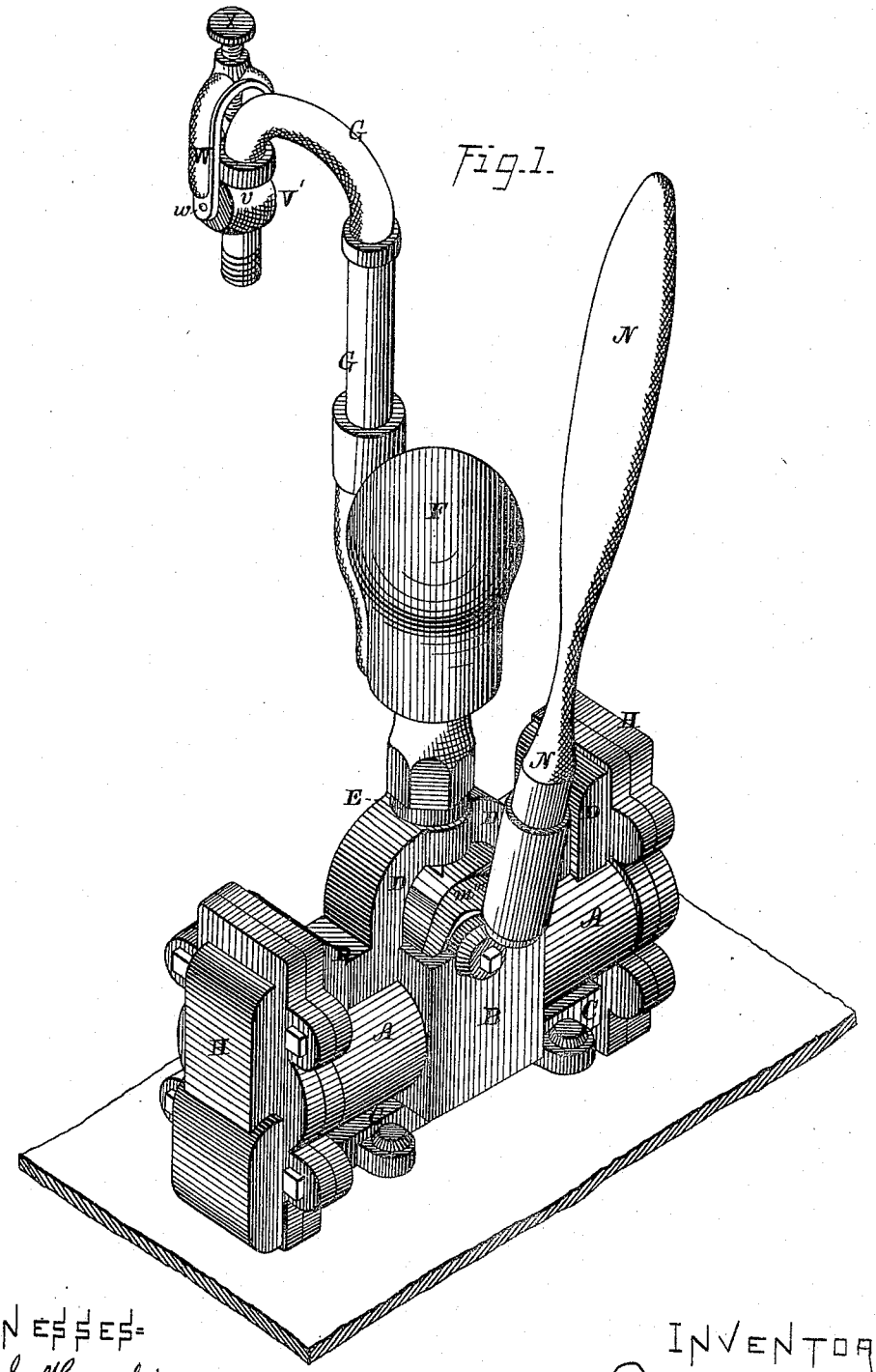
4 Sheets—Sheet 1.

J. S. ADAMS.

Double-Acting Pumps.

No. 197,809. Patented Dec. 4, 1877.

Fig. 1.



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4 Sheets—Sheet 2.

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Double-Acting Pumps.

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Fig. 2.

