Aug. 6, 1946. T. D. NISBET 2,405,322

FLUID PUMP

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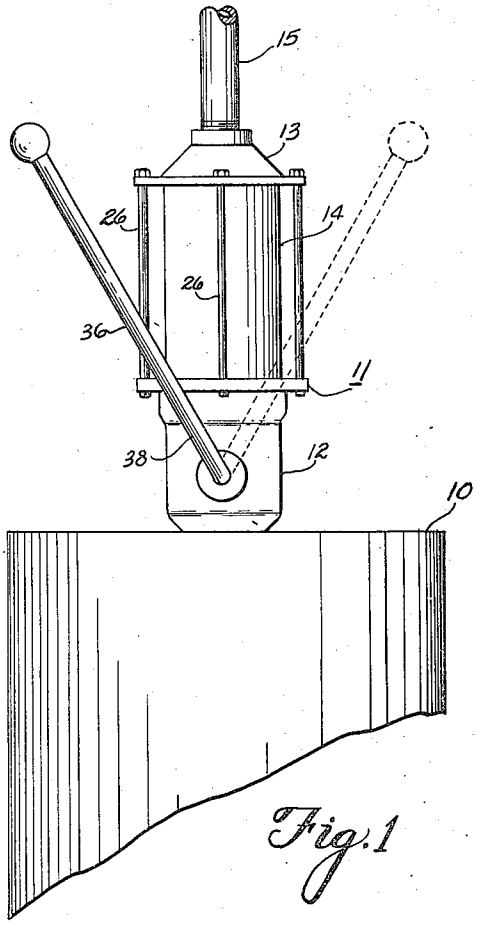

Fig. 1

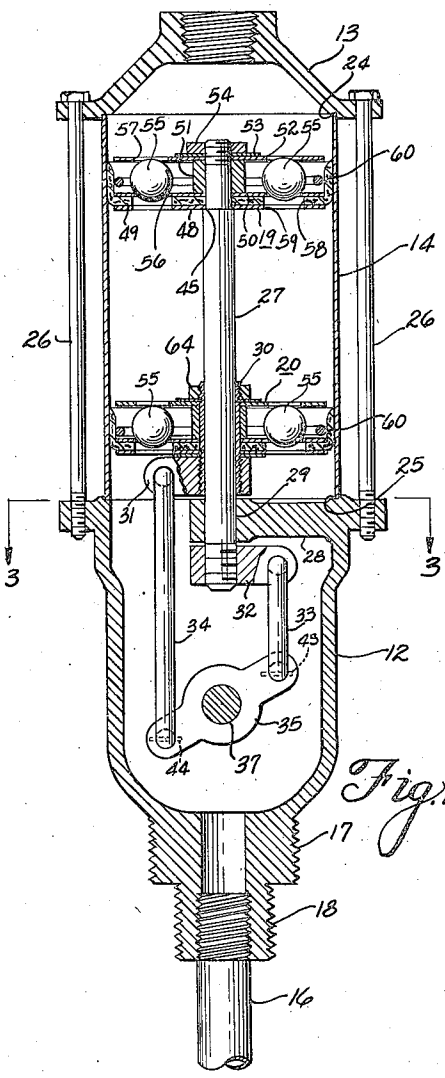

Fig. 2

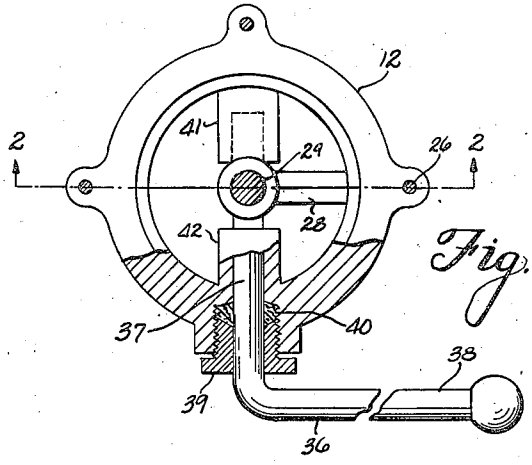

Fig. 3

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FLUID PUMP

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11 Claims. (Cl. 103—200)

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My invention relates in general to fluid pumps and more particularly to fluid pumps adapted to be mounted on a container for transferring the fluid in the container to a vessel or other container.

