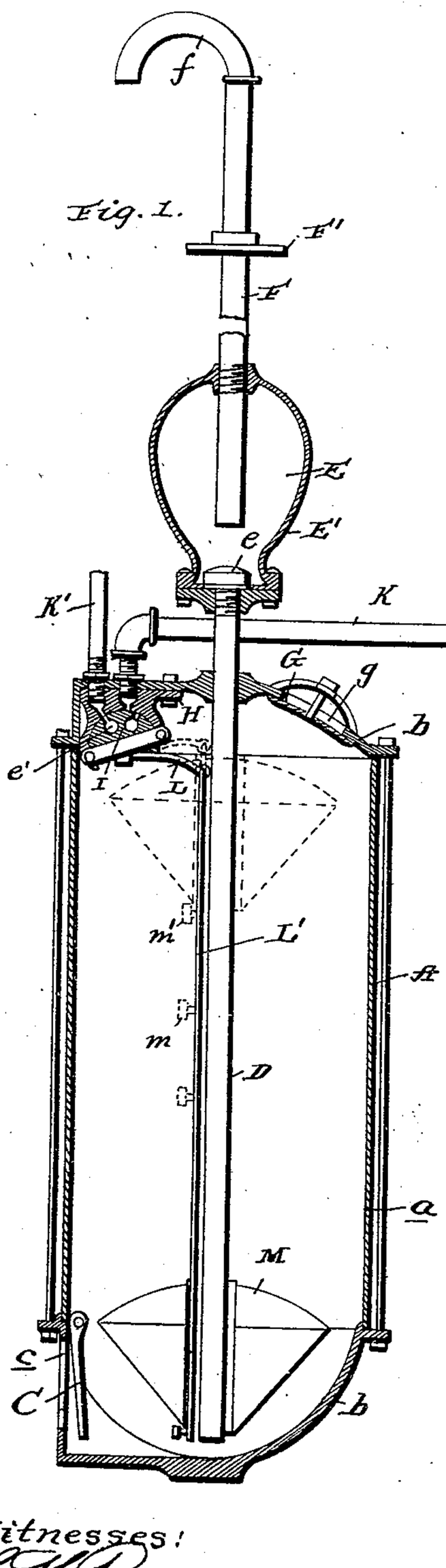
(No Model.)

M. L. G. WHEELER.

FORCE PUMP AND WATER ELEVATOR.

No. 484,169. Patented Oct. 11, 1892.

Fig. 1.



