

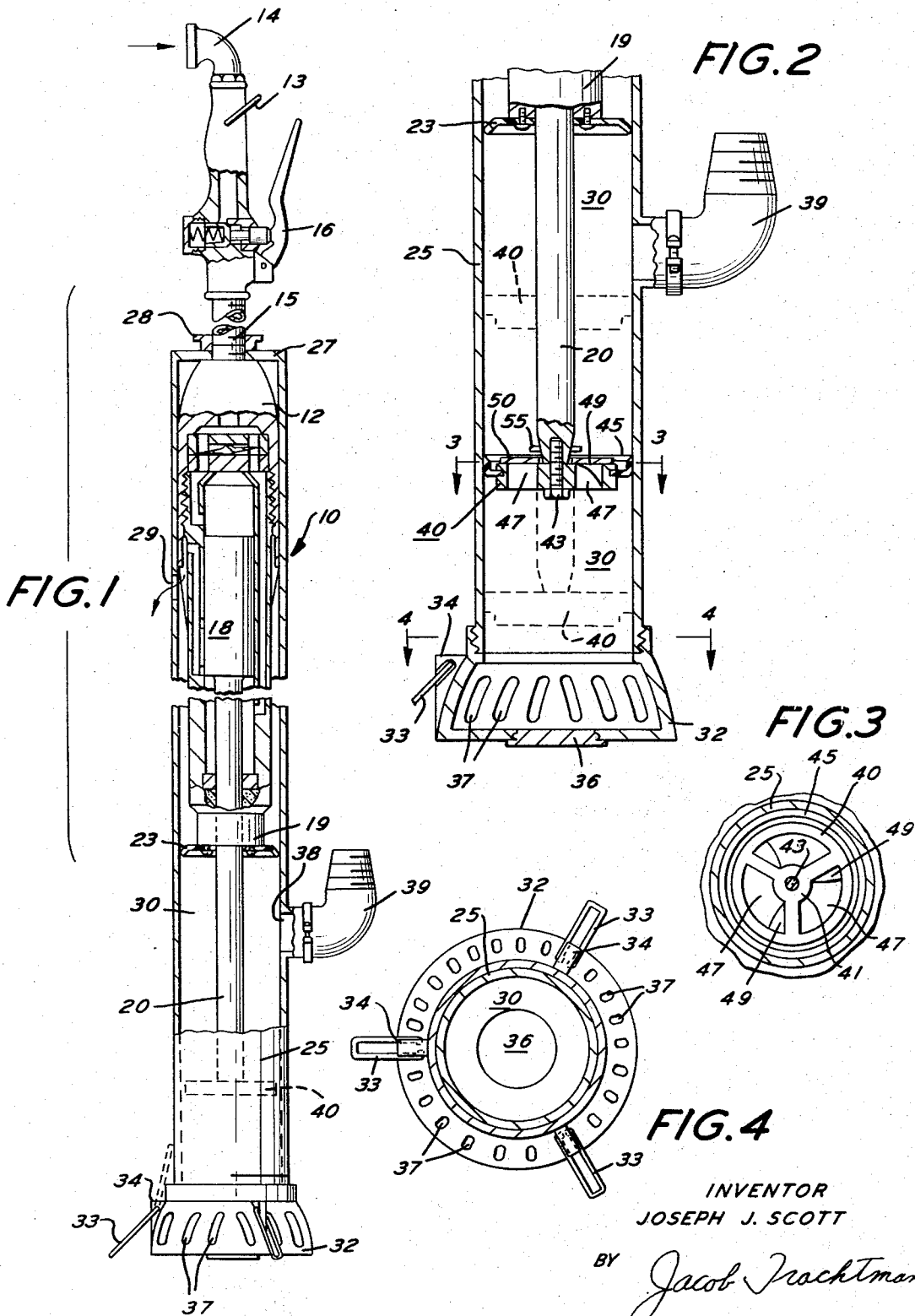
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FLUID PUMP DEVICE

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FLUID PUMP DEVICE

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This is a continuation-in-part of my copending application, Serial No. 428,812, filed January 28, 1965, entitled Fluid Pump Means.

This invention relates, in general, to a fluid pump device, and in particular, to a fluid pump adaptor which may be detachably connected to a pneumatic reciprocal actuating device such as those embodied in a backfill tamper.