An object of my invention is the provision of a pump having two independently operable pistons within a cylinder in which the pistons may be actuated toward and away from each other by an actuating lever which may be actuated back and forth through an angle less than 180 degrees.

Another object of my invention is the provision of a pump having an L-shaped actuating lever whereby the pump may be directly mounted upon a container without the actuating lever contacting or engaging the container on which the pump is mounted.

Another object of my invention is the provision of a pump having two independently operable pistons within a cylinder in which the pistons are actuated by a rocker which oscillates through an angle less than 180 degrees.

Another object of my invention is the provision of a pump having two independently operable pistons within a cylinder, in which the pistons move toward and away from each other and in which the movement of the pistons is maintained substantially in a straight line motion.

Another object of my invention is the provision of a bracket for aligning a rod which actuates one of the pistons substantially co-axial of the cylinder, the said rod also functioning as a slidable guide rod for the movement of the other piston.

Another object of my invention is the provision of mounting one of the pistons upon a sleeve which slidably engages the rod that actuates the other piston.

Other objects and a fuller understanding of my invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawing, in which:

Figure 1 represents a side elevational view of a pump embodying the features of my invention and is shown as being mounted upon a fluid container;

Figure 2 is a longitudinal cross-sectional view of my pump, the section being taken along the line 2—2 of Figure 3; and

Figure 3 is a view of my pump taken along the line 3—3 of Figure 2 with the rocker and the connecting links omitted for the purpose of clarity.

One useful employment of my pump is that of transferring liquid such as gasoline or oil from

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the original shipping or delivery container into another tank or vessel, and particularly where little suction or head pressure is required. These types of pumps are usually referred to as transfer pumps. One of the most common type of transfer pump found on the market is operated by a crank involving a rotary principle and thus requires a considerable amount of space or room between the pump body and the fluid container whereby a full swing of the crank may be made. In order to provide this space or head room, a pipe nipple is used to elevate the pump body away from the fluid container which precludes the screwing of the pump body directly into the drum or container. In my invention, the pump body may be screwed or attached directly to the fluid container from which fluid is to be pumped.

With particular reference to the drawing, the reference character 10 represents a fluid container from which fluid such as gasoline or oil is to be transferred. As shown in Figure 1, my pump which is indicated by the reference character 11 is connected directly to the top of the container 10 and is adapted to be actuated by a manually operable lever 36 which is rocked back and forth to produce the pumping operation.

With reference to Figure 2, my pump comprises an intake housing 12, a discharge housing 13 and a cylinder 14 mounted therebetween. The discharge housing 13 is provided with an annular stepped shoulder 24 and the intake housing 12 is provided with an annular stepped shoulder 25 and as illustrated the ends of the cylinder 14 respectively abut against these annular stepped shoulders 24 and 25 and are firmly held therein by the connecting bolts 26 which extend between the discharge housing 13 and the intake housing 12. When the connecting bolts 26 are turned down tight a good sealing engagement is made between the end of the cylinder 14 and the annular stepped shoulders 24 and 25. A discharge conduit 15 may be threadably connected to the discharge housing 13, and as the pump is operated the fluid which is being pumped is discharged out through the discharge conduit 15 into another vessel or container. An intake conduit 16 may be threadably connected to the bottom of the intake housing 12 and when the pump is in operation the intake conduit 16 extends down into the container 10 for conveying liquid to the intake housing 12. Although not shown, a ball check valve may be placed immediately in the intake housing 12 above the intake conduit 16 to prevent the return of the flow of liquid to the container. However, I find from actual op-

eration that my pump produces a sufficient vacuum so that for ordinary purposes the ball check valve may be dispensed with, particularly where little fluid suction or vacuum is required to elevate the liquid from the container to the pump. However, where the head pressure or suction becomes great it is preferable to employ a ball check valve in the intake housing 12 above the intake conduit 16. As illustrated in Figure 2, the lower end of the intake housing 12 is provided with two stepped threaded portions 17 and 18 whereby my pump may accommodate threaded openings in the container of different sizes. Original shipping or delivery containers or drums as now found on the market have two sizes of threaded openings and thus if my pump is to be connected to a container having a small opening then the threaded portion 18 is employed, and in the event that the container has the large opening then the threaded portion 17 is employed to connect my pump to the top of the liquid container.