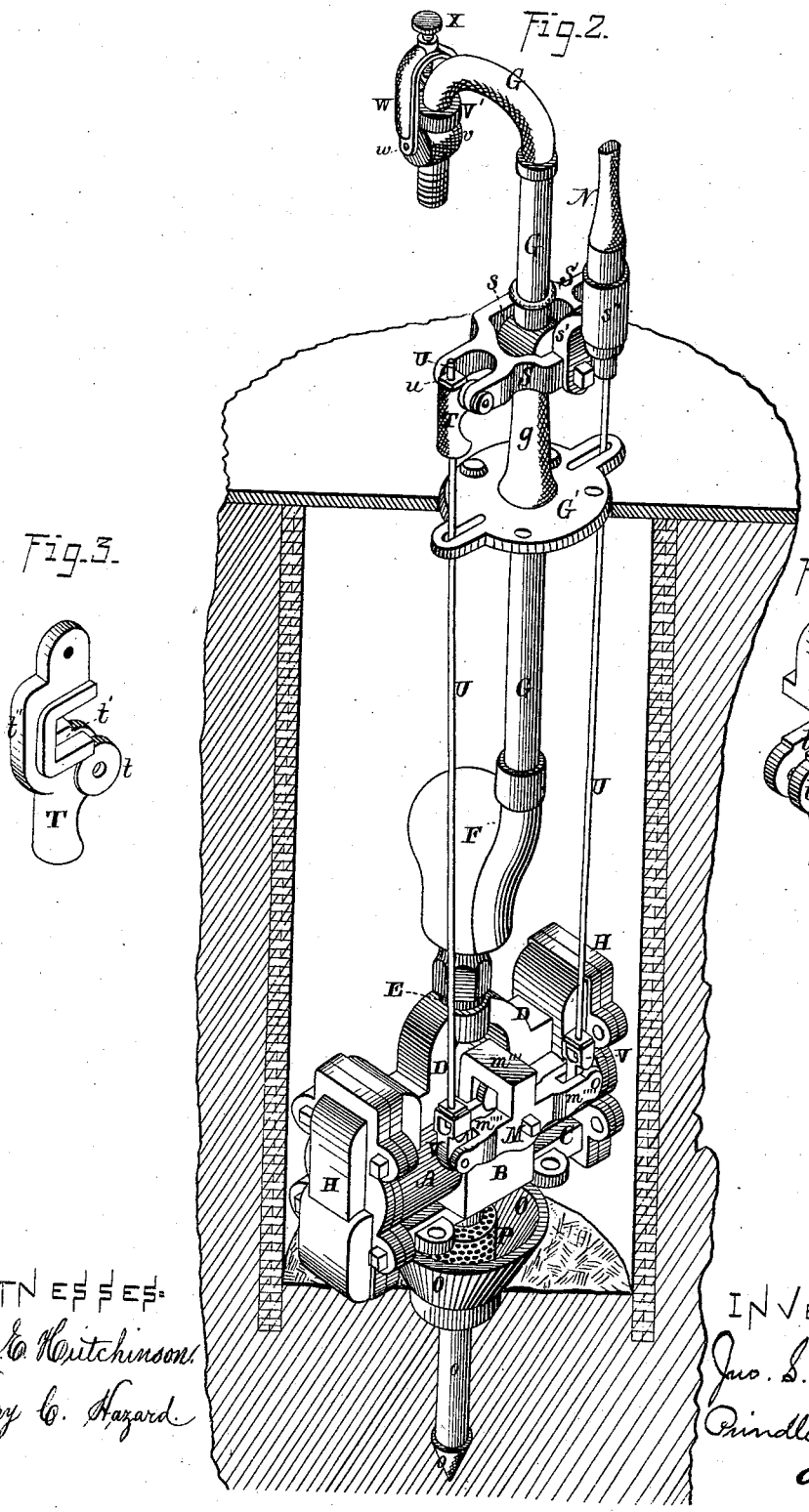
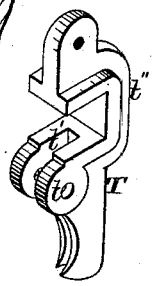


Fig. 3.

Fig. 4.



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4 Sheets—Sheet 3.

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Double-Acting Pumps.

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Fig. 5.

