March 23, 1937. P. HERBST 2,074,787

PISTON PUMP FOR GASES AND LIQUIDS

Filed July 3, 1934

Fig. 1.

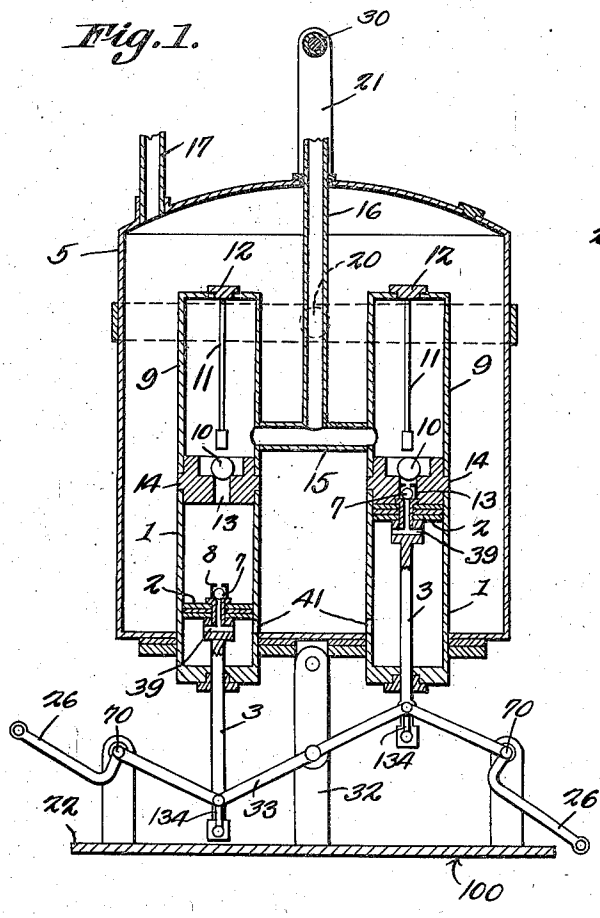


Fig. 3.

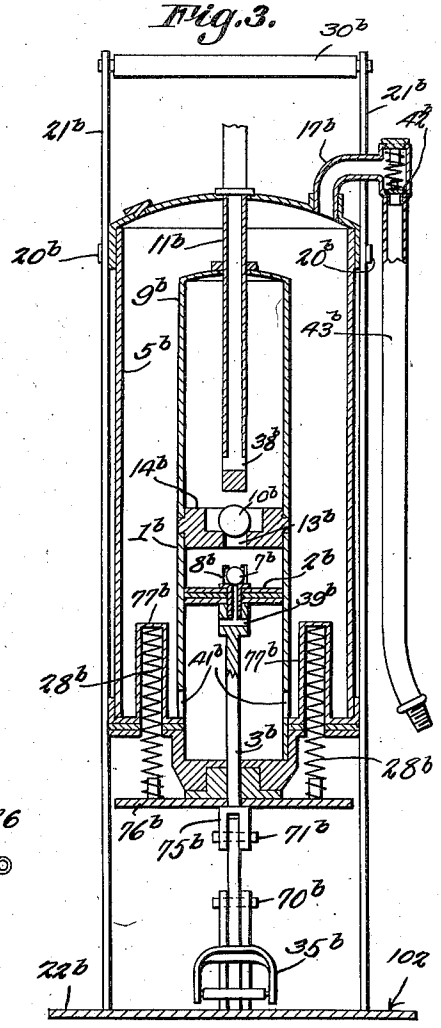
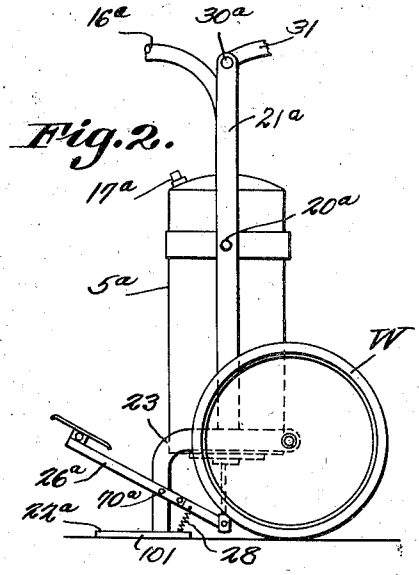


Fig. 2.