Mounted within the cylinder 14 of my pump are two pistons 19 and 20 which are substantially of the same construction. The upper piston is designated by the reference character 19 and the lower piston by the reference character 20. As illustrated, the upper piston 19 is connected to the end of a centrally disposed rod 27. The lower end of the rod 27 is adapted to slidably move through a guide hole 29 in a bracket 28 which is preferably integrally connected to the side wall of the intake housing 12. The lower piston 20 is provided with an inner sleeve 30 which slidably fits around the rod 27 whereby the lower piston 20 may be actuated independently of the upper piston 19. Connected to the lower end of the sleeve 30 is an actuating lug 31 which is adapted to be reciprocally operated by a connecting link 34 from a rocker arm 35 actuated by the lever 36. The rod 27 and the upper piston 19 are also actuated by the rocker arm 35 through means of an actuating lug 32 connected to the bottom end of the rod 27 and an interconnecting link 33 which is connected to the opposite end of the rocker arm to that from which the connecting link 34 is connected. As shown in Figure 3, the L-shaped lever 36 is constructed of a first portion 37 and a second portion 38. The first portion 37 is adapted to be mounted for rocking movement into bearing lugs 41 and 42 preferably constructed integrally with the intake housing 12. The rocker arm 35 is non-rotatively connected to the first portion 37 of the L-shaped lever and is disposed between the two bearing lugs 41 and 42. For the purpose of clarity, the rocker arm 35 is not shown in Figure 3. A packing gland nut 39 surrounds the first portion 37 of the L-shaped lever and is adapted to compact a packing 40 which surrounds the first portion 37 of the L-shaped lever to prevent leaking of liquid from the intake housing 12. The second portion 38 of the L-shaped lever extends externally of the intake housing and is disposed for manual rocking movement back and forth for pumping liquid. The angle through which the lever may be operated is less than 180 degrees and is preferably within the range of 60 to 90 degrees. Accordingly, the actuating lever does not interfere with the liquid container and thus the pump intake housing 12 may be connected directly to the container.

The lower end of the connecting link 33 is provided with a right angle portion which is adapted to fit within an opening in the right-hand end of the rocker arm as shown in Figure 2. A cotter key 43 is employed to keep the connecting link 33 from disengagement with the rocker arm 35. Similarly, the lower end of the connecting link 34 is provided with a right angle portion which extends through an opening in the left-hand end of the rocker arm. A cotter key 44 is employed to keep the connecting link 34 from becoming disengaged with the rocker arm 35. The upper ends of the connecting links 33 and 34 are respectively provided with right-angle portions for fitting, respectively, in the openings provided in the actuating lugs 32 and 31. Cotter keys need not be provided in the upper ends of the connecting links to keep them from becoming disengaged with the actuating lugs because the fit of the lower end of the connecting links into the rocker arms prevents this engagement.

The upper piston 19 which is connected to the upper end of the rod 27 is adapted to rest upon a shoulder 45 provided on the rod 27 and is connected thereto by means of a nut 54. The upper piston 19 comprises a bottom plate 48, an intermediate plate 50, and a top plate 52. Between the bottom plate 48 and the intermediate plate 50 is a gasket 49 having an annular up-turned flange which fits against the inside wall of the cylinder 14. The annular up-turned flange of the gasket 49 may be held against the inside wall of the cylinder 14 by means of a suitable wire spring indicated by the reference character 60 which may be either of a single wire type or a coiled spring type for providing the necessary resiliency. The top plate 52 and the intermediate plate 50 are held apart by means of a spacer 51. A washer 53 may be provided under the nut 54 and on top of the top plate 52. Holes 56 may be provided in the intermediate plate 50 which function as valve seats for ball valves 55 which prevent the back flow of the liquid through the piston 19. The top plate 52 may be provided with holes 57 into which the ball valves 55 partially extend, whereby the holes 57 operate as retaining holes to keep the ball valves between the intermediate plate and the top plate. As fluid or liquid flows upwardly through the piston 19, the ball valves are raised from their seats 56 but when liquid tends to flow backward through the piston 19 the ball valves make seating engagement with the holes 56 for preventing this back flow. The leather gasket 49 and the bottom plate 48 are likewise provided with openings 58 and 59 to provide a passageway for the fluid or liquid to flow through the seats for the ball valves.