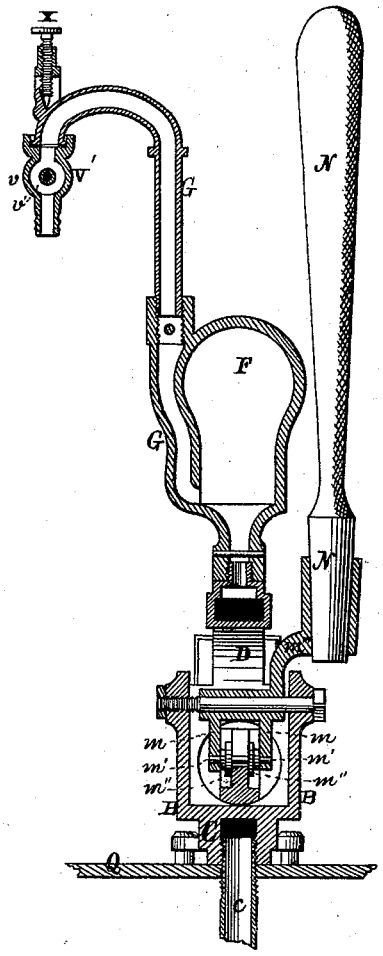
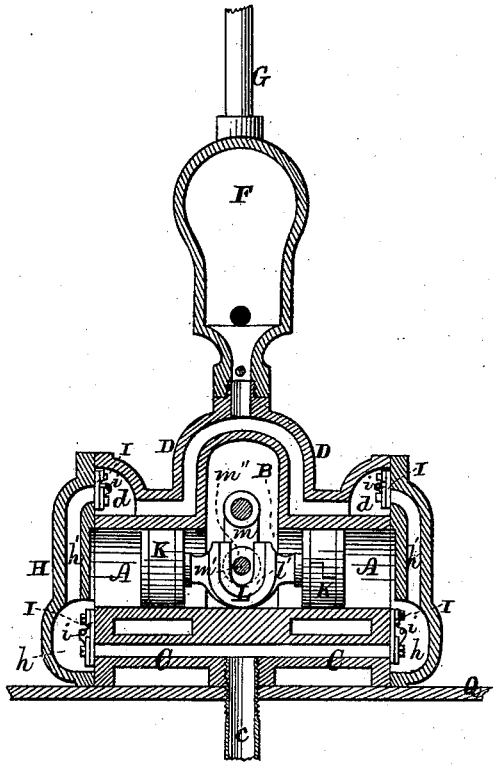


Fig. 6.



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Double-Acting Pumps.

No. 197,809. **Patented Dec. 4, 1877.**

Fig. 7.

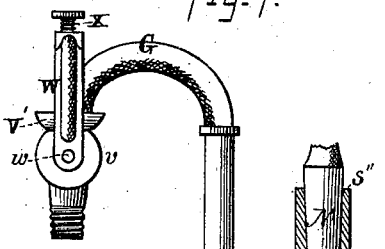


Fig. 8.

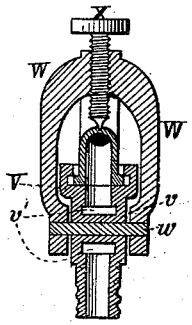


Fig. 10.

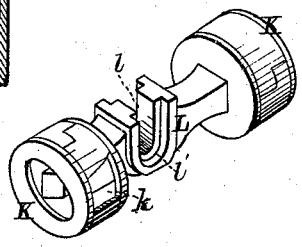


Fig. 9.

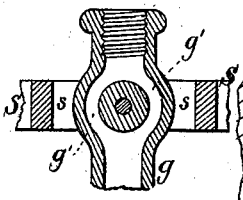
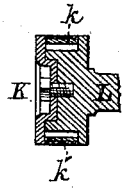
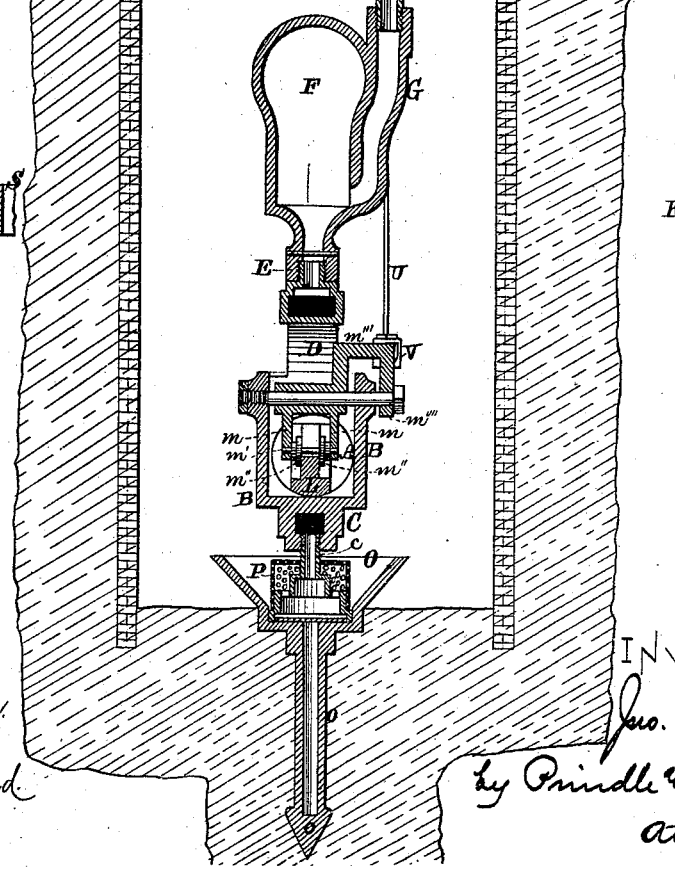