Portable pump units have long been utilized by the construction industry to pump out various construction sites, such as foundations, trenches, etc. The conventional pump unit includes a rotary or reciprocating pump, driven by a portable power source, usually a gasoline engine, all mounted on a portable cart or frame. An intake hose connection is required since this well known pump arrangement does not operate when submerged in the fluid to be pumped. Naturally, the intake hose must be filled with fluid in order to prime the pump, which is often a time consuming chore. In general, the prior art portable pump units are bulky and unhandy, particularly the larger capacity units. Furthermore, the portable pump units of the past have proven to be undependable, the intake hoses being easily clogged and the underpowered gasoline engines frequently being stopped and difficult to restart.

Therefore, to overcome the foregoing and other difficulties of the prior art, the general object of this invention is to provide a new and improved portable fluid pump device.

It is the principal object of this invention to provide a novel and improved fluid pump device adapted for connection on a pneumatic reciprocal actuating means such as the pneumatic actuator of a backfill tamper.

A further object of this invention is to provide a handy, reliable and compact portable pump unit which may be directly immersed in the fluid to be pumped and simultaneously primed therein.

Another object of this invention is to provide a new and improved portable pump unit which is not readily clogged and which is driven by a reliable, not easily stopped, direct reciprocal power source.

An additional object of the invention is to increase the utility of a pneumatic activator such as that of a backfill tamper by a quick and easy adaption into a pneumatic pump unit.

It is still another object to provide a fluid pump device which is simple and rugged in construction for easy operation and maintenance and which is economical to produce by utilizing conventional, currently available standard components and materials that lend themselves to standard mass production manufacturing techniques.

For the purpose of illustrating the invention, there are shown in the drawings forms which are presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

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

FIGURE 1 is an elevational view, partially in section, of the fluid pump device of the present invention;

FIGURE 2 is an enlarged cross sectional view of the lower portion of FIGURE 1;

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FIGURE 3 is a cross sectional view of FIGURE 2 taken in the direction of the arrows 3—3; and

FIGURE 4 is a cross sectional view of FIGURE 2 taken in the direction of the arrows 4—4.

Referring to the drawings in detail, wherein like numerals indicate like elements, there is shown in FIGURE 1 a representation of the fluid pump device of the present invention designated generally at 10.

A pneumatic activator 12 may be a conventional hand held type utilized as a backfill earth tamper, or the like; the construction and operation thereof being described in my copending application, Serial No. 428, 812 filed January 28, 1965, entitled "Fluid Pump Means," and being so well known that a detailed description thereof is obviated here. The pneumatic activator 12 has a pneumatic supply connection at fitting 14 and a control means at manual valve 16, which are common to such activators. A piston 18, within the pneumatic activator 12, is driven by compressed air to reciprocate the rod member 20 extending, as shown, from end 19 of the activator. The activator 12 is an elongated, compact type and its rod 20 is adaptable for connection to the bottom tamper pad (not shown), when used as a tamper. Reciprocation of the rod 20 is, of course, inward and outward in reference to end 19, between the inward and outward stroke limits indicated in phantom on FIGURE 2.

An elongated sleeve casing 25 receives the entire length of the activator 12 and the rod 20 therein, as illustrated in FIGURE 1. The enclosed end 27 of the casing 25 has an opening for insertion of the nipple portion 15 of the fitting 14 therethrough and into engagement with the pneumatic activator 12. In this manner, a connection to the motive pneumatic source (not shown) may be effectuated. A lock nut 28, threadedly engaged around nipple 15, may be tightened to clamp end 27 of the casing 25 against the pneumatic activator, as shown, to securely connect the casing 25 and activator 12 together. An opening 29 in the side of the casing 25 provides an exhaust port for the activator 12. Thus, a pneumatic motive force for the activator is supplied and exhausted as indicated by the arrows entering fitting 14 and exiting at an exhaust port at opening 29.

It is to be noted that the sleeve casing 25 extends from the end 19 of activator 12 to beyond the outward stroke limit of rod 20, as may be best ascertained by the detail of FIGURE 2. Thus, a hollow pump chamber 30 is formed around the reciprocating rod member 20. A gasket member 23 may be secured at end 19 for a fluid tight separation of the chamber 30 and the activator 12. The gasket 23 may be of a suitable flexible and durable material, such as leather, rubber or neoprene, which has been appropriately shaped and with a central opening therethrough for passage of the reciprocating rod member 20.