The construction of the lower piston 20 is substantially the same as that of the upper piston 19 and is connected to the sleeve 30 by means of a nut 64 which holds the lower piston 20 upon the sleeve against the upper surface of the actuating lug 31.

In operation, as the rocker arm 35 is rotated in a clockwise direction, the linkage is such as to cause the upper piston 19 to move downwardly and the lower piston 20 to move upwardly. As the upper piston moves downwardly it is merely displaced within the liquid contained within the pump cylinder 14. As the lower piston 20 moves upwardly it forces the liquid which is above the piston outwardly of the discharge conduit 15 and at the same time draws in liquid from the container 10 into the intake housing 12 and the cylinder which is below the piston 20. When the rocker arm is rotated in a counter-clockwise direction the mechanical linkage is such as to move the upper piston 19 upwardly and the lower piston 20 downwardly. The movement of the lower piston 20 downwardly is merely a displacement

of the piston within the liquid, in which case the liquid within the cylinder 14 flows upwardly through the ball valves into the portion of the cylinder above the lower piston 20. The movement of the upper piston in an upward direction forces the liquid which is above the piston out through the discharge conduit 15 and at the same time produces a suction for elevating the liquid within the cylinder 14 which is below the upper piston 19. Accordingly, my double piston construction is such as to deliver liquid upon each actuation of the actuating lever 36, and thus may be characterized as a double-action pump. The guide bracket 28 which stabilizes the lower end of the rod 27 enables me to bring the two pistons in close proximity with each other without tipping the pistons. Accordingly, the pistons move in a straight line motion since the actual center of the rod 27 is maintained co-axial with the center of the cylinder 14. In other words, the plane of the pistons is kept perpendicular to the axis of the cylinder 14 as the rocker arm is actuated by the lever 36. By reason of the straight line motion of the piston as effected by the guide bracket 28, it is to be noted that I am not restricted in the diameter of my pump cylinder since there is no tendency for the pistons to tip within the cylinder. If they were allowed to tip it would cause leakage of the liquid as well as binding of the pistons within the cylinder. In actual construction, my cylinder and piston may be of such size and dimension as to deliver the predetermined amount of liquid such, for example, as one pint for each rocking travel of the lever arm 36. In assembly, the connecting links and the rocker arm 35 and the actuating lever are first mounted within the intake housing 12, after which the rod 27 and the piston cylinders may be assembled. After the pistons are assembled within the cylinder, then the discharge housing 13 is bolted down by means of the connecting bolts 26.

Although I have described my invention in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A fluid pump, comprising an intake housing, a discharge housing, a cylinder mounted between the intake housing and the discharge housing, a first and a second piston independently operable in said cylinder, means including a first connecting link for reciprocally actuating the first piston and a second connecting link for reciprocally actuating the second piston, and an L-shaped lever having a first portion and a second portion, means for mounting the first portion of the L-shaped lever for rocking movement in the intake housing, said second portion of the lever extending externally of the intake housing and being disposed for manual operation, rocker means in said intake housing connected to the first portion of the L-shaped lever for operating the connecting links and thereby independently reciprocating the pistons within the cylinder.

2. A fluid pump, comprising an intake housing, a discharge housing, a cylinder mounted between the intake housing and the discharge housing, first and second pistons independently operable in the cylinder, a rod for actuating the first piston, a sleeve slidably mounted around

said rod and adapted to actuate the second piston, a first connecting link for actuating said rod, a second connecting link for slidably actuating said sleeve relative to said rod, an L-shaped lever having a first portion and a second portion, means for mounting the first portion in the intake housing for rocking movement, said second portion of the L-shaped lever extending externally of the intake housing and being disposed for manual operation, rocker means in said intake housing connected to the first portion of the L-shaped lever and having opposite ends adapted respectively to actuate the first and second connecting links for independently actuating said pistons in the cylinder upon manual movement of the second portion of the L-shaped lever.