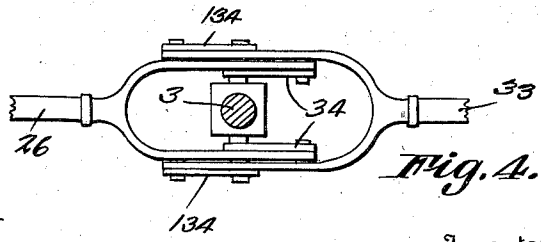


Fig. 4.

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Patented Mar. 23, 1937 2,074,787

UNITED STATES PATENT OFFICE

2,074,787

PISTON PUMP FOR GASES AND LIQUIDS

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Application July 3, 1934, Serial No. 733,652
In Germany July 3, 1933

2 Claims. (Cl. 103—215)

This invention has for its objects the provision of a pump which is readily portable, characterized by a minimum amount of wear on the piston rod, and so constructed that the operator may assume a comfortable position and work the pump with a minimum amount of effort and fatigue.

Material embodiments of the invention are shown by way of illustration in the drawing, but a mechanic who confines himself to the scope of the claims may make such changes as his skill may suggest, without departing from the spirit of the invention.

In the drawing:

Fig. 1 shows in vertical section, a device constructed in accordance with the invention, parts being in elevation;

Fig. 2 is a side elevation showing a modification;

Fig. 3 is a longitudinal section disclosing a further modification, parts remaining in elevation.

Fig. 4 is a plan illustrating the link connections used in the form shown in Fig. 1.

In carrying out the invention as disclosed in Fig. 1, there is provided a supporting frame 100, comprising transversely spaced, substantially vertical side members 21, a hand grip 30 connecting the upper portions of the side members, and a base 22 to which the lower portions of the side members are connected. A tank 5 is provided, and is mounted on the frame 100 for oscillatory swinging movement about a substantially horizontal axis, through the instrumentality of trunnions 20, pivotally carried in the side members 21 of the frame, in a way to be understood clearly from Figs. 2 and 3, although those views disclose modifications.

Pump cylinder structures are provided, and each includes a cylinder 1, mounted on the lower end of the tank 5 and extended into the tank. The tank 5 and the trunnions 20 constitute means for mounting the pump cylinder structures (including the cylinders 1) on the side members 21 for the aforesaid oscillatory swinging movement about a substantially horizontal axis.

The pump cylinders 1 are provided near their lower ends with inlets 41, communicating with the tank 5. Fixed on the upper end of each pump cylinder 1 is a head 14, having an opening 13 controlled by a downwardly closing check valve 10, which may be described broadly as associated with the cylinder 1. An air chamber 9 is secured to the head 14. A rod 11 is secured removably, as at 12, in the upper end of the air chamber 9. The lower end of the rod 11 forms a stop for the check valve 10. The tank 5 is provided at its upper end with an inlet 17. The air chambers 9 are connected by a cross tube 15, communicating with an outlet pipe 16, extended out of the tank 5, the pipe 16 constituting an outlet for the cylinders 1.

A piston 2 is mounted for reciprocation in each cylinder 1. Each piston 2 is carried by a piston rod 3, including a portion extended downwardly out of the pump cylinder 1. A cage 8 is mounted on the piston 2 and retains, movably, a downwardly closing check valve 7, which may be described broadly as associated with the cylinder 1. The check valve 7 controls an opening 39, extended through the piston 2, and downwardly and laterally through the piston rod 3.

Foot levers 26 are fulcrumed at 70 on the lower portion of the frame 100, at points fixed with respect to the base 22, for oscillatory swinging movement, and are extended beneath the tank 5 and the cylinders 1. The inner end of each lever 26 is forked, as shown in Fig. 4, the forked portions of the levers being connected by links 34 to the downwardly extended portion of the corresponding piston rod 3. Links 134 are pivoted to the forked inner ends of a walking beam 33, fulcrumed intermediate its ends on a support 32.

