

(No Model.)

C. L. BURDICK.
FOOT PUMP.

No. 522,726.

Patented July 10, 1894.

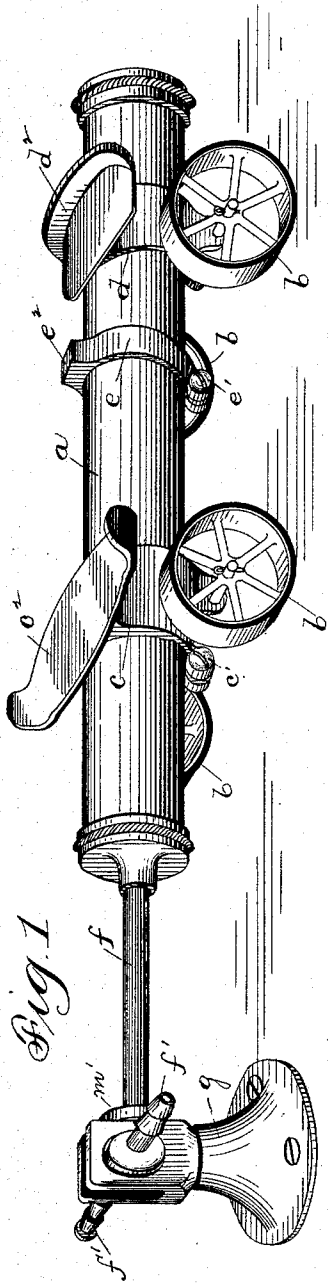


Fig. 1

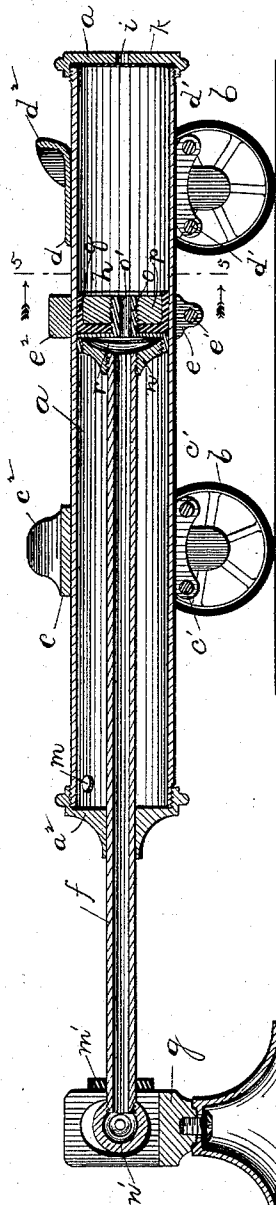


Fig. 2

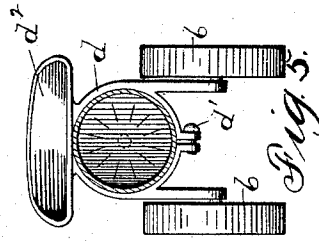


Fig. 3

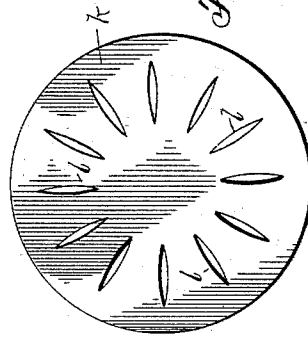


Fig. 4

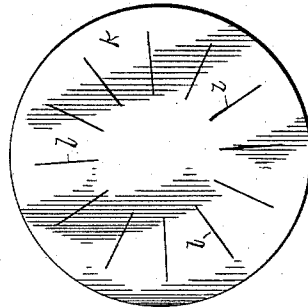


Fig. 5

Witnesses:

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UNITED STATES PATENT OFFICE.

CHARLES L. BURDICK, OF CHICAGO, ILLINOIS, ASSIGNOR TO HENRY J. THAYER AND CHARLES H. CHANDLER, OF SAME PLACE.

FOOT-PUMP.

SPECIFICATION forming part of Letters Patent No. 522,726, dated July 10, 1894.

Application filed May 2, 1893. Serial No. 472,709. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. BURDICK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Foot-Pumps, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to pumps, and more particularly to a foot pump adapted to be actuated by motion imparted to it by the foot of the operator.

The object of my invention is, first, to produce a foot pump adapted to be operated by the foot without unduly taxing the muscles of the body and without jarring the body, and, second, to produce a valve in which shall be combined compactness, certainty of operation, and durability.

