Nov. 16, 1965 F. B. FISHBURNE 3,217,941

HYDRAULIC POWER UNITS

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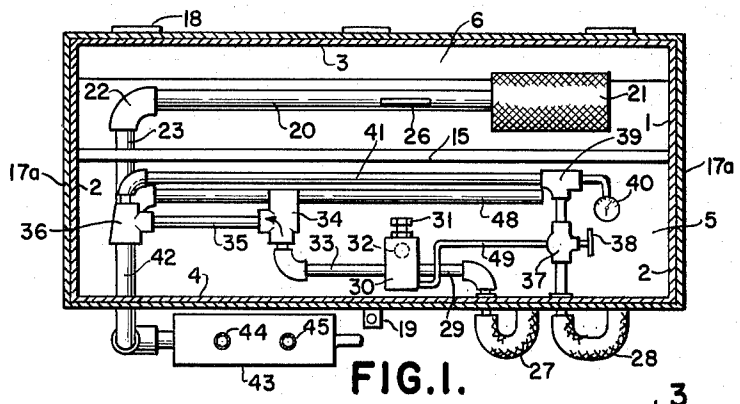


FIG. 1.

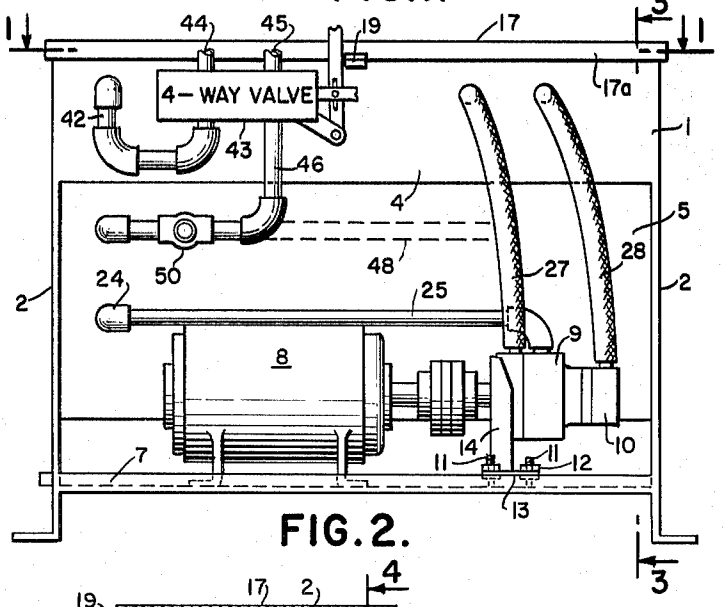


FIG. 2.

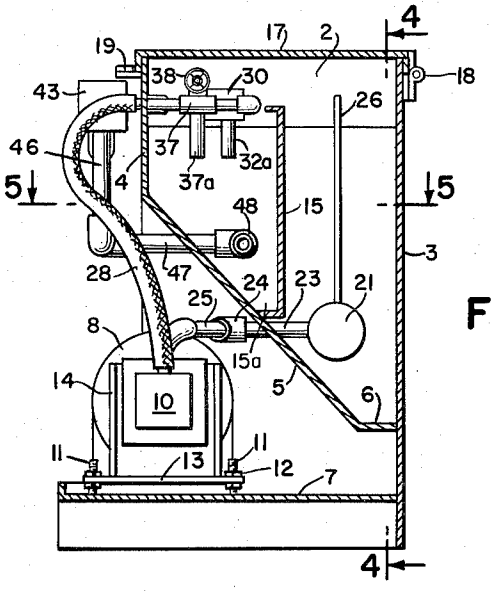


FIG. 3.