Fig. 11.





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UNITED STATES PATENT OFFICE.

JOHN S. ADAMS, OF ELGIN, ILLINOIS.

IMPROVEMENT IN DOUBLE-ACTING PUMPS.

Specification forming part of Letters Patent No. **197,809**, dated December 4, 1877; application filed August 10, 1877.

To all whom it may concern:

Be it known that I, JOHN S. ADAMS, of Elgin, in the county of Kane, and in the State of Illinois, have invented certain new and useful Improvements in Pumps; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of my improved pump arranged as a surface or platform pump. Fig. 2 is a like view of the same arranged as a submerged pump. Figs. 3 and 4 are perspective views of opposite sides of the tension-block. Figs. 5 and 6 are, respectively, vertical central sections of Fig. 1 upon transverse and longitudinal lines. Fig. 7 is a like view upon a transverse line of Fig. 2. Fig. 8 is a vertical central section of the hose-coupling at the end of the delivering-pipe. Fig. 9 is a like view of the standard at the point where the pivotal bolt of the walking-beam passes through. Fig. 10 is a perspective view of a piston, a portion of the head and packing being broken away; and Fig. 11 is a longitudinal section of the same.

Letters of like name and kind refer to like parts in each of the figures.

The design of my invention is to simplify the construction and increase the efficiency and durability of pumps, and to render the same easily adjustable as surface or submerged pumps; to which end it consists, principally, in the means employed for operating the reciprocating pistons, substantially as is hereinafter specified.

It consists, further, in the means employed for operating the pump when submerged or set below the operating-platform, substantially as and for the purpose hereinafter shown.

It consists, further, in the construction of the casing of the pump, substantially as and for the purpose hereinafter set forth.

It consists, further, in the construction of the valves and seats, and their arrangement within the pump, substantially as and for the purpose hereinafter shown and described.

It consists, further, in the peculiar construction of the packing of the pistons, substantially as and for the purpose hereinafter specified.

It consists, further, in the construction of the supporting-base, and its combination with the pump, substantially as and for the purpose hereinafter shown.

It consists, further, in the peculiar construction of the standard at the point where the pivotal bolt for the walking-beam passes, substantially as and for the purpose hereinafter set forth.

It consists, further, in the construction of the tension-blocks, and their combination with the walking-beam and tension-rods, substantially as and for the purpose hereinafter shown and described.

It consists, finally, in the means employed for connecting a hose to or with the discharge-pipe of the pump, substantially as is hereinafter specified.

In the annexed drawings, A and A represent two cylinders, which have the same axis, are open at their outer ends, and at their inner ends open into a chamber, B, that is open at its upper side, said chamber being cast with and forming a part of said cylinders.

Below the cylinders A and chamber B is a pipe, C, which extends from end to end of said cylinders, is cast upon the same and said chamber, and has open ends, and at its lower side, at its longitudinal center, is provided with a branch *c*, that extends vertically downward.

Formed upon the upper side of the cylinders A is a second pipe, D, which, over the chamber B, is arched, as seen in Fig. 4, and at its ends, which coincide with the ends of said cylinders, is expanded laterally and vertically, so as to form at such points a chamber, *d*. From the upper side, at the longitudinal center of said pipe, a pipe, E, extends upward to and is connected with an air-chamber, F, and from the latter another pipe, G, extends upward to any desired point at which water is to be discharged.

The outer ends of each cylinder A and of the pipes C and D are inclosed by means of a head, H, which, opposite the said pipe C, is provided with a recess, *h*, that corresponds in size to the chamber *d* of the pipe D, from which recess extends upward within said head a pipe, *h'*, that connects with said chamber *d*.