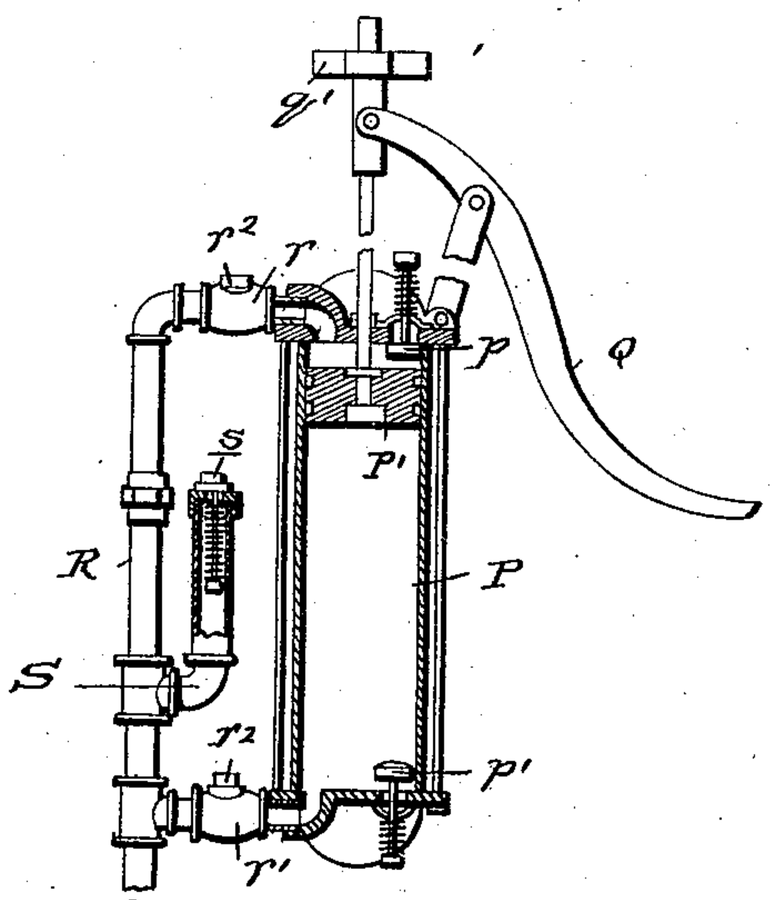


Fig. 2.

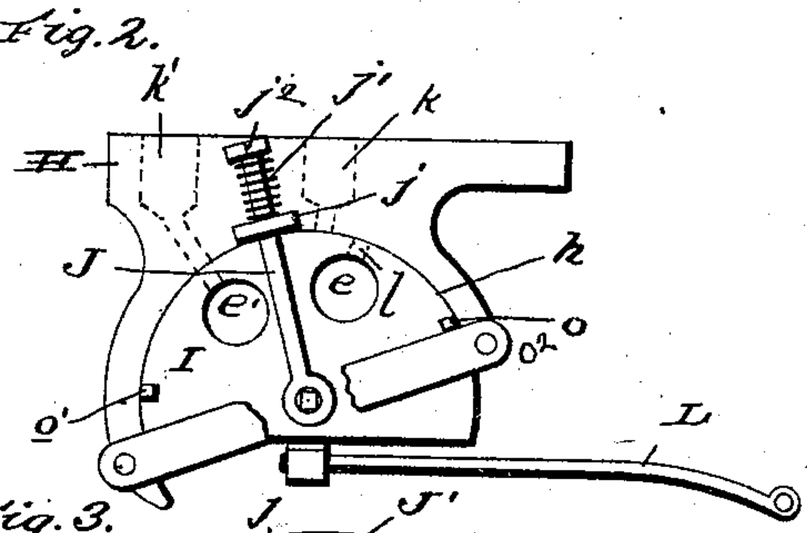


Fig. 3.

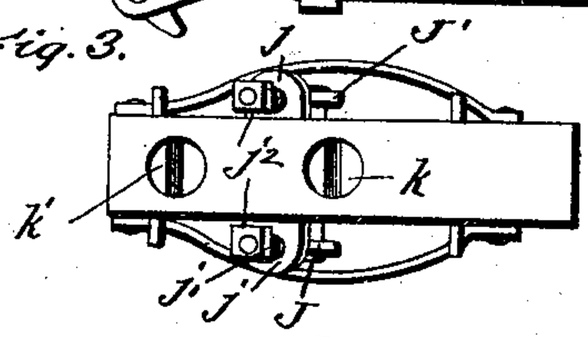
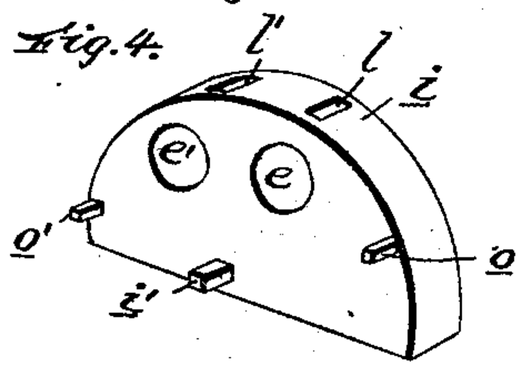


Fig. 4.



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UNITED STATES PATENT OFFICE.

MILO LUTHER GATES WHEELER, OF NORTH YAKIMA, WASHINGTON.

FORCE-PUMP AND WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 484,169, dated October 11, 1892.

