July 4, 1961 E. M. DETERS 2,990,778

PRESSURE WATER SYSTEM

Filed Oct. 28, 1957

Fig. 1

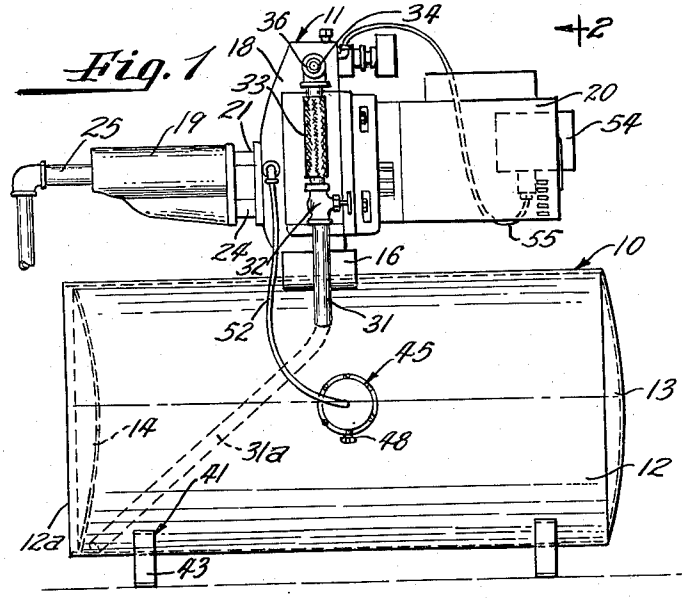


Fig. 3

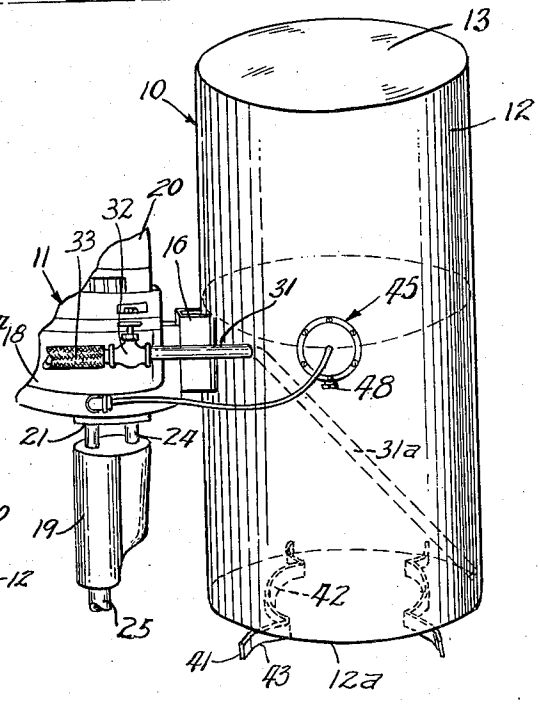
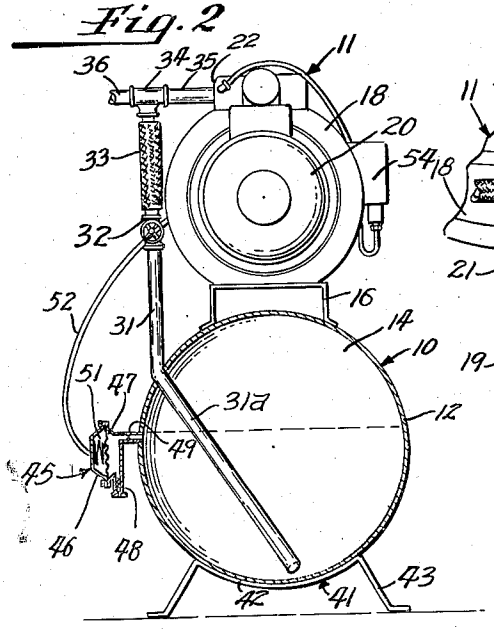


Fig. 2



Inventor

Elmer M. Deters

By McCanna, Morsbach + Pillote

Atty's

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PRESSURE WATER SYSTEM

Elmer M. Deters, Davenport, Iowa, assignor to Red Jacket Manufacturing Co., Davenport, Iowa, a corporation of Iowa

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This invention relates to well pumping units and particularly to an improved pump and tank assembly.

In some pump and tank unit installations the tank is mounted in a horizontal position and in others the tank is mounted in an upright position. It has heretofore been the practice to provide one tank constructed and having fittings arranged to permit horizontal mounting of the tank, and a different tank constructed and arranged to permit upright or vertical mounting of the tank. This required the dealer to stock two different tanks in each of the different sizes thereof and effectively doubled the required stock for each of the different tank sizes. Moreover, if the pumps were pre-assembled on the tanks at the factory, it is apparent that the number of pumps in stock would also be effectively doubled. On the other hand, if the pumps were shipped separate from the tanks to permit use of one pump for either a horizontal or a vertical tank, then the dealer or the installer must make all the connections required between the tank and pump, thus increasing the complexity and expense of installation.