My foot pump is particularly adapted for use in connection with air brushes or other apparatus in which dexterity of the hand is required, and in which it is essential that the movement of the foot necessary to operate the pump shall not jar the body or tax the muscles thereof to such an extent as to impair the proper use of the hands in manipulating the air brush or other air actuated apparatus.

My invention consists, first, in a foot pump comprising a cylinder and a piston horizontally movable relative to one another, one of said elements being fixed and the other being mounted upon rollers, or the like, so that it may be moved back and forth with as little friction as possible, gripping devices being provided upon the movable element adapted to be engaged by the foot of the operator, whereby motion may be imparted to the same.

My invention consists, second, in a valve comprising a central opening or port and a disk of flexible material, as leather, placed over the same and provided with apertures or openings, as radial slits, extending outward from points a short distance beyond the periphery of said port, whereby the central solid portion of the disk is adapted to seal the port when the disk is pressed against the same, and fluid passing through the port may find

egress through the openings about said central solid portion when the disk is pressed away from the port.

My invention consists, third, in various details of construction hereinafter described.

Heretofore foot pumps capable of operation without unduly jarring the body or taxing the muscles thereof, have usually been provided with pedals hinged horizontally and adapted to move up and down, motion being imparted to the pedals by an ankle movement of the foot of the operator, much after the manner of operating the pedals of a sewing machine or organ. Such pumps, while not unduly taxing the body are objectionable since sufficient power cannot be obtained by the ankle movement. Pumps have been constructed in which the pedals are adapted to be operated by a full leg movement, but such movements of the leg create such a strain upon the muscles of the body and so jar the body that the hand is incapable of performing those delicate movements required in order to manipulate the air brush or other air actuated apparatus.

In the pump of my invention I mount one of the elements thereof, preferably the cylinder, upon rollers or wheels, so that the same may be moved back and forth horizontally by the foot, while the end of the piston rod is rigidly held in position by being pivoted to a standard secured to the floor, or a base board. Plates are provided upon the top of the cylinder whereby a firm grasp may be obtained by the foot of the operator and a backward and forward motion imparted to the cylinder to effect the pumping action. By this construction I am enabled to get a long stroke without unduly taxing and jarring the body, since I am enabled to take advantage of the full movement of the foot about the knee, while heretofore, under the same requirements, only the ankle movement of the foot has been available.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a perspective view of the pump. Fig. 2 is a longitudinal sectional view upon a vertical plane passing through the axis of the cylinder of the pump. Fig. 3 is a view of the

valve when the pressure is in such a direction that the same is pressed against the port. Fig. 4 is a view of the valve when the pressure is in such a direction that the same is pressed away from the port, the slits being thereby slightly opened. Fig. 5 is a transverse sectional view of the pump upon line 5-5 of Fig. 2.

Like letters refer to like parts throughout the several figures.

The pump cylinder *a* is mounted upon wheels *b b* and is provided upon its upper surface with gripping devices adapted to be engaged by the foot of the operator. Encircling the fore part of the cylinder is a band *c*, which, by means of screws *c' c'* may be clamped to the cylinder. From the sides of this band project the axles of the wheels *b b* and upon the top of the band is formed the toe plate *c²* adapted to fit the sole of the shoe of the operator. Encircling the rear part of the cylinder is a second band *d* which by means of screws *d' d'* may be clamped to the cylinder. From the sides of this band likewise, project the axles upon which the rear wheels are mounted. Upon the top of band *d* is formed the heel plate *d²*, which conforms to the shape of the heel of a shoe. Intermediate between the bands *c* and *d* is the band *e* which is adapted to likewise encircle the cylinder, said band being provided with a screw *e'* by means of which it may be clamped to the cylinder. Upon the upper part of the band is formed the lug *e²* which is adapted to bear against the front part of the shoe heel and prevent its forward movement relative to the cylinder. It will be observed that by thus mounting the various parts adapted to be engaged by the foot upon movable bands, adjustment may be made for feet of various sizes.

One end of the piston rod *f* is secured to the piston *h* which works within the cylinder *a*, while the other end thereof is pivoted to the standard *g* which may be secured to the floor or to any suitable board. The end of the piston rod is so pivoted to the standard as to permit a slight vertical motion, as well as a rotary motion, thus permitting adjustment to inaccuracies upon the floor or track upon which the wheels carrying the cylinder travel. A rubber washer *m'* surrounds the piston rod *f* and acts as a stop or buffer against which the end of the cylinder comes in its forward excursion.