Application filed April 29, 1891. Serial No. 390,997. (No model.)

To all whom it may concern:

Be it known that I, MILO LUTHER GATES WHEELER, a citizen of the United States, residing at North Yakima, in the State of Washington, have invented certain new and useful Improvements in Force-Pumps and Water-Elevators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in compressed-air water-elevators; and the object in view is to provide simple and efficient means for raising the water from a well, cistern, or other subterranean place by means of the force of compressed air, steam, or other motive fluid.

In this invention I contemplate the provision of means whereby water from a lower level than the place where the air or steam is compressed or generated may be raised without any expenditure of manual labor, although the latter may be used, if desired; but it is not essential, as provision is made for the automatic inlet and egress of the pressure-fluid and for the like automatic ingress of water to a cylinder and for exit of the water from the lower level to the devices which convey the same to a higher level.

By this invention either air or steam may be used as the motive fluid, and in case of steam-power it is only necessary to provide a suitable generator and couple the same to the working cylinder of the hydraulic elevator. When compressed air is to be used as the motive fluid, an air pump or compressor is provided, which may be located very close to its source of power—as, for instance, upon the tower of a windmill close to the sails thereof—and thereby avoid the friction and waste of power necessarily present when heavy cumbersome pitmen are used to transmit the power from the elevated shaft to the counter-shafting at the base of the tower.

The invention consists in the combination of devices and novel construction and arrangement of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

My invention is fully illustrated in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical sectional view through my compressed-air water-elevator in which an air-compressor is used in connection with the hydraulic cylinder. Figs. 2, 3, and 4 are detail detached views of the valve mechanism for the hydraulic cylinder provided for the regulation of supply and exhaust of the compressed motive fluid.

Like letters of reference denote corresponding parts in all the figures of the drawings, referring to which—

A designates the hydraulic cylinder, adapted to be lowered into a well, cistern, or other deep or shallow place and to be entirely submerged in the water-supply therein. This cylinder A may be of any suitable construction, consisting, preferably, of a cylindrical barrel *a*, the two heads *b b*, and bolts connecting said heads, although this detail construction is not essential, as I may employ short bolts to couple double-flanged barrel and heads together in the manner familiar to those skilled in the art. In the lower part of the barrel of the hydraulic cylinder is provided a water-inlet port *c*, through which the water flows into the cylinder, and this port is closed by means of a flap-valve C, which is adapted to open inwardly when the cylinder is free from the influence of the compressed motive fluid adapted to be admitted thereto for forcing out the water therein, whereby this inlet-port valve may be opened by the pressure of surrounding water to permit the cylinder to be filled to the desired limit by the pressure of the water in which the cylinder is submerged. A suitable valve-seat may be secured around this inlet-port, and the seat and valve may be packed in any desirable manner, which, however, I have not deemed it essential to illustrate, as the same is of the common pattern.

Extending longitudinally through the cylinder A is a vertical discharge-pipe D, the upper end of which passes through the upper head of the cylinder and is secured in a pressure-chamber E, formed by a shell or inclosure E′, the inlet-opening to which is closed by means of an inwardly-opening flap-valve *e*. In the upper end of this shell or inclosure E′

is secured the spouted pipe F, having the goose-neck or spout *f* at its extremity, and on this pipe F is secured the collar or supporting-plate F′, which is adapted to be secured in any suitable way to the floor of the cistern, well, or other place where the elevator is used. The lower end of the pipe E terminates close to the bottom head of the cylinder A, and the lower end of the pipe F likewise is arranged close to the bottom of the upper inclosure or shell E′.