The opposite, outward end of the chamber 30 is capped by a strainer member 32, which is threadedly engaged with the outward end of casing 25. The strainer member 32 has somewhat bell-bottomed configuration of larger diameter than the casing 25 to provide a supporting stand for the fluid pump device 10 in the vertical disposition. Additional support may be provided by the elongated foot elements 33 which are pivoted on the flanges 34 extending at the sides of strainer member 32. Each flange 34 is grooved corresponding to the extended positions of the foot elements 33, which are received in the grooves to maintain the extended position. The foot elements 33 may be snapped into a retracted upright position indicated by the dashed lines. A removable plug 36 is provided at the bottom of the strainer member 32. A plurality of slots 37 are spaced around the perimeter of the strainer member 32, as illustrated, to provide an inlet to the chamber 30, which is slightly beyond the outward stroke limit of rod 20. An additional inlet may be

provided by removal of the plug 36, if desired. An outlet from the pump chamber 30 is shown at 38, which may include an appropriate fitting 39, such as a threaded elbow or the like, for connection to an inlet hose.

A piston member 40 is fastened at its hub 41 to the adaptable rod 20 by means of the machine bolt 43. A suitably shaped sealing member 45 is provided at the outer perimeter of the piston 40 for a fluid-tight seal between the piston and chamber 30 during an inward stroke. The sealing member 45 may be of a resilient material and of the cup type which loses contact with the casing 25 during the outward or compression stroke. This allows an inward flow of fluid around the sealing member 45 and reduces friction during the outward stroke. As shown, openings 47 in piston 40 provide a mainly open interior for fluid flow therethrough. A plurality of vanes 49 are provided in the piston 40 for rotation thereof as fluid flows therethrough. The rotary action dislodges foreign matter and promotes a more even wear.

A check valve in the piston 40 is provided by a movable cover plate 50. The cover plate 50 has a central opening for loose accommodation of the rod 20 and is of a sufficient size and area to completely cover the openings 47 of the piston. During an inward stroke of the rod 20, fluid pressure will force the plate 50 against the piston 40 to cover openings 47 and prevent escape of fluid. Upon an outward stroke, fluid pressure will move the plate 50 away from the piston, uncovering the openings 47 and allowing an inward flow of fluid from the slots 37 to the outlet 38. The stop lug 55 limits movement of the plate 50 along rod 20 and away from piston 40 to a desired distance. Thus, it may be clearly visualized, in the manner described, that the cover plate 50 operates as a check-valve allowing a one-way inward flow of fluid into the chamber 30.

Operation of the invented fluid pump device 10 is very handy and easy. Due to the device's elongated and compact configuration, it is very portable and may be conveniently placed at the pump site, such as in a sump prepared therefor. The device 10 is stood in an upright position with the strainer member 32 immersed in the fluid to be pumped. Immersion of the strainer 32 also simultaneously primes the pump. The valve 16 is opened to admit pneumatic motive force to the activator 12, which reciprocates the rod member 20. A latch 13 may be utilized to hold the valve 16 open. The outward and inward movements of the piston 40 will cause a pumping action drawing fluid to flow inward through slots 37 and out the outlet 38. The resulting fluid flow will naturally draw any foreign matter in the fluid along with it. The strainer member 32 prevents the passage of large foreign bodies into the chamber 30 where they might damage piston 40. Normally, a large collection of obstructions around a strainer will tend to clog it, however, the invented fluid pump device 10 prevents clogging by repeatedly moving and agitating any obstructions collecting around the strainer member 32. Inward fluid flow is slightly impeded by the cover plate 50, causing a slight back pressure during the outward stroke to momentarily move obstructions away from the strainer 32. When it is considered that a very rapid reciprocation is furnished by the activator 12, it may be appreciated that any obstructions around the strainer member 12 will be in a constant state of agitation, yet allowing uninterrupted fluid flow thereby. Additionally, the immensely powerful stroke furnished by the pneumatic activator 12 and the close proximity of the piston 40 at the outward stroke limit, to the strainer member 32, will dislodge obstructions and produce vibrations for further displacement and agitation thereof. In fact, the vibrations and repeated displacements have been found effective to break up some of the obstructing bodies into smaller particles which may pass through the pump. Furthermore, the pneumatic motive force of the activator 12 is very powerful and reliable, providing a fluid pump device 10 which

may be depended upon since it is not easily clogged and stopped.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicating the scope of the invention.