INVENTOR.
Francis B. Fishburne

BY
J. Hanson Boyden

ATTORNEY

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HYDRAULIC POWER UNITS

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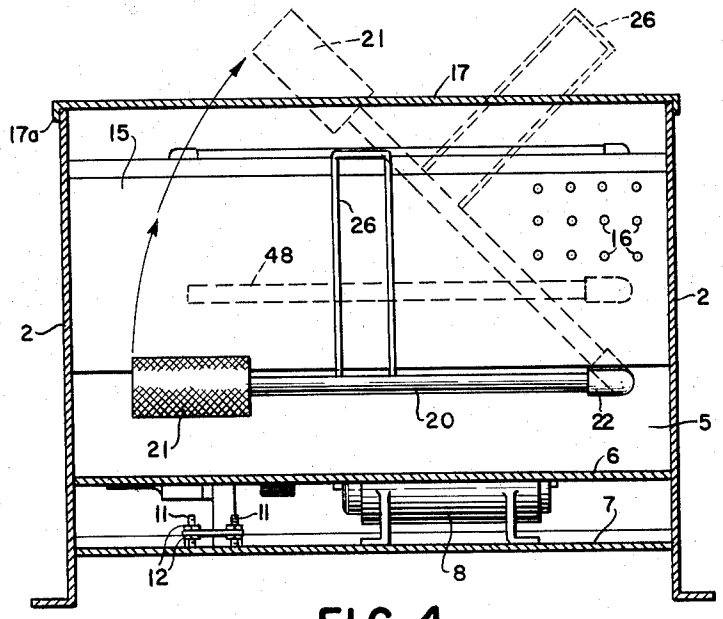


FIG. 4.

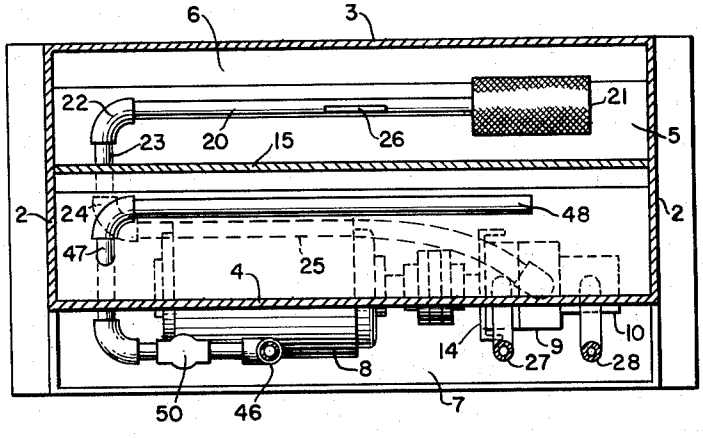


FIG. 5.

INVENTOR.
Francis B. Fishburne

BY
J. Hanson Boyden,

ATTORNEY

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HYDRAULIC POWER UNITS

Francis B. Fishburne, P.O. Box 1927, Asheville, N.C.

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This invention relates to hydraulic power units, and more particularly to a power unit comprising a motor driven pump and an associated tank in which the motive fluid is stored.

In conventional equipment of this nature now in common use, the motor and pump are usually mounted on top of the tank, and the intake and return pipes extend down through the fixed tank cover. The intake pipes have filters or strainers at their lower ends, and these are inaccessible for cleaning or repair without disassembling the entire unit.

In my novel design, I mount the motor and pump on a base carried by but below the bottom of the tank, whereby the motive fluid flows down into the pump by gravity.

An object of the present invention is to greatly facilitate access to the strainers at the end of the intake pipes, and to achieve this I employ an open top tank having a hinged cover. I arrange the intake pipe in a horizontal position, and provide a swivel connection at the end opposite the strainer, so that the intake pipe may be swung upwardly in a vertical plane and the strainer thus lifted up through the open top of the tank to a position in which it is readily accessible for inspection, cleaning or repair, without disturbing any other parts of the unit.

One of the main problems encountered in the operation of hydraulic power equipment is the occurrence of air bubbles (due to leaks) in the motive fluid. Another object of the present invention is to make it practically impossible for such bubbles, if present, to enter the intake pipe. Air bubbles, when they occur, are usually discharged with the fluid from the exhaust or return pipe, into the tank. To positively prevent such bubbles from entering the intake pipe, I dispose the discharge end of the return pipe at a higher level than the end of the intake pipe, so that any bubbles discharged will rise to the surface of the body of fluid in the tank, and will not go down to the level of the intake pipe. Furthermore, I arrange a vertical baffle between the intake and return pipes, so as to make it still more impossible for air to pass from one to the other.