The upper head of the hydraulic cylinder is made dome-like in form, and it is provided on one side with a hand-hole *g*, which is closed by a cover G of common construction. This head of the cylinder is shaped or constructed to receive the support or block H of a valve I, adapted to control the supply and exhaust of the compressed motive fluid adapted to be admitted to the hydraulic cylinder A to expel or elevate the water therein. This valve-seat H is secured to the upper head by bolts or in any other suitable way, and the lower side of the valve-seat is provided with a segmental or curved recess *h*, which constitutes the seat for the valve I, and the upper side of the valve is curved, as at *i*, to adapt the same to be snugly fitted in the seat. This valve is of the oscillating variety, adapted to rock or turn back and forth around a fixed axis, which is formed by the shaft, trunnions, or bolt *i′*, on which the valve is rigidly secured. This axial bolt or shaft *i′* of the rocking valve has its ends loosely journaled in the lower extremities of adjusting-links J J′, the upper ends of which pass through fixed guides *j*, which are rigid with the valve block or support H, and the upper ends of the links are encircled by spiral tension-springs *j′*, which bear against the fixed guides *j*, and nuts *j²*, which are fitted on the threaded upper ends of the suspending links. These spiral springs serve to normally draw the valve snugly to its seat in the block or support, and by adjusting the nuts the tension of the springs can be varied to always insure the necessary tight joint between the valve and its support or block to prevent the leakage of the motive fluid between the valve and its support.

Through the fixed support or block H of the valve are provided the inlet and exhaust ports *k k′* for the compressed air or other motive fluid, said passages being independent of each other, and the upper ends of the passages are enlarged and internally screw-threaded to adapt the lower ends of the supply and exhaust pipes K K′ to be coupled directly to the support or block H. The lower ends of the passages *k′ k* open through the lower side or seat of the valve-block, and with these passages are adapted to communicate radial passages *l l′*, forming the inlet and egress passages through the valve for the compressed air or steam, said inlet and egress passages in the valve terminating at their inner ends in circular enlargements which open through the side or lateral faces of the valve to insure the free and uninterrupted inlet or egress of the air or steam to and from the valve. The air or steam pipes, as stated, are screwed in the threaded ends of the passages in the valve-support, and each pipe is provided with a gasket, which secures the desired tight joint or connection between the pipe and the valve-support. The oscillations of the valve around its axis are limited in either direction by means of the fixed studs *o o′*, which are rigid with the valve and project laterally from the same, and these studs are adapted to alternately impinge against the stop-bar *o²*, which extends across the face of the valve and has its ends secured to the valve-support H, so that the play of the valve is arrested at the desired points to cause the ports therein to properly align with the passages in the support or block H.

To one arm of the valve shaft or bolt is rigidly secured a rock-arm L, to the other end of which is pivoted an endwise-movable float-rod L′, that is arranged vertically in the hydraulic cylinder and lies parallel to the water-outlet pipe leading from said cylinder. Around this float-rod and the exit-pipe is loosely fitted the float M, of any suitable form and construction, and which is free to rise and fall in the hydraulic cylinder with the water therein, and this float acts on the stops *m m′*, which are secured to the float-rod at the upper and lower ends thereof, or at any desired points at which it is desired to cause the float to open the valve-ports for the ingress and egress of the compressed air, so that the upper stop *m* is adapted to determine the water-level in the hydraulic cylinder. The stops on the float-rod are in the path of the float, and when the float is lowered with the water in the cylinder A the lower stop *m′* is forced down to depress the rod, turn the arm L, and move the valve so that the exhaust-port *l* therein will align with the exhaust-passage *k′* in the support H to permit the compressed air in the cylinder A to pass into the exhaust-pipe K′, which should extend above the surface of the water in the well or cistern in which the cylinder is submerged, and when the water has reached the desired level and the float is released, it impinges against the upper stop *m* and raises the rod L′ to turn the arm L and the valve, so that the alignment is broken between the exhaust-passages *l* and *k′* in the valve and seat and establish communication between the inlet-passages *l′ k* in said valve and seat, and thus admit the compressed air or steam from the pipe K to the cylinder A, whereupon the compressed air or steam exerts its pressure upon the water in the cylinder A to close the valve C and force or expel the water through the pipe D into the chamber E, and thence through the pipe F in a continuous uninterrupted stream until the steam or air has practically expelled all the water, and the descending float depresses the lower stop *m′* and the valve-rod so as to shift the valve I and bring the ports *l k′* into

alignment, so that the air in the cylinder can be exhausted or discharged and the valve *c* reopened to again admit water to the cylinder A.