The bearings in the standard *g* in which the journal *n'* on the end of the piston rod *f* bears, is made with a greater vertical than horizontal dimension so that vertical movement of the end of the piston rod may be permitted to allow for irregularities in the floor or board over which the wheels are traveling. The journal is rotatably mounted in the standard so that the pump may, when desired, be used as a hand pump, the cylinder being grasped by the hand and moved in a vertical or oblique direction as desired.

Connection to the reservoir or other receptacle into which it is desired to pump the fluid is made by means of a rubber hose attached to the extension *f'* of the piston rod *f*, which I have shown at right angles to the piston rod and with two ends projecting, either one or both of which may be used for making connection between the pump and the reservoir. The cylinder is closed by the removable ends *a' a²*. In the center of the end *a'* is the port *i*, which is adapted to be covered by the central portion of the flexible disk *k* which is provided with the radial slits *l l l*. This disk of flexible material fits the end of the cylinder and is adapted to be held between the ends of the cylinder proper and the covering *a'* when the covering is screwed into place. The end *a²* of the cylinder is provided with a hole to permit the passage of the piston rod.

The port *m* is provided in the cylinder near the end thereof to admit fluid to the pump on the side of the piston opposite the end *a'*. Upon the piston rod is fastened the concave nut *n*, to which nut is fastened the angular piston plate *o*, which is provided with the port *o'*. The nut *p* is fastened to said piston plate and is adapted to hold the piston packing *q* in place and to press same against the inner surface of the cylinder. Between the concave nut *n* and the piston plate *o* is the flexible disk *r* similar in form to the disk at the end of the cylinder. The center of said disk *r* is adapted to close the port *o'* during the excursion of the piston in one direction, and to admit air into the piston rod through the slits *l l l* provided therein during the excursion in the other direction.

I make the concave portion of the nut *n* sufficiently deep to permit the play of the flexible disk which is held between the concave nut and the piston plate, without permitting the flexible disk to at any time close the orifice of the hollow piston rod which is at the lower portion of the concave nut.

From the foregoing description the operation of this device will be readily understood.

In the forward excursion of the pump cylinder the flexible disk *k* is forced back so that its center covers the port *i* in the end of the cylinder. The compression of the air in the cylinder back of the piston presses the flexible disk *r* into the position shown in Fig. 2, where the slits in said flexible disk assume the appearance shown in an exaggerated form in Fig. 4. The air thus passes from the rear of the cylinder through the port *o'* and the slits in the flexible disk *r* into the piston rod connecting with the reservoir. After the forward excursion has been completed and the rearward excursion begun, the flexible disk *r* drops back against and closes the port *o'* and the flexible disk *k* at the same time is drawn away from the opening *i* and permits, through the slits *l l l* which are now slightly open in the flexible disk *k*, the admission of air to the cylinder back of the piston. It will be apparent that as this operation is repeated the

air will be successively admitted to the cylinder in the rear of the piston, then pass to the hollow piston rod, and so be forced into the tank, and the pressure in the tank kept
5 at the desired point.

Many modifications of my construction will readily suggest themselves. I therefore do not wish to be limited to the precise construction shown herein, but

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

1. In a foot pump, the combination with a piston and a horizontal cylinder relatively
15 movable, of foot plates secured to one of said parts and adapted to be engaged by the foot to impart movement thereto, substantially as described.

2. In a foot pump, the combination with a
20 fixed piston, of a horizontal cylinder mounted upon rollers and movable relatively to said piston, and foot plates secured to said cylinder and adapted to be engaged by the foot to impart movement to said cylinder, substan-
25 tially as described.

3. In a foot pump, the combination with a cylinder *a* mounted upon rollers and adapted

to be moved horizontally, of a piston *h* secured to a piston rod *f*, and a standard *g*, the end of said piston rod being secured thereto
30 by a connection adapted to permit a slight vertical movement of said cylinder, as well as a rotary motion about said connection, substantially as described.

4. In a pump, the combination with a cen-
35 tral port, of a valve comprising a disk of flexible material adapted to cover said port, said disk being secured around its outer edge and provided with a number of distinct apertures or openings around said port and beyond the
40 periphery thereof, substantially as described.

5. In a pump, the combination with a cen-
45 tral port, of a valve comprising a disk of flexible material adapted to cover said port, said disk being secured around the outer edge and provided with radial slits extending outward from points beyond the periphery of the cen-
tral port, substantially as described.

In witness whereof I hereunto subscribe my name this 28th day of April, A. D. 1893.

CHARLES L. BURDICK.

Witnesses:

W. CLYDE JONES,
HENRY J. THAYER.