Various operations are possible, depending more upon the will of an operator and upon the end to be accomplished than upon limitations imposed by the specific structure shown and described, but it may be stated, generally, that the pistons 2 are reciprocated by means of the piston rods 3 and the corresponding foot levers 26. On the upstroke of the pistons 2, fluid is drawn into the tank 5, through the inlet 17, and into the lower portion of the cylinders 1, through the inlets 41. On the downstroke of the pistons 2, the fluid passes through the openings 39 in the pistons and raises the check valves 7. On the next upstroke of the piston 2, the valve 7 closes, the check valve 10 opens, and the fluid moves into the chamber 9, and out through the exit means 15—16, responsive to the air cushion in the upper part of the chamber 9.

The pivotal mounting of the tank 5 on the frame 100, enables the device to be operated without objectionable wear at the place where the piston rod 3 slides in the lower end of the cylinder 1.

In the form shown in Fig. 2, parts hereinbefore described have been designated by numerals already used, with the suffix "*a*". The structure of Fig. 2 relates more particularly to a single cylinder form of the general sort shown in Fig. 3 and hereinafter described. The supporting frame 101

comprises an inverted L-shaped structure 23, whereon ground wheels W are mounted to rotate, to the end that the device may be trundled about. Having this consideration in mind, the grip 30a may be supplied with an extension 31.

The single foot lever 26a is fulcrumed at 70a on the part 23. A pull spring 28, connected to the inner portion of the lever 26a and secured to the base plate 22a, constitutes means for raising the free end of the foot lever 26a while the operator maintains a hold on the hand grip 30a, the hand grip being disposed above and closely adjacent to the tank 5a and in readily accessible position for use by an operator whose foot is on the free end of the foot lever 26a.

In carrying out the invention as disclosed in Fig. 3, there is provided a supporting frame 102, comprising transversely spaced, substantially vertical side members 21b, a hand grip 30b connecting the upper portions of the side members, and a base 22b to which the lower portions of the side members are connected. A tank 5b is provided, and is mounted on the frame 102 for oscillatory swinging movement about a substantially horizontal axis, through the instrumentality of trunnions 20b, pivotally carried in the side members 21b of the frame 102.

A pump cylinder structure is provided, and includes a cylinder 1b, mounted on the lower end of the tank 5b and extended into the tank. The tank 5b and the trunnions 20b constitute means for mounting the pump cylinder structure (including the cylinder 1b) on the side members 21b for the aforesaid oscillatory swinging movement about a horizontal axis.

The pump cylinder 1b is provided near its lower end with oppositely disposed inlets 41b, communicating with the tank 5b. Fixed on the upper end of the pump cylinder 1b is a head 14b, having an opening 13b, controlled by a downwardly closing check valve 10b, which may be described broadly as associated with the cylinder 1b. An air chamber 9b is secured to the head 14b. A pipe 11b is secured to the upper end of the air chamber 9b and extends out of the tank 5b, the pipe 11b constituting an outlet for the cylinder 1b. The lower end of the pipe 11b forms a stop for the check valve 10b, the pipe having a bore which leads downwardly to a transverse opening 38b in the pipe. The tank 1b is provided at its upper end with an inlet 17b, carrying an outwardly closing check valve 42b. A supply hose 43b is attached to the casing of the valve 42b.

A piston 2b is mounted for reciprocation in the cylinder 1b. The piston 2b is carried by a piston rod 3b, including a portion 75b extended downwardly out of the pump cylinder 1b. A cage 8b is mounted on the piston 2b and retains, movably, a downwardly closing check valve 7b, which may be described broadly as associated with the cylinder 1b. The check valve 7b controls an opening 39b, extended downwardly through the piston 2b and downwardly and laterally through the piston rod 3b.