Another problem which has plagued the industry is the question of sludge, and how to prevent such sludge from entering the intake pipe and clogging strainers, valves, etc. A third object of the present invention is to provide means for taking care of this sludge and preventing it from becoming troublesome. To this end I construct my improved tank with a transversely sloping bottom, from an intermediate point of which rises the vertical baffle, above mentioned. The lower edge of the sloping bottom is united with the side wall by a relatively narrow horizontal shelf. Any sludge or foreign matter slides down the sloping bottom and tends to collect on this narrow shelf, from which it may be readily cleaned off.

Hydraulic power units usually have various controls associated with them, such as check valves, relief valves, pressure adjustment valves, etc. It has heretofore been the common practice to locate all such valves and controls outside of the tank. This is objectionable for two reasons, first, the controls are open to everyone, and may be tampered with; and second, such valves and controls, or the pipe connections, sometimes develop leaks, which, even if small, foul up the floor, or other equipment. A still further object of the invention is to overcome these

objections. To this end, I mount all such valves and controls inside the tank, under the hinged cover, which may be locked. Thus, the valves and controls are protected from tampering by unauthorized persons, and, if small leaks should develop, no harm will be done.

With the above and other objects in view and to improve generally on the details of such apparatus, the invention consists in the construction, combination and arrangements of parts hereinafter described and claimed and illustrated in the accompanying drawings forming part of this specification and in which:

FIG. 1 is a sectional plan view of my complete hydraulic unit taken substantially on the line 1—1 of FIG. 2;

FIG. 2 is a front elevation of the unit;

FIG. 3 is a vertical transverse section substantially on the line 3—3 of FIG. 2, looking in the direction of the arrows;

FIG. 4 is a vertical section taken substantially on the line 4—4 of FIG. 3, looking in the direction of the arrows; and

FIG. 5 is the horizontal section taken substantially on the line 5—5 of FIG. 3.

Referring to the drawings in detail, my improved unit comprises a tank 1 of generally rectangular shape having end walls 2, a front wall 4, a rear wall 3 and a sloping bottom 5. The front wall 4 is relatively short and the sloping bottom 5 extends from the lower edge of the wall 4 diagonally toward the rear wall 3, but terminates adjacent such rear wall in a narrow shelf 6 forming with the rear wall a trough or gutter.

Also supported by the end walls 2 at a point well below the sloping bottom 5 is a base or platform 7, on which is mounted a motor 8 directly coupled to a pair of rotary pumps 9 and 10, these two pumps being of the low pressure and high pressure types, respectively. The pumps 9 and 10 are adjustably supported on the base 7 by means of threaded studs 11 welded to the base 7 and supporting between them a plate 13 which may be adjusted vertically on the studs 11 by means of the nuts 12. A bracket 14 extends upwardly from the plate 13 and supports the shaft of the pumps. Thus, by adjusting the nuts 12 the pump may be readily aligned with the motor shaft.

It will be seen that the pumps are positioned below the tank so that the liquid will flow into them by gravity, and that the motor and pump assembly is located between the end walls and beneath the sloping bottom of the tank.

Extending upwardly from the sloping bottom 5 at a point approximately midway of its width is a baffle 15 having at one end a series of openings 16, as shown in FIG. 4. This baffle has a narrow shelf 15*a* at its lower edge where it adjoins the sloping bottom, and extends from the sloping bottom up to a point above the normal level of liquid in the tank.

The tank is open at the top and is provided with a lid or cover 17 hinged at 18, so that it may be swung to open or closed position. This lid or cover has a peripheral flange 17*a*, as shown in FIGS. 3 and 4, and cooperating lugs 19 are provided on this flange and on the front wall 4, such lugs having registering perforations through which the shackle of a padlock may be passed, if desired.

Located in the compartment of the tank between the baffle 15 and the rear wall 3 is a horizontally disposed intake pipe 20 having at its free end a suitable filter or strainer 21. This intake strainer is located a substantial distance above the trough 6, as shown in FIG. 3, but a substantial distance below the level of the liquid in the tank.

