# United States Patent

[11] 3,584,979


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[21] Appl. No. 818,742
[22] Filed Apr. 23, 1969
[45] Patented June 15, 1971


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[54] SELF-PRIMING LIQUID-PUMPING SYSTEM
2 Claims, 1 Drawing Fig.


[52] U.S. Cl. 417/89
[51] Int. Cl. F04d 9/00
[50] Field of Search 103/113 J, 113 R, 5; 415/80, 88, 89, 76



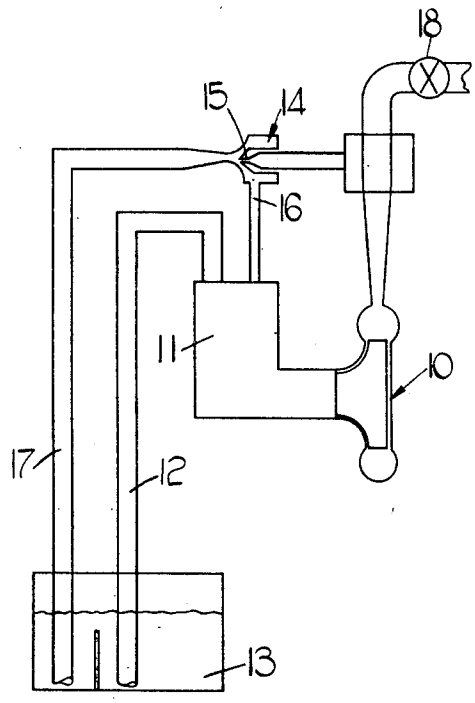
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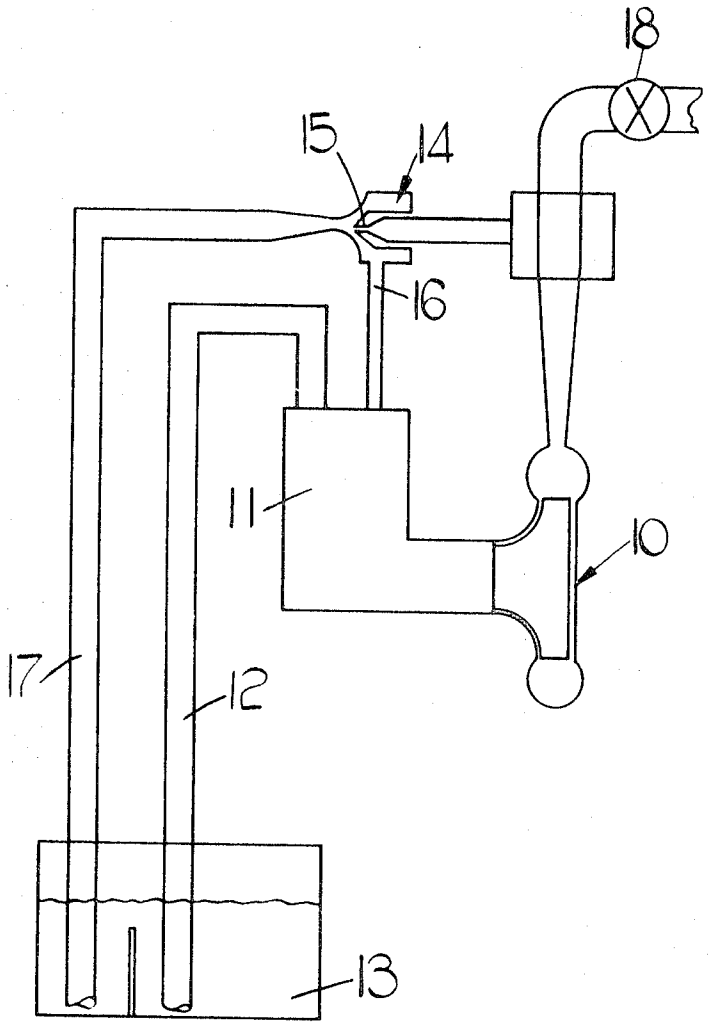


**ABSTRACT:** A self-priming liquid-pumping system has a main pump which draws liquid from a tank at a lower level and includes a priming reservoir above the main pump and which has a capacity larger than that of the piping between the main pump and the tank. A secondary pump may be provided to remove vapor from the reservoir. The system is primarily intended for use in the fuel system of a helicopter, in which a main centrifugal pump driven from the engine is preferable.

PATENTED JUN 15 1971

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## SELF-PRIMING LIQUID-PUMPING SYSTEM

This invention relates to a self-priming liquid-pumping system.

A self-priming liquid-pumping system in accordance with the invention comprises a main pump arranged to draw liquid through piping from a tank at a lower level than said main pump, characterized by a priming reservoir at a level higher than the main pump and of a volume sufficiently greater than the volume of said piping to enable the removal of liquid from the priming reservoir to draw liquid into the priming reservoir.

An example of the invention is illustrated in the accompanying drawing which is a diagrammatic representation of the pumping system.

The system includes a centrifugal pump **10**, the inlet of which is connected to a priming reservoir **11**. The reservoir **11** is connected via piping **12** to a tank **13** at a lower level than the pump **10**. The volume of the priming reservoir **11** is chosen so as to be greater than the volume of the piping **12** by an allowance determined in accordance with the vapor pressure in the most adverse conditions under which the system has to operate plus an allowance dependent on the volume change in the piping in the most adverse conditions.

For removing vapor from the reservoir **11** there is an injector pump **14**, the nozzle **15** of which draws liquid from the high-pressure side of the pump **10**. The inlet **16** of pump **14** is connected to the uppermost part of the reservoir **11** and its outlet is connected by piping **17** to the tank **13**.

The system is intended to be employed in the fuel system of a helicopter in which a main tank is situated in the lowermost part of the fuselage with gravity feeds from various supplementary tanks in other parts of the fuselage. To raise the fuel to the engine a lifting pump of some nature is required, and, for various reasons, a centrifugal pump driven by the engine is preferable. The system described enables the pumping system to be started without manual or other priming, but is relatively inexpensive to install and is not excessively bulky. The system is used with a shutoff cock **18** on the high pressure side of the pump **10**, so that fuel in the pipework between the pump **10** and the shutoff cock **18** can run back into the reservoir **11** on shutdown.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

**1**. A self-priming liquid pumping system comprising a main pump arranged to draw liquid through piping from a tank at a lower level than said main pump, a priming reservoir at a level higher than the main pump and of a volume sufficiently greater than the volume of the said piping to enable removal of liquid by the main pump from the priming reservoir to draw liquid into the priming reservoir and an injector pump supplied, in use, with liquid from the main pump, an inlet of the injector pump being connected to the priming reservoir adjacent an