The foot lever 35b is fulcrumed at 70b on the lower portion of the frame 102 (specifically, on the base 22b) at a point fixed with respect to the base 22b, for oscillatory swinging movement, and is extended beneath the tank 5b and the cylinder 1b, a means 71b being provided for connecting the lever pivotally with the downwardly extended portion 75b of the piston rod 3b.

A spring means, having abutment against the cylinder structure, is provided for moving the piston rod 3b downwardly, and for raising the free end of the foot lever 35b while the operator maintains a hold on the hand grip 30b, the hand grip being disposed above and closely adjacent to the cylinder 9b, and in readily accessible position for use by an operator whose foot is on the free end of the foot lever. That means embodies compression springs 28b, abutting at their lower ends against a cross head 76b on the piston rod 3b, and abutting at their upper ends within tubular sockets 77b, forming part of the cylinder structure.

The operations to be carried out with the device shown in Fig. 3 depend more upon the will of the operator and the end to be accomplished than upon limitations imposed by the specific structure shown and described, but it may be stated, generally, that the piston 2b is reciprocated by means of the piston rod 3b and the foot lever 35b.

On the upstroke of the piston 2b, fluid is drawn into the tank 5b past the outwardly closing check valve 42b, through the hose 43b and the inlet 17b, and into the lower portion of the cylinder 9b, through the inlets 41b. On the downstroke of the piston 2b, the liquid passes through the opening 39b in the piston, and raises the check valve 7b. On the next upstroke of the piston 2b, the check valve 7b closes, the check valve 10b opens, and the fluid moves into the chamber 9b and out through the pipe 11b. If a continuous flow is desired, the hose 43b may be removed at first, the pipe 11b may be closed by any suitable means (not shown), and an air pressure may be built up in the chamber 9b. Thereafter, the parts are restored to the condition of Fig. 3, and liquid is ejected in a continuous stream, through the pipe 11b. The specific pump details disclosed are well known, and a more detailed description of the operation is considered unnecessary for the information of a person skilled in the art.

Because the assisting spring means 28b is provided, the labor imposed upon the operator is decreased greatly. The pivotal mounting of the tank 5b on the frame 102 at 20b, enables the device to be operated without objectionable wear at the place where the piston rod 3b slides in the lower head of the cylinder 1b.

Having thus described the invention, what is claimed is:

1. A pump comprising a supporting frame including a base, a tank mounted on the frame for oscillatory swinging movement about a substantially horizontal axis and having an inlet, a pump cylinder mounted on the lower end of the tank and extended into the tank, the pump cylinder being provided with an inlet communicating with the tank, the pump cylinder having an outlet extended out of the tank, inlet and outlet valves associated with the pump cylinder, a piston mounted for reciprocation in the pump cylinder, a piston rod connected to the piston and including a portion extended downwardly out of the tank, a foot lever fulcrumed on the lower portion of the frame, for oscillatory movement, and extended beneath the tank, and means for connecting the lever pivotally with the downwardly extended portion of the piston rod.

2. In a pump, a supporting frame comprising transversely spaced, substantially vertical side members, a hand grip connecting the upper portions of the side members, and a base to which the lower portions of the side members are connected; a pump cylinder structure including a cylinder disposed between the side members, means for mounting the pump cylinder structure on the side

members for oscillatory swinging movement about a substantially horizontal axis, the pump cylinder being provided with an inlet and an outlet, inlet and outlet valve means associated with the pump cylinder, a piston mounted for reciprocation in the pump cylinder, a piston rod carrying the piston and including a portion extended downwardly out of the pump cylinder, a foot lever fulcrumed at a point fixed with respect to the base, for oscillatory movement, and extended beneath the pump cylinder, means for connecting the lever pivotally with the downwardly extended portion of the piston rod, and spring means, having abutment against the cylinder structure, for moving the piston rod downwardly and raising the free end of the foot lever while the operator maintains a hold on the hand grip, the hand grip being disposed above and closely adjacent to the cylinder, and in readily accessible position for use by an operator whose foot is on the free end of the foot lever.

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