3. A fluid pump, comprising an intake housing, a discharge housing, a cylinder mounted between the intake housing and the discharge housing, first and second pistons independently operable in the cylinder, a rod for actuating the first piston, a sleeve slidably mounted around said rod and adapted to actuate the second piston, a first connecting link for actuating said rod, a second connecting link for slidably actuating said sleeve relative to said rod, an L-shaped lever having a first portion and a second portion, means for mounting the first portion in the intake housing for rocking movement, said second portion of the L-shaped lever extending externally of the intake housing and being disposed for manual operation, rocker means in said intake housing connected to the first portion of the L-shaped lever and having opposite ends adapted respectively to actuate the first and second connecting links for independently actuating said pistons in the cylinder upon manual movement of the second portion of the L-shaped lever, and a bracket connected to the intake housing having an opening therein through which the said rod slidably reciprocates for stabilizing the rod, whereby its longitudinal axis substantially coincides with the longitudinal axis of the cylinder.

4. A fluid pump, comprising a cylinder, a first and a second piston independently operable therein, a rod for actuating the said first piston, a sleeve surrounding and slidably mounted upon said rod for actuating the second piston, stabilizing means having an opening in which said rod slidably moves for maintaining the reciprocal movements of the rod in a straight-line motion within said cylinder, and means including first and second links for independently actuating said rod and said sleeve to operate said pistons independently in said cylinder, first connection means on one side of said stabilizer means for connecting said first link to said rod, second connection means on the opposite side of said stabilizer means for connecting said second link to said sleeve.

5. In a fluid pump having a cylinder and a housing at one end thereof, the improvement of a piston arrangement to operate in the said cylinder, said improvement comprising a first and second piston mounted for reciprocating pumping action, a longitudinally reciprocable rod, a sleeve member providing a hub in said second piston, said rod extending through said second piston hub with sliding engagement therewith, thereby permitting said second piston to be guided by the said rod but to reciprocate independently thereof, said rod being secured to said first piston and operating said first piston recipro-

cably within said cylinder, centrally supported guide means to guide the end of the rod opposite from the end secured to the said first piston, and actuating means having first connection means on one side of said guide means connected to said rod and second connection means on the opposite side of said guide means connected to said sleeve member for respectively operating the said first and second pistons with opposed reciprocating movements within said cylinder.

6. In a fluid pump having a cylinder and a housing at one end thereof, the improvement of a piston arrangement to operate in the said cylinder, said improvement comprising a first and second piston mounted for reciprocating pumping action, a longitudinally reciprocable rod, a sleeve member providing a hub in said second piston, said rod extending through said second piston hub with sliding engagement therewith, thereby permitting said second piston to be guided by the said rod but to reciprocate independently thereof, said rod being secured to said first piston and operating said first piston reciprocably within said cylinder, guide means extending from the wall of said housing to guide the end of the rod opposite from the end secured to the said first piston, and actuating means having first connection means on one side of said guide means connected to said rod and second connection means on the opposite side of said guide means connected to said sleeve member for respectively operating the said first and second pistons with opposed reciprocating movements within said cylinder, said actuating means including rocker means and an L-shaped lever mounted for rocking movement in said housing and adapted to oscillate through an angle less than 180 degrees.

7. In a fluid pump having a cylinder and a housing at one end thereof, the improvement of a piston arrangement to operate in the said cylinder, said improvement comprising a first and second piston mounted for reciprocating pumping action, a longitudinally reciprocable rod, a sleeve member providing a hub in said second piston, said rod extending through said second piston hub with sliding engagement therewith, thereby permitting said second piston to be guided by the said rod but to reciprocate independently thereof, said rod being secured to said first piston and operating said first piston reciprocably within said cylinder, centrally supported guide means to guide the end of the rod opposite from the end secured to the said first piston, and actuating means connected to said rod and said sleeve member for operating the said first and second pistons with opposed reciprocating movements within said cylinder, said actuating means including an L-shaped lever having a first portion and a second portion, means for mounting said first portion for rocking movement in said housing, said second portion extending externally of said housing and being disposed for manual operation, and rocker means mounted on said first portion, and first and second connecting links operated by the rocker means and connected respectively to the said rod and to the said sleeve member on opposite sides of said guide means for actuating said pistons with opposed movements within said cylinder.