Opposite the cylinder A each head H is recessed slightly, to correspond with the inte-

rior of the same, while the recess *h* extends upward to said cylinder, and furnishes a communication between the interior of the same and the pipes C, *h'*, and D.

Fitted over each end of the pipe C is a flap-valve, I, which is hinged, at its upper end, to or upon its seat, and is held with a yielding pressure against said seat by means of a spring or springs, *i*, that is arranged to press against its outer side, the arrangement being such as to cause said valve to swing outward and upward in uncovering the end of said pipe.

The upper end of each pipe *h'* within the head H, which open inward into the chamber *d*, is inclosed by means of a valve, I, which is the exact counterpart of the valve described, and swings inward and upward in uncovering said pipe.

Within each cylinder A is fitted a piston, K, which is connected with the opposite piston by means of a rod, L, so as to move simultaneously with the same.

The central portion of the piston-rod L is flattened, so as to increase its vertical dimensions, and within such portion is formed a vertical slot, *l*, which is open at its upper end.

Motion is imparted to the pistons K by means of a rock-shaft, M, which is journaled horizontally within the upper portion of the chamber B, and is provided with two arms, *m*, that extend downward upon each side of the piston-rod L, and are connected by a pin, *m'*, which passes through the slot *l*. A washer, *m''*, is placed upon said pin *m'* upon each side of said piston-rod, and, fitting into a recess, *l'*, that is formed upon each side of the latter, forms a rolling bearing, and receives the pressure as said rock-shaft is oscillated upon its bearing.

From the upper side, at one end of the rock-shaft M, an arm, *m'''*, extends upward, outward, and then upward, and at its upper end is provided with a socket for the reception of a bar or lever, N, that is employed for operating the pump.

If, now, the pump is secured upon a suitable support, and the pipe *c* connected with a supply of water, the oscillation of the operating-lever N will cause the pistons to be moved back and forth within their cylinders, and each of said pistons to alternately fill its cylinder with water through the pipes *c* and C and recess *h*, and to expel said water through said recess *h*, pipe *h'*, chamber *d*, pipe D, and pipe E, during which operation the lower valves I will permit water to enter the recess *h* from the pipe C, but not to move in an opposite direction, while the upper valves I will permit water to pass from the pipe *h'* into the chamber *d* while operating to prevent the return of said water.

It will be seen that water passing through each valve is given a downward direction as it leaves the same, by which means sand passing into the pump will be prevented from settling, and, by being kept in motion, will be carried upward by the current of water until it passes from the pump.

The pistons K are packed by means of a ring of metal, *k*, which is divided transversely at one point, is somewhat larger than the cylinder, and is sprung into the same, while outside of said ring is placed a ring or covering of leather, rubber, or other like flexible material, which is divided transversely at one point upon a zigzag line, that causes one portion of each end to lap by the corresponding portion of the opposite end of said flexible ring.

This packing is durable and efficient, and when worn out can be easily and quickly replaced by any person capable of operating a pump.

When the pump is for use in a well I employ a support, which consists of a flaring, cup-shaped base, O, and a pointed spur, *o*, that projects downward from the lower side of the same.

The supporting-base O is placed in position by driving its spur downward until the lower end of said base rests upon or is sunk slightly into the soil at the bottom of the well, after which a cylindrical strainer, P, is placed upon the lower end of the inlet-pipe *c*, and the lower end of said strainer caused to fit into a corresponding recess that is provided in said base, when, as shown in Figs. 2 and 5, the whole weight of the pump will be sustained by said base, and said pump prevented from moving laterally, while, from the shape of the former, the water at the bottom of the well will be prevented from becoming riled in consequence of disturbance of the soil at such point.

When the pump is thus submerged, or is placed below the operating-platform, it is operated by the following-described means: The discharge-pipe G is provided, at a level with the surface of the ground, with a flange, G', that extends horizontally outward, and furnishes a means whereby said pipe may be secured to or upon a platform, Q. At a suitable distance above the platform Q the pipe or standard G is provided with a cylindrical enlargement, *g*, which has its axis placed horizontally, and around such axis is formed an annular opening, *g'*, that communicates with, and forms a continuation of, the water-passage within said standard, above and below said boss. Through the otherwise solid axial center of the boss *g* is provided an opening which receives and contains a bolt, R, that serves as a pivotal bearing for a walking-beam, S, which beam has a central opening, *s*, that enables it to be placed over or around said standard. This construction of the standard enables the walking-beam to be easily and strongly pivoted thereto, without interference with or penetration of the water-channel.

