Feb. 13, 1940. W. P. SCHIRMER 2,190,246

COMBINATION MOTOR AND PUMP UNIT

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Fig. 1.

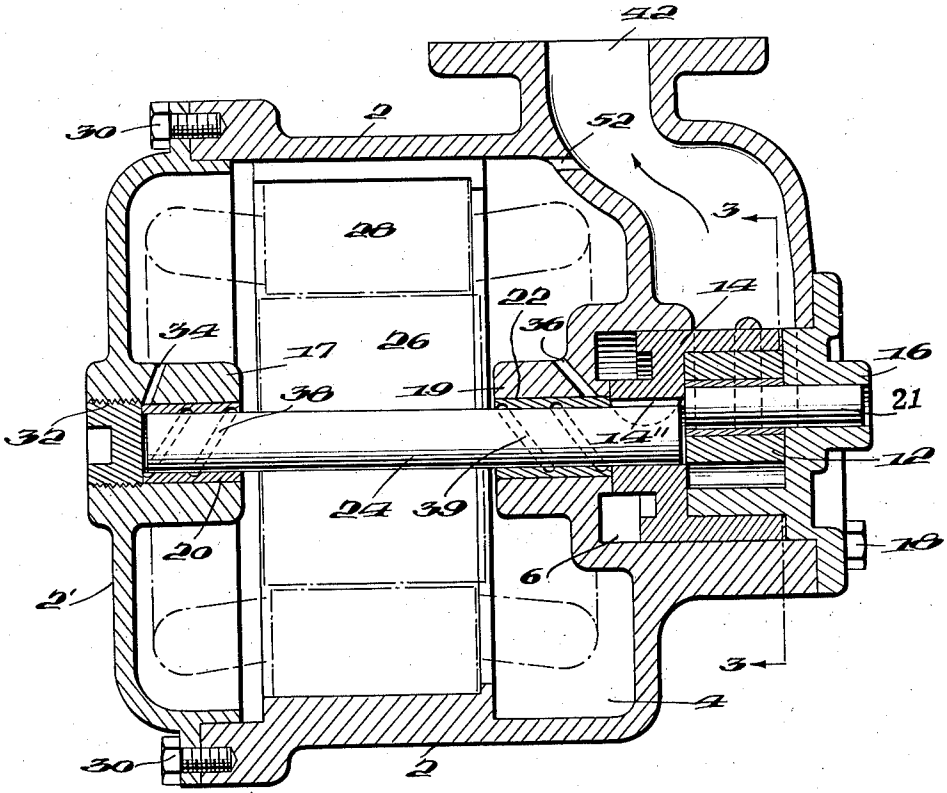
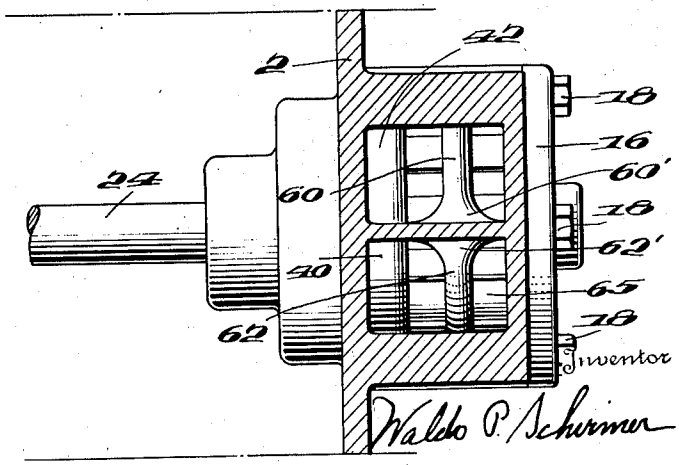


Fig. 4.



Inventor

Waldo P. Schirmer

By J. Wesley Everett

Attorney

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Fig. 2.