An important object of this invention is to provide an improved tank construction adapted to have a pump mounted directly thereon and hydraulically connected thereto, and which tank is arranged to enable mounting of the same in either a horizontal or an upright position without requiring any changes in the pump mounting or in the hydraulic connections between the pump and tank.

A more particular object of this invention is to provide a pump and tank unit in which the pump is mounted on one side of the tank, intermediate the ends thereof, and means is provided in the tank for communicating the outlet of the pump with the interior of the tank, adjacent one end of the latter and at the side thereof opposite the side to which the pump is attached, so as to thereby enable operation of the pump and tank unit in either a horizontal or in an upright position.

Still another object of this invention is to provide a pump unit, in accordance with the foregoing object, in which the air volume control is mounted on the tank in a position such that the air volume control maintains approximately the same amount of air within the tank independent of whether the tank is in a horizontal or in an upright position.

These, together with various ancillary objects and advantages of this invention will be more readily appreciated as the same becomes better understood by reference to the following detailed description when taken in connection with the accompanying drawings wherein:

FIGURE 1 is a side elevational view of the pumping unit shown mounted in a horizontal position;

FIGURE 2 is a transverse sectional view through the tank, taken on the plane 2—2 of FIGURE 1, and

FIGURE 3 is a fragmentary perspective view of the pumping unit shown mounted in an upright position.

The pumping unit, as is conventional, includes a reservoir tank **10** and a pump **11**. In accordance with the present invention, the pump and tank are constructed and the pump mounted on the tank in such a manner as to enable the pumping unit to be mounted in either a horizontal or an upright position. More particularly, the tank **10** is conveniently formed with a cylindrical

wall **12** having a domed head **13** at one end thereof and a concave head **14** at the other end thereof so that the tank terminates, at the last mentioned end, in a flat rim **12***a* adapted to support the tank in an upright position.

The pump **11** is mounted on the side of the tank and, as shown in the drawings, is attached to a generally U-shaped mounting bracket **16** which is welded or otherwise rigidly secured to the side walls **12** of the tank, intermediate the ends of the latter. The pump **11** may be of any conventional construction suitable for operation in either a horizontal or a vertical position, and, in the specific embodiment shown, there is provided an injector type pump including a centrifugal pump **18** and an injector **19**. The centrifugal pump is driven by an electric motor **20** fastened to the housing of the pump **18** to be supported thereby. The centrifugal pump has an inlet **21** adapted for connection to a source of supply and an outlet connection **22** (see FIG. 2), through which the water under pressure is discharged. As is conventional, the injector **19** is connected to the pump inlet **21**, to increase the pressure at the suction side thereof, and a portion of the fluid from the centrifugal pump is passed through a fitting **24** to the nozzle (not shown) of the injector. As is apparent, the injector **19** may either be mounted closely adjacent the centrifugal pump **18** or remotely therefrom adjacent or in the well, as desired. The inlet of the injector **19** is connected through a conduit **25** to the well.

It has heretofore been the practice to provide one tank having legs on the side thereof and fittings arranged as to enable mounting of the tank and pump unit in a horizontal position and to provide a different tank having fittings arranged to enable mounting of the tank and pump in an upright position. In accordance with the present invention, a pipe is operatively connected to the outlet of the pump and arranged to extend into the tank to communicate with the interior of the latter adjacent the end wall **14** and at the side of the tank opposite the side at which the pump is mounted so that the end of the pipe is located adjacent the lowermost portion of the tank, when the tank is in either a horizontal or in an upright position. More specifically, a pipe **31** is affixed to the tank side wall **12** at a point laterally offset from the pump **18** and extends alongside the pump as is clearly shown in FIGURES 1 and 2. The outer end of the pipe **31** is connected through a shut-off valve **32** and a flexible coupling **33** to a T-fitting **34**. The T-fitting is connected through a conduit **35** to the outlet **22** of the pump. In addition, a service conduit **36** is connected to the T-fitting **34** to receive liquid either directly from the pump **18** or from the tank **10**. The portion **31***a* of the pipe **31** is angulated with respect to the external portion of that pipe and extends obliquely to the longitudinal axis of the tank, as show in FIGURES 1 and 2, to a point closely adjacent the end wall **14** and at the side of the tank **10** diametrically opposite the side to which the pump is attached. Consequently, liquid can be introduced and withdrawn from the tank at a point closely adjacent the bottom thereof, when the tank is in either a horizontal or an upright position. The shut-off valve **32** is normally open so that liquid will flow into the tank, when the pump is operated, and out of the tank when the supply line **36** is opened to dispense liquid.