What is claimed is:

1. A portable fluid pump device, comprising in combination: a pneumatic activator including a reciprocating rod; a sleeve casing connected to said activator and providing a pump chamber around said rod, said chamber having an inlet and an outlet; a piston attached to said rod for reciprocation therewith in said chamber; and a check-valve in said piston for a one-way fluid flow through said piston from said inlet to said outlet during the motion of said piston toward said inlet, said inlet remaining open at all times to fluid flow therethrough in either direction.
2. A fluid pump device in accordance with claim 1 including a sealing means between said activator and chamber for a fluid tight separation thereof, said means allowing passage of said reciprocating rod therethrough.
3. A portable fluid pump device, comprising in combination: a pneumatic activator with a rod provided with a piston attached at one end thereof for reciprocation between an outward and an inward stroke limit; a sleeve casing connected on said activator to provide a pump chamber around said rod, said chamber extending from said end to beyond said outward stroke limit and having an inlet and an outlet, said inlet being beyond said outward stroke limit; and a check-valve in said piston providing one-way fluid flow through said piston and chamber from said inlet to said outlet during the motion of said piston toward said inlet, said inlet remaining open at all times and allowing fluid flow therethrough in either direction.
4. A fluid pump device in accordance with claim 3 wherein said check-valve partially limits said flow therethrough to provide a slight back pressure in said chamber beyond said outward stroke limit and thereby cause an unclogging flow action at said inlet during an outward stroke of said rod.
5. A fluid pump device in accordance with claim 4 wherein said inlet is sufficiently near said outward stroke limit for an effective displacement by said unclogging flow action of obstructions at said inlet.
6. A fluid pump device in accordance with claim 5 wherein said inlet is a plurality of slots spaced around the perimeter of said sleeve casing at an outermost end thereof, said slots allowing a radially inward passage of fluid to said chamber as obstructions to said slots are repeatedly displaced by said unclogging flow action.
7. A fluid pump device in accordance with claim 6 wherein said rod is reciprocated at a rapid rate by said activator to provide an unclogging flow action around said perimeter of said casing for a continual displacement of obstructions at said slots enabling an uninterrupted fluid flow therethrough.
8. A fluid pump adapter for a pneumatic tamper activating device of the elongated type having an adaptable rod member reciprocating between an outward and inward stroke limit at one end thereof, said adapter comprising: an elongated sleeve casing to entirely receive and enclose said tamper activating device therein and provide a pump chamber around said rod, said casing being connected to said tamper activating device and having openings therethrough for pneumatic supply and exhaust connections thereto, said pump chamber extending from said one end of said tamper activating device to beyond said outward stroke limit and having an inlet and an outlet, said inlet being beyond said outward stroke limit; a sealing means at said one end of said tamper activating device for fluid tight separation therefrom of said chamber, said means having an opening for passage of said reciprocating rod therethrough.

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cating rod therethrough; a piston adapted for connection on said rod and reciprocation therewith in said chamber; and a check-valve in said piston providing one-way fluid flow therethrough from said inlet to said outlet during the motion of said piston toward said inlet, said inlet remaining open at all times to fluid flow therethrough in either direction.

9. An adaptor in accordance with claim 8 wherein said check-valve partially limits said flow therethrough to provide a slight back pressure in said chamber beyond said outward stroke limit and thereby cause an unclogging flow action at said inlet during an outward stroke of said rod, and wherein said inlet is sufficiently near said outward stroke limit for an effective displacement by said unclogging flow action of obstructions at said inlet.

10. An adaptor in accordance with claim 9 wherein said inlet is a plurality of slots spaced around the perimeter of said sleeve casing at an outermost end thereof, and said rod is reciprocated at a rapid rate by said tamper activator device to provide a continual unclogging flow action around said perimeter of said casing for repeated displacement of obstructions at said slots allowing

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a radially inward passage of fluid therethrough to said chamber.

11. An adaptor in accordance with claim 9 including a resilient member around the outer perimeter of said piston to form a fluid tight seal between said piston and said chamber, said piston having a mainly open interior for fluid flow therethrough, and said check-valve being provided by a movable cover plate covering said open interior of said piston and being movable in a direction away from said piston to allow a one-way fluid flow therethrough in said direction, said check-valve including a stopper lug on said rod limiting movement of said cover plate away from said piston.

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