8. In a pump, an intake housing, a pump cylinder secured to said intake housing, a first and second piston operable within said cylinder, a reciprocable rod extending substantially along the longitudinal axis of the cylinder, said second piston having an opening through the center thereof, said rod extending through the said center opening of the second piston, said rod being secured at one end thereof to the first piston and disposed to reciprocably move said first piston, stationary axis rocker means within said intake housing, two extension links extending from said rocker means, one of said extension links serving to operate said center rod and first piston, and the other of said extension links serving to operate the said second piston, said second piston moving reciprocably within said cylinder independently of the direction of longitudinal movement of the said rod but said rod serving as a guide therefor, lever arm means extending from said rocker means to the exterior of the housing, whereby a rocking motion may be transmitted to the rocker means to operate the pistons, and a discharge opening on the pump barrel chamber on the opposite end of the chamber from the intake housing.

9. A fluid pump comprising a first housing, a second housing, a cylinder mounted between the first and second housings, a first and a second piston independently operable in said cylinder, means including a first connecting link for reciprocably actuating the first piston, and a second connecting link for reciprocably actuating the second piston, an actuating member having a first portion and a second portion, means for mounting the first portion of the actuating member for rocking movement in said first housing, said second portion of the actuating member extending externally of the first housing and being disposed for manual operation, rocker means in said first housing connected to the first portion of the actuating member for operating the connecting links, and thereby independently reciprocating the pistons within the cylinder, one of said housings constituting an intake housing having an inlet and the other said housing constituting a discharge housing having a discharge outlet, said pistons each having a flow passage through which fluid flows from said intake housing to said discharge housing, said pistons, connecting links and rocker arm being disposed between said inlet and said outlet.

10. A pump comprising a first housing, a second housing, a pump cylinder secured between said housings, a first and second piston operable within said cylinder, a reciprocable rod extending substantially along the longitudinal axis of the cylinder, said second piston having a sleeve centrally disposed thereof, said rod extending through the said sleeve of the second piston, said rod being secured at one end thereof to the first piston and disposed to reciprocably move said first piston, stationary axis rocker means within said first housing, two extension links extending from said rocker means, first connection means for connecting one of said extension links to said rod for operating said first piston, second connection means for connecting the other of said extension links to said sleeve for operating said second piston, said second piston and sleeve moving reciprocably within said cylinder independently of the direction of longitudinal movement of the said rod but said rod serving as a guide therefor, centrally supported guide means disposed between said first and second connection means for guiding said rod, actuating means extending from said rocker means to the exterior of said first housing, whereby a rocking motion may be transmitted to the rocker means to operate the pistons, said pistons each having a flow passage through

which fluid flows between said housings, said first and said second housing each having an opening through which fluid flows as said pistons are operated.

11. A pump comprising a first housing, a second housing, a pump cylinder secured between said housings, a first and second piston operable within said cylinder, a reciprocable rod extending substantially along the longitudinal axis of the cylinder, said second piston having a sleeve centrally disposed thereof, said rod extending through the said sleeve of the second piston, said rod being secured at one end thereof to the first piston and disposed to reciprocably move said first piston, stationary axis rocker means within said first housing, two extension links extending from said rocker means, first pivotal connection means for

connecting one of said extension links to said rod for operating said first piston, second pivotal connection means for connecting the other of said extension links to said sleeve for operating said second piston, said second piston and sleeve moving reciprocably within said cylinder independently of the direction of longitudinal movement of the said rod but said rod serving as a guide therefor, actuating means extending from said rocker means to the exterior of said first housing, whereby a rocking motion may be transmitted to the rocker means to operate the pistons, said pistons each having a flow passage through which fluid flows between said housings, said first and said second housing each having an opening through which fluid flows as said pistons are operated.

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