The ends of the walking-beam S are bifurcated, and within each is pivoted a block, T, which, as seen in Figs. 3 and 4, is grooved longitudinally upon its inner side, and is provided near its upper end with ears *t*, that

project inward, and serve as bearings for the reception of the pivotal bolt.

Within the groove t' of each block T is placed one end of a tension-rod, U, which is threaded and provided with nuts u at the upper and lower ends of said block, by means of which said rod is secured in place and is adjusted longitudinally.

This construction of the tension-block prevents the tension-rod and the axial bearing of said block from interference with each other, and enables stronger and more durable connections to be made.

The lower end of each tension-rod U is connected with a block, V, which is pivoted within one end of a horizontal bar, m'''', which is secured upon the arm m''' of the rock-shaft M in place of the lever-socket. If, now, the walking-beam S is caused to oscillate upon its pivotal bearing, its motion will be communicated, through the rods U, lever m'''', and rock-shaft M, to the pistons of the pump, and the latter caused to force water into and through the standard G.

For the operation of the pump by hand, an arm, s', projects upward, outward, and upward from the axial center, at one side of the walking-beam S, and at its upper end is provided with a socket, s'', for the reception of the hand-lever N; while for use in connection with a windmill, one of the tension-blocks T is provided with an arm, t'', which extends upward, inward, and then upward, and at its upper end has such shape as to permit of the attachment of the vertically-reciprocating operating-rod of such windmill.

It being often necessary that hose should be attached to the discharge-pipe of a pump, the following-described means for such attachment are provided: The end of the standard G is slightly enlarged, so as to furnish at such point a bearing for a packing-gasket, and over such end is fitted a coupling, V, the upper end of which latter is recessed so as to receive the end of said standard. The lower end of the coupling V is grooved circumferentially, so as to permit of the ready attachment of a hose, while at a point near its upper end is provided a cylindrical enlargement, v, through the center of which passes the pivotal bearing w of a stirrup, W, that at its upper end contains a set-screw, X. The water-channel v' of the coupling V passes concentrically around the axis of the enlargement v, so that the pivotal bearing w of the stirrup W does not enter said channel. A spur, g'', formed upon the outer side of the standard G at a short distance above its end, receives the set-screw X, and enables the coupling V to be secured in place, as shown in Fig. 2.

The coupling described is simple in construction, is easily placed in or removed from position, and is not liable to get out of order.

Having thus fully set forth the nature and merits of my invention, what I claim as new is—

1. In combination with the piston-rod L, provided at its longitudinal center with a vertical slot, l, and recesses l', the rock-shaft M, having the arms m, connected by the pin m', and the washers m'' placed upon said bar, substantially as and for the purpose specified.

2. In combination with the rock-shaft M, provided with the lever m'''', the walking-beam S, having the arm s' s'', the tension-blocks T, and the tension-rods U, said parts being arranged to operate in the manner and for the purpose substantially as shown.

3. The casing of the pump, consisting of the cylinders A, central chamber B, inlet-pipe C c, outlet-pipe D d E, and heads H, which are each provided with a recess, h, and vertical pipe h', substantially as and for the purpose set forth.

4. In combination with the ends of the pipes C and h', arranged, respectively, above the bottoms of the chamber d and recess h, the valves I, hinged at their upper ends to or upon the ends of said pipes, and capable of opening outward and upward, substantially as and for the purpose shown and described.

5. As a means for packing the pistons K, an expansible inner metal ring, k, and an outer ring or covering of flexible material, k', said plate being constructed and combined substantially as specified.

6. As a means for supporting the pump, and preventing lateral motion of the same when placed at the bottom of a well, the base O, arranged to embrace the strainer P, and provided with a spur, which projects downward from its lower side, substantially as and for the purpose shown.

7. The standard G, provided with the cylindrical enlargement g and annular passage g', in combination with the walking-beam S and its pivotal bearing R, substantially as and for the purpose set forth.

8. As a means for combining the tension-rod U with the walking-beam S, the blocks T, having the pivotal ears t and longitudinal grooves t', substantially as and for the purpose shown and described.

9. In combination with the end of the pipe G, having the spur g'', the coupling V, recessed at its upper end to receive the end of said pipe G, and provided with the cylindrical boss v, annular water-chamber v', stirrup W, and set-screw w, substantially as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand this 31st day of July, 1877.

JOHN S. ADAMS.

Witnesses:

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M. C. TOWN.