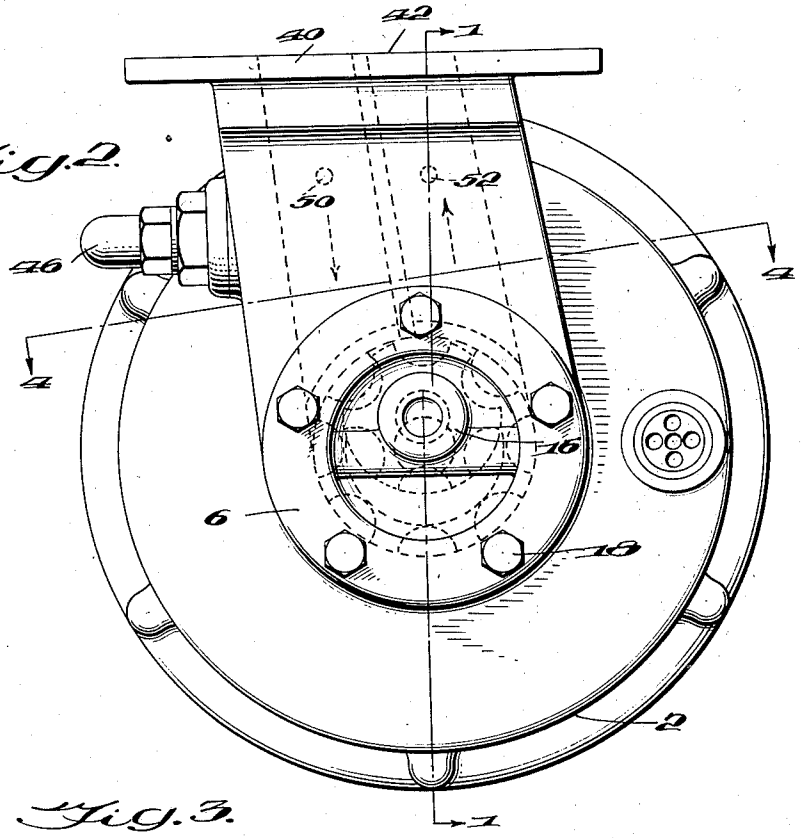
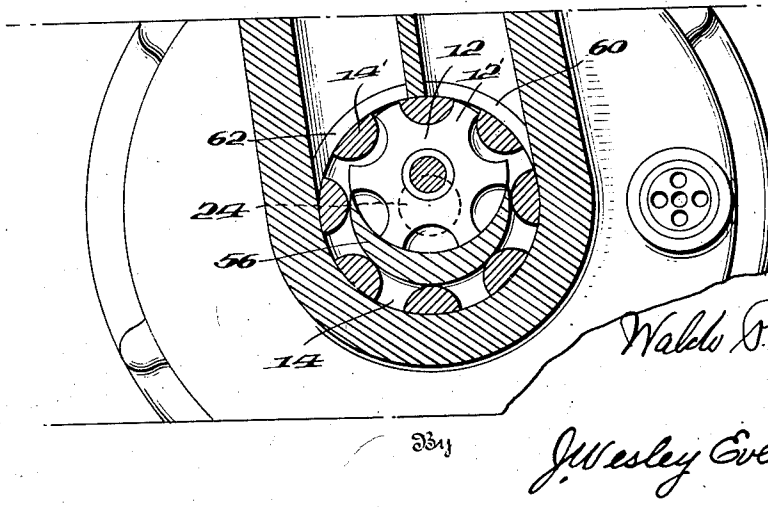


Fig. 3.



Inventor
Waldo P. Schirmer

By J. Wesley Everett
Attorney

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COMBINATION MOTOR AND PUMP UNIT

Waldo P. Schirmer, Cuyahoga County, Ohio

Application December 1, 1938, Serial No. 243,435

2 Claims. (Cl. 103—118)

The present invention relates to a motor operated pump and in particular to an arrangement in which the motor and pump elements are combined in a single compact unit. This pumping unit is principally adapted to the pumping of gasoline, or other volatile fluids which produce a highly explosive gas when mixed with the proper amount of oxygen. The pump and motor are retained within closely associated separate compartments which form the supporting element for the motor and pump.

The primary object of the invention is to provide an improved pumping unit of this character which will reduce the possibility of fire hazards to a minimum. This being accomplished by a novel construction which allows for a part of the liquid passing through the pump to circulate through the motor compartment and maintaining the liquid in the motor compartment at a predetermined level.

Another object of the invention is to provide such a pumping unit which is of compact design in order that it may be installed in a space of minimum size.

Still another object of the invention is to provide a pumping unit of this type which is constructed of a minimum number of parts yet rugged and durable and which may be manufactured at a comparatively low cost.

While several objects of the invention have been specifically set forth above, other objects will appear from the following specifications when taken in connection with the drawings which form a part of this application, and in which:

Fig. 1 is a sectional view of the unit taken along the line 1—1 of Fig. 2.

Fig. 2 is a view in elevation of the pump end of the unit.

Fig. 3 is a fragmentary sectional view taken along the line 3—3 of Fig. 1 showing the pump elements.

Fig. 4 is a fragmentary sectional view taken along the line 4—4 of Fig. 2 showing a top plan view of the pumping elements.

Referring now in particular to the drawings, the present embodiment of the invention comprises a housing 2 having a compartment 4 for inclosing the motor and a compartment 6 for inclosing the pump elements. The pump as shown is of the internal rotary type and involves broadly the principles set forth in my Patent #2,124,377.

Briefly the pump is composed of two rotary members 12 and 14, which are provided with inner meshing gear teeth 12' and 14' respectively. The pump compartment 6 is closed on the outer side by the plate 16. This plate is held in position by the bolts 18. Secured within the plate 16 is a shaft 21 upon which the pumping element 12 is supported in operating position with the cooperative pump element 14. The compartment 4 in which the motor is encased is provided with bearing supports 17 and 19 in which the bearings 20 and 22 are received and in which the shaft 24 of the motor is rotatable. Secured to the shaft 24 is the rotor element 26 of the motor. The field windings 28 are located adjacent the inner circumference of the compartment 4. This compartment is provided with an end bell member 2' for hermetically sealing the outer end of the compartment and is secured to the housing 2 by suitable studs 30. For preventing leakage through the end bearing 21, the bearing support 17 is provided with a plug member 32, threadedly receivable in the outer end thereof. Extending through the bearing supports perpendicular to the direction of the shaft are wells 34 and 36 for conveying a part of the liquid in the motor compartment to the bearings. The bearings 20 and 22 are provided with grooves 38 and 39 for distributing the fluid evenly through the bearings. One end of the shaft 24 is secured to the pump element 14 by the key element 14'' for fixing the pump element 14 to the shaft in order that it will rotate therewith.