Steam from a suitable boiler or generator may be admitted directly to the cylinder by leading and connecting the pipe K to the steam-dome of said generator; but I may also employ an air-compressor, as shown in Fig. 1, to supply compressed air as the motive fluid for raising the water. This compressor has a connected barrel and heads, forming the cylinder P, in which reciprocates the piston P′, which is suitably packed, the heads of the air-cylinder being provided with the spring-controlled inlet-valves *p p′*, adapted to act alternately to admit air to either end of the cylinder on reciprocation of the piston P′. This piston has its rod *q*, passing through a suitable stuffing-box in one head of the cylinder, and said rod operates in a fixed guide *q′*. The piston-rod is reciprocated in any suitable way, either by a pitman (not shown) of a windmill or engine or by a hand or power lever Q; but this is not essential, although it is evident that the air-compressor may be placed on top of the tower of the windmill close to the sails thereof, to avoid the use of heavy cumbersome pitmen, and the pipe K can be led from the compressor to the valve-support of the hydraulic cylinder.

The air-pump is of the duplex or double-acting class, and from the opposite heads thereof lead the outlet-pipes *r r′*, which each have a check-valve r^2, and said outlet-pipes are connected to a common pipe R, which in turn leads and is coupled to the supply-pipe K for the hydraulic cylinder.

To the supply-pipe R is connected, at a point between the valve-pipes *r r′*, a pipe S, having a relief-valve *s*, and when the air-pump is in operation during the time the air-inlet port is closed in the hydraulic cylinder and the exhaust is open therefrom to allow water to fill into the cylinder A the air-pump is relieved from accumulating excessive pressure in the pipes R K by the opening of the relief-valve *s* in the pipe S.

The operation of my invention will be readily understood by those skilled in the art from the foregoing description, when taken in connection with the accompanying drawings.

If desired, a signal or call-whistle (not shown) may be attached to the pipe K for supplying the motive fluid, and it will be found that the pressure in this pipe is sufficient to sound a loud blast on the call, which can be used for signaling or other purposes.

I am aware that changes and alterations in the form and proportion of parts and details of construction can be made without departing from the spirit or sacrificing the advantages of my invention, and I therefore reserve the right to make such modifications as fairly fall within the scope of my invention.

Having described my invention, what I claim is—

1. In a compressed-air or steam water elevator, the combination, with a cylinder and an exit-pipe leading therefrom, of the perforated valve-support fixed within the cylinder, the oscillating valve fitted snugly in said support and having its passages opening directly into the cylinder, the adjustable links in which the valve is supported and free to rock or turn, the arm rigid with the valve, the endwise-movable stem having the studs, and the float, substantially as described.

2. In a compressed-air or steam water-elevator, the combination, with a cylinder and an exit-pipe leading therefrom, of the fixed support within the cylinder, the rocking valve having the passages and the rigid bolt or shaft, the hubs in which the valve is pivotally supported and fitted in the fixed guides, the tension-springs and adjusting means therefor, the float-rod connected to said valve, and the float, substantially as described.

3. In a compressed-air or steam water-elevator, the combination, with a cylinder and its exit-pipe, of the valve-support having the passages, the rocking valve provided with the lateral studs, the stops fixed to said support and arranged in the path of the studs on said valve, the arm rigid with the valve, the supporting-links in which the valve is journaled, the rod, and a float, substantially as described.

4. In a compressed-air or steam water-elevator, the combination of a cylinder, a discharge-pipe arranged therein and adapted to receive therefrom, a fixed valve-support having ingress and egress passages and also arranged in the cylinder, a rocking valve fitted to said support and likewise having the inlet and egress passages, an endwise-movable rod connected to said valve, and a float slidable on said pipe and rod and adapted to move the latter, as and for the purpose described.

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