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3,263,618

## WINDSHIELD WASHER PUMP

Keith H. Carpenter, Pittsford, N.Y., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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This invention pertains to diaphragm pumps, and particularly to hydraulically actuated windshield washer pumps of the diaphragm type.

Heretofore, windshield washer pumps utilizing an elastomeric diaphragm as the liquid displacing member, with a spring actuated intake stroke and a hydraulically actuated delivery stroke, have been built. A pump of this type is shown in Olson Patent 2,859,700. Ordinarily, the hydraulic fluid for actuating the windshield washer pump is derived from either the lubricating system of the engine or an accessory hydraulic system such as power steering. In either event intermixing of washer solvent and the hydraulic fluid is undesirable. In the past the probability of intermixing of the two fluids has been minimized by providing a separate motor piston and cylinder for effecting the hydraulic stroke of the diaphragm pump, such a construction being shown in Snyder Patent 2,901,977.

The present invention constitutes a simplification of a hydraulically actuated windshield washer pump such that upon rupture of the diaphragm, intermixing of the two fluids will be precluded. Accordingly, among my objects are the provision of an improved hydraulically actuated diaphragm pump for windshield washer equipment; the further provision of a hydraulically actuated diaphragm pump including a double diaphragm; and the still further provision of a double diaphragm construction for a pump which precludes intermixing of the fluid being pumped and the actuating fluid.

The aforementioned and other objects are accomplished in the present invention by utilizing a double diaphragm with an integral separator. If the diaphragm on the hydraulically actuated side should rupture, the actuating fluid will flow to a reservoir, whereas if the diaphragm on the solvent side should rupture, the pump will be rendered inoperative since pump suction will be dissipated.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing, wherein a preferred embodiment of the present invention is clearly shown.

In the drawing:

FIGURE 1 is a longitudinal sectional view of the improved windshield washer pump with the diaphragm shown in its intake stroke position.

FIGURE 2 is a view similar to FIGURE 1 with a diaphragm shown in its delivery stroke position.

Referring to the drawing, the improved windshield washer pump comprises a two part casing 10 and 12, the two parts having flanged edges which are interconnected by bolts 14 so as to clamp the split bead of a double diaphragm 16 therebetween. The upper part 10 of the casing is provided with an inlet nipple 18 that communicates with a one-way inlet check valve 20, and an outlet nipple 22 that communicates with a one-way outlet check valve 24. The diaphragm 16 divides the casing into a pump chamber 26 and a motor chamber 28, and inlet and outlet check valves communicate with the pump chamber 26.

The lower part 12 of the casing has a central aperture at 30 connecting with a threaded fitting 32 through which

hydraulic fluid under pressure can be intermittently supplied to actuate the washer pump. In addition, the lower part 12 of the casing is formed an integral sump, or reservoir 34, which is at atmospheric pressure, the sump being connected by a tube 36 to the double diaphragm 16. The outlet of tube 36 is above the level of the reservoir 34.

The double diaphragm 16 includes an upper elastomeric diaphragm portion 38 and a lower elastomeric diaphragm portion 40, the two diaphragm portions being spaced apart by an integral separator 42 as well as the peripheral bead. The tube 36 communicates with the annular space 44 between the diaphragm portions 38 and 40. The diaphragm 16 constitutes a fluid displacing member which has an intake stroke and a delivery stroke. The intake stroke is effected by a coil compression spring 46, one end of which is seated in the upper part 10 of the casing, the other end of which engages a combined washer and spring guide 48 which may be bonded to the double diaphragm 16.

Operation of the improved pump is effected by supplying hydraulic fluid under pressure to the fitting 32 and the motor chamber 28 so as to move the diaphragm 16 from the position of FIGURE 1 to the position of FIGURE 2 thereby collapsing the pump chamber 26 so as to force liquid solvent through the outlet check valve 24 and the nipple 22 for delivery through conventional spray nozzles. Upon connecting the motor chamber 28 to drain, or exhaust, the spring 46 will move the diaphragm from a position of FIGURE 2 to a position of FIGURE 1 thereby completing the intake stroke of the pump and filling the pump chamber through inlet check valve 20.

If the pumping diaphragm 38 should rupture, the pump suction would be dissipated, and air would be drawn into the pump chamber through the tube 36 from atmospheric sump 34. On the other hand, if the motor diaphragm 40 should rupture, the hydraulically actuated fluid would flow harmlessly back to the sump 34 through the tube 36. Accordingly, it is apparent that the improved washer pump construction precludes intermixing of the hydraulically actuating fluid and the liquid solvent, and upon rupture of either diaphragm portion, the washer pump will be inoperative.

While the embodiment of the present invention as here disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A pump comprising, a casing having a fluid displacing diaphragm therein with an intake stroke and a delivery stroke, power means acting constantly on said diaphragm to effect one stroke thereof, and hydraulic fluid pressure actuated means for effecting the other stroke of said diaphragm, said diaphragm being characterized by having a pair of spaced diaphragm portions and integral separator means holding said diaphragm portions in spaced relation whereby rupture of either of said diaphragm portions renders the pump inoperative and precludes intermixing of the fluid being pumped and the actuating hydraulic fluid, said integral separator means including a centrally disposed integral portion and an integral peripheral bead, said casing having two parts which clampingly embrace said bead.

2. A pump including, a two-part casing having a liquid displacing member therein with an intake stroke and a delivery stroke, a spring biasing said liquid displacing member to move it throughout one stroke, hydraulic fluid pressure actuated means for effecting the other stroke of said member, said liquid displacing member comprising

a double diaphragm having a pair of spaced diaphragm portions and integral separator means therebetween comprising a centrally disposed integral portion and an integral peripheral bead clamped between said two-part casing, and a tube connecting the space between said diaphragm portions to an atmospheric sump whereby rupture of either of said diaphragm portions renders the pump inoperative and precludes the intermixing of the liquid being pumped and the actuating hydraulic fluid.

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ROBERT M. WALKER, *Primary Examiner.*