantially on a level with the coupling-piece, and consequently avoids the necessity of laying the said discharge-pipe so deep in the ground as would otherwise be necessary. The placing of said valve-chamber C^2 on a side of the pipe C′ at right angles to the coupling C is further advantageous in bringing the pipes F and G and the connecting or pump rod E′ compactly together, and thus rendering practicable the convenient and advantageous arrangement hereinbefore described of the parts of the pump above the platform, besides enabling the parts below the platform to be passed through a smaller hole in the latter. Obviously, the pump-rod E′, in addition to being operatively connected with the pump-handle, may be also connected by any suitable means with the operating-rod of a windmill or other motor, if so desired. Furthermore, the lower cylinder A of that type of pump shown in Figs. 1 to 4 may, if desired, be connected to the coupling-piece C′ by a screw-joint either by the use of an intermediate bushing or by being directly screwed into the coupling in the same manner as the upper cylinder B, it being obvious that the precise form of connection at this point is of minor importance. In cases where such screw-joint is thus employed between the lower cylinder and coupling the brace-pipe D^3 will, of course, be dispensed with and the lower end of the pipe C′ closed by a plug C^4, as in Figs. 6, 7, and 8.

I claim as my invention—

1. In a differential piston pump the combination with the upper and lower cylinder, of the coupling piece connecting the adjacent ends of said cylinders and in open connection therewith, a vertical pipe opening out of the side of said coupling piece and cast integral with the same, said vertical pipe extending upwardly from the coupling piece at the side of the upper cylinder, an air pipe connected with the top of said vertical pipe in alignment with the latter, a three way valve chamber cast integral with the vertical pipe at the upper end and at one side thereof, a discharge pipe leading from the top of said valve chamber to the pump spout, a second discharge pipe leading from the bottom of said chamber, a valve within the chamber adapted to close communication with either of said pipes, and a valve operating rod leading out through the upper discharge pipe, substantially as described.

2. In a differential piston pump the combination with the upper and lower cylinders of the coupling piece connecting the adjacent ends of said cylinders and in open communication therewith a vertical pipe leading out of the side of said coupling piece and cast integral therewith, an air pipe leading from the top of said vertical pipe in alignment with the latter, a brace pipe rigidly connected at its upper end to the bottom of said vertical pipe and at its lower end to the lower cylinder, a three way valve chamber cast integral with the vertical pipe at the upper end and at one side thereof, a discharge pipe leading from the top of said valve chamber to the pump spout, a discharge pipe leading from the bottom of said chamber, a valve within the chamber adapted to close communication with either of said discharge pipes and a valve operating rod leading out through the upper discharge pipe, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

SEYMOUR A. ROUSE.

Witnesses:
C. W. CARTER,
WILLIAM L. HALL.