As shown in FIGS. 1 and 5, the end of the intake pipe

20 opposite the strainer 21 is connected with an elbow fitting 22, which in turn is threaded onto a transversely extending pipe 23 which passes through the sloping bottom 5 of the tank, as shown in FIGS. 3 and 5. The elbow fitting 2 is capable of free swiveling movement about the pipe 23, so that the intake pipe 20 carrying the strainer 21 may be swung around the pipe 23 as a pivot so that the intake pipe and strainer may be brought up to the dotted line position shown in FIG. 4 for inspection, cleaning or repair. In order to facilitate thus moving the intake pipe up into dotted line position, a handle 26, in the nature of a loop, is secured to the pipe 20 and extends above the normal level of liquid in the tank, as shown in FIG. 3, so that it may be readily grasped by the operator. It will be understood, of course, that when the intake pipe and strainer are thus swung upwardly, the lid or cover 17 of the tank is open.

The end of the pipe 23 opposite the fitting 22 is connected with an elbow 24 and this in turn is connected with a pipe 25 which delivers into the pumps 9 and 10, as shown in FIGS. 2 and 5.

From the pumps 9 and 10 extend, respectively, flexible hoses 27 and 28 which pass upwardly through the front wall 4 into the interior of the tank near the top thereof, as best shown in FIG. 2. Inside of the tank, the hose 27 is connected with pipe 29 which in turn connects with an unloading valve 30. From this valve extends another pipe 33 through a check valve 34 and a pipe 35 to a T 36, and from this T extends a pipe 42 out through the front wall of the tank to a manual four-way operating valve 43 mounted on the said front wall outside the tank. From the top of this valve 43 extend pipes 44 and 45 to the opposite ends of a cylinder or other hydraulic motor which it is desired to operate. From the lower side of the valve extends an exhaust pipe 46 which is connected with another pipe 47 passing through the sloping bottom of the tank into the interior thereof, as shown in FIG. 3, and connected with a horizontal discharge pipe 48. It will be noted that the discharge pipe 48 is located on the opposite side of the baffle 15 from the intake strainer 21 and also that it is disposed at a considerably higher level than the intake pipe, as best shown in FIG. 3. Moreover, the openings 16 in the baffle 15, shown in FIG. 4, are located at the left-hand end of the baffle, as viewed in FIGS. 1 and 5, so that the liquid discharged from the pipe 48 has to flow in a zigzag course, first to the left, then through the openings in the baffle and then to the right, in order to reach the intake strainer 21.

As a result of this, it will be appreciated that any air bubbles which may be discharged from the pipe 48 will immediately rise to the surface, and the pipe 48 being separated from the intake pipe 20 by the baffle 15, such bubbles cannot possibly enter the intake strainer 21. Any foreign matter or sludge that may form in the liquid in the system, when discharged from the end of the pipe 48 will tend to slide down the sloping bottom 5 and to collect and accumulate on the narrow shelf 15*a*, and some will eventually find its way into the narrow trough 6, from which it may be readily cleaned.

The flexible hose 28 from the high pressure pump 10 is connected, inside of the tank, with a relief valve 37 having a manually controlled hand wheel 38, and this valve in turn is connected to a T 39 to which a suitable pressure gauge 40 may be attached. From the other end of the T 39 extends a pipe 41 to the T 36, above mentioned. A remote pressure control line 49 connects the relief valve 37 with the unloading valve 30. From the unloading valve 30 and relief valve 37 extend discharge pipes 32*a* and 37*a* downwardly into the tank.

The combination of the relief valve, unloading valve, remote pressure control line, check valve and pressure gauge described is a common and well known arrangement and forms no part of the present invention. The novelty in the present design, however, consists in the fact that all of these parts are located inside of the tank,

instead of outside thereof, as usual. By this means, they are protected from being tampered with by unauthorized persons, by virtue of the fact that hinged cover 17 may be locked as above described, and, moreover, should any leaks occur in the various valves or fittings, the liquid will simply run back into the tank and no harm will be done.

Interposed in the discharge pipe line 46–48 is a sight flow fitting 50 (see FIG. 2) having a glass window through which the appearance of the liquid may be observed to determine the presence of excessive air bubbles.

No attempt is made to illustrate and describe herein the four-way valve 43, since this is also a well known piece of equipment and is commercially available from several different sources. A valve of this type is also shown in detail in applicant's prior Patent No. 2,675,154, issued April 13, 1954.

What I claim is:

1. A hydraulic power unit comprising a pump and a generally rectangular elongated tank having side and end walls, a sloping bottom extending between said walls, and a baffle extending upward from said sloping bottom and dividing the tank longitudinally into two communicating compartments, an operating valve for controlling the flow of motive fluid from said pump to both ends of any desired hydraulic cylinder, an intake pipe for said pump having a strainer at its end located in one compartment, and a common return pipe from said valve delivering into the other compartment.

2. A hydraulic power unit in accordance with claim 1 in which the end of said return pipe and said strainer are located near one longitudinal end of the tank and the end portion of said baffle adjacent the opposite end of the tank is formed with openings through which the motive fluid may circulate from one compartment to the other.

3. A hydraulic power unit in accordance with claim 1 in which the return pipe discharges at a point at a substantially higher level than the strainer on the intake pipe, whereby any air bubbles discharged from the return pipe cannot enter the intake pipe.

4. A hydraulic power unit in accordance with claim 1 in which said baffle extends vertically upward from a point intermediate the upper and lower edges of said sloping bottom to a point above the normal level of liquid in the tank.

5. A hydraulic power unit comprising a pump and open top tank, said tank having side and end walls and a bottom consisting of a relatively wide sloping portion and a baffle extending upwardly from said sloping bottom, and having at its lower edge adjacent said bottom relatively narrow shelf, whereby any foreign matter contained in the motive fluid tends to fall down along the sloping bottom and collect on the relatively narrow shelf.

6. A hydraulic power unit comprising a pump and open top tank, an intake pipe extending from said tank to said pump, an operating valve outside of said tank, and a delivery pipe extending from said pump to said operating valve, said delivery pipe being disposed adjacent the top of said tank and having interposed therein any desired fittings, including pressure control and check valves, all of said fittings being located inside of said tank, a removable cover for said tank, directly overlying said fittings, and means for locking said cover in closed position to prevent access to said other fittings by unauthorized persons.

7. A hydraulic power unit comprising a base, a generally rectangular elongated tank, having vertical front, back and end walls, said front wall terminating at a point substantially above said base, a sloping bottom extending the full length of said tank from the lower edge of said front wall downwardly and rearwardly toward said back wall, thus providing a space between itself and said base, a co-axial motor and rotary pump assembly mounted on said base between said end walls in the space beneath said sloping bottom, and disposed with its axis extending longi-

tudinally of said tank and parallel with said sloping bottom, and an intake pipe connecting said pump with said tank.

8. A hydraulic power unit in accordance with claim 1 in which a pipe connected with said pump passes transversely through said sloping bottom, and in which the intake pipe, carrying the strainer at one end, extends approximately horizontally, and is swiveled at its opposite end to swing around the axis of said transversely disposed pipe in a vertical plane, said intake pipe lying at right angles to said transversely disposed pipe at all times.

9. A hydraulic power unit comprising a pump and a generally rectangular, elongated tank with a sloping bottom portion, a fixed, transversely and horizontally extending pipe connected at one end with said pump and passing through said sloping bottom portion, an elbow fitting secured loosely on the other end of said pipe, and

an intake pipe inside said tank carrying a strainer at one end, and rigidly secured at its other end to said elbow fitting, whereby said intake pipe and elbow can be swung in a vertical plane around the axis of said fixed pipe.

References Cited by the Examiner

UNITED STATES PATENTS

857,519	6/1907	Foster	210—460
1,116,234	11/1914	Brown	210—460
1,915,656	6/1933	Fiegel	210—167
2,745,574	5/1956	Hunter	222—189
3,111,242	11/1963	Reed	222—189 X

LOUIS J. DEMBO, *Primary Examiner.*

HARRY B. THORNTON, *Examiner.*