In order to support the tank and pump, in either of the positions thereof, there are provided a pair of saddles **41** including an arcuate strap portion **42** adapted to engage the arcuate side walls **12** of the tank, and depending leg portions **43** adapted to support the tank in a horizontal position. The saddles **41** are formed separate from the tank so as to permit detaching the same from the side walls when the tank is in an upright posi-

tion as shown in FIGURE 3. Conveniently, the saddles **41** can be laid upon their sides, as shown in FIGURE 3, below the flat lower rim **12***a* of the tank, to support the tank in spaced relation to the floor.

Provision is also made for controlling the volume of air in the tank to maintain a preselected volume of air therein, when the tank is in either a horizontal or in an upright position. For this purpose, an air volume control **45** is mounted on the side of the tank **10** at a point which is axially spaced from the domed end **13** and circumferentially spaced from the side of the tank at which the pump is mounted, so that the air volume control maintains approximately the same amount of air in the tank when the latter is in either a horizontal or in an upright position. In other words, the air volume control **45** is positioned on the tank so that the volume of air in the tank above the air volume control, when the tank is in a horizontal position as shown in FIGURE 1, is substantially the same as the volume of air in the tank above the air volume control, when the tank is in an upright position as shown in FIGURE 3.

The specific air volume control herein illustrated is of the diaphragm type and is of conventional construction. In general, the air volume control includes a housing **46** separated by a diaphragm **47** into separate compartments. One compartment has an air snifter valve **48** therein and communicates through a restricted opening **49** with the interior of the tank. The other compartment has a spring **51** therein and is communicated through a tube **52** to the suction side of the pump **18**. Briefly, this type of air volume control will function when the pump **18** is operated to draw in a charge of air through the air snifter valve **48**, if the liquid level in the tank **10** is above the orifice **49**, and to discharge this charge of air into the tank when the operation of the pump is interrupted, to thereby increase the volume of air in the tank. However, if the liquid level in the tank is at or below the orifice **49**, then the air volume control will merely draw in a charge of air from the tank and discharge this air back into the tank so as to not increase the volume of air therein.

As is conventional in pumping units of this type, the pump motor is automatically energized and deenergized in accordance with the pressure in the system. For this purpose, there is provided a pressure switch **54**, herein shown mounted on the motor **20**, and which pressure switch is connected through a tube **55** with the discharge side of the pump **18**. As previously described, the discharge side of the pump is connected through the pipe **35**, T fitting **34**, resilient fitting **33** and pipe **31** to the tank. Consequently, the pressure switch is operated in accordance with the pressure within the tank and is arranged to initiate operation of the pump when the pressure within the tank decreases to a preselected lower pressure and to interrupt operation of the pump when the pressure within the tank increases to a preselected upper pressure limit.

The valve **32** is provided for maintaining the pressure in the tank, should it be necessary to service the pump, to thereby provide a supply of liquid under pressure for repriming the centrifugal pump.

From the foregoing it is apparent that the tank is constructed and the pump and air volume control attached thereto in such a manner as to enable mounting of the tank in either a horizontal or in an upright position. The pump unit is mounted on the side of the tank intermediate the ends thereof so as not to interfere with the mounting of the tank in a horizontal or vertical position and the pipe **31** is arranged to communicate with the interior of the tank adjacent the lower portion thereof when the tank is horizontal or vertical. In addition, the air volume control **45** is positioned on the tank so as to maintain substantially the same volume of air in the tank, when the tank is either horizontal or vertical. It is only necessary to turn the air volume control through approximately 90° from the position shown in FIGURE 1 to the position shown in FIGURE 3, when changing from a horizontal to an upright installation. The saddles **41** are removable from the side walls when the tank is in its upright position, and may, if desired, be used to support the tank in spaced relation to the floor, as shown in FIGURE 3.

I claim:

A pumping unit comprising an elongated cylindrical tank, means for mounting the tank in a horizontal or in an upright position on one end thereof, a pump including a motor mounted on one side of said tank intermediate the ends thereof, said pump having an inlet adapted for connection to a well and an outlet, a pipe extending into the side of said tank at a point intermediate the ends thereof and adjacent said pump, said pipe extending inside said tank and terminating at the inner end thereof adjacent said one end of said tank and at the side thereof diametrically opposite the side on which said pump is mounted, conduit means connecting said pump outlet to the outer end of said pipe to deliver water to the tank when the pump is operated, a service conduit communicating with said pump outlet and with the outer end of said pipe to permit water to flow from said pump and from said tank to said service outlet when the tank is in either a horizontal or an upright position, and an air volume control mounted on the side of said tank at a point spaced from said one end thereof and angularly spaced from the side of said tank at which the inner end of said pipe terminates to effect control of the amount of air in the tank and maintain approximately the same amount of air in the tank when the latter is in either a horizontal or an upright position.

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