Leading to the pump is an intake or suction passage 40 and an outlet or discharge passage 42. These passages are shown extending upwardly from the pump, but they may extend in any desirable direction or at any angle most convenient for installation. There is provided adjacent the upper limits of the motor compartment 4 an opening 50 leading from the suction passage 40 into the compartment and also an opening 52 leading from the motor compartment to the discharge or pressure passage 42.

Associated with the suction and pressure passages 40 and 42 is a pressure valve 46, the details of which are not shown. The purpose of this pressure valve being to function under a predetermined pressure for allowing the fluid in the pressure passage to enter the suction passage when the pressure becomes too great by operating the pump when the discharge outlet is closed.

Referring to Fig. 4 the inlet and outlet passages are provided with an improved port design. Apart from the pumping elements being supported on the shafts, there is an additional sup-

port in the crescent member 56 which is in turn supported by the plate 16 or otherwise retained within the pump compartment. This crescent-shaped member extends between the pumping elements 12 and 14 through approximately one-half of their circumference, the remaining portion of the circumference of the member 14 is furnished additional support by the members 60 and 62. These members extend throughout the distance of the intake and outlet ports and are tapered toward the side of the pump elements adjacent their ends 60' and 62'. This arrangement prevents the pump from howling by permitting the gradual closing of the ports. This not only prevents the pump from howling but as stated above it also furnishes an additional supporting means for the pump element 14 throughout the area occupied by the ports.

The particular type of motor used in this unit is a single phase motor having no brushes or other equipment that will cause the motor to create a spark while being started or in operation. The starting apparatus is set up at a convenient safe distance from the fuel and is well known to those familiar with the art of electric motors.

In operation the motor is first preferably filled with the liquid to be pumped, which is usually gasoline, kerosene, or other fluids of similar character. The motor is caused to operate the pump by introducing the proper electric current thereto. This in turn rotates the shaft 24 and the pump element 14. This causes the pump element 12 to also operate, setting up a suction through the intake passage 40 and a pressure in the outlet passage 42. Assuming the pump is primed, the pumping action will start at once, the fluid entering the passage 40 and being discharged through the passage 42. As the fluid is discharged a portion will enter the opening 52 leading to the compartment 4, and will be discharged through the opening 50 leading from the compartment 4 to the suction passage 40. This operation assures a fresh supply of liquid to be always within the motor compartment, which acts to remove the heat created by the motor and at the same time keeps the temperature of the liquid within the compartment at a low degree. It is advisable to have the inlet opening 52 slightly larger than the outlet opening 50, in order that the fluid within the compartment will be under a slight pressure.

This arrangement dispenses with the customary stuffing box which is used about the pump shaft. While the amount of escaping fluid may be very slight through this stuffing box, it does create a very dangerous fire hazard, particularly where the fluid being handled is capable of producing a highly explosive gas.

In the present apparatus the field windings and rotor of the motor are impregnated with a suitable compound to make them impervious to gasoline and other like fluids. The level of the fluid in the motor compartment is preferably kept at a point above the rotating member 26, although the fluid may be kept at any desired height which is best suited to the circumstances under which the fluid is being pumped.

While the invention has been described and illustrated in a particular form it is not intended that it be limited to this particular description of use, as the scope of the invention is best defined in the following claims.

I claim:

1. In combination; a motor and a fluid pump, a fluid inlet and outlet passage to said pump, said motor and pump having an hermetically sealed housing enclosing said pump and motor, a separate compartment within said housing for said motor, an inlet to the said motor compartment from the fluid outlet passage for allowing the passage of a part of the fluid being pumped to enter said compartment, means for withdrawing said fluid from said motor compartment, said means comprising an opening leading from a point at the top of the cavity of said motor compartment into the pump inlet passage and means for releasing the pressure in the fluid outlet passage by allowing the fluid to escape into the fluid inlet passage.

2. In combination; a motor and fluid pump unit having a housing for enclosing the same, a separate compartment within said housing for said motor, a separate compartment within said housing for said pump unit, a suction passage and discharge passage connected with said pump unit through which the said fluid is circulated, inlet means connecting the said discharge passage and the motor compartment for allowing a part of the discharge fluid to enter said motor compartment, and means connecting the said suction passage and the motor compartment at the uppermost point in the said motor compartment for withdrawing said fluid from said motor compartment only after the said motor compartment has been completely filled, the inlet to said motor compartment being of a larger cross-sectional area than the said outlet, thereby creating a pressure on the said fluid within the compartment.

WALDO P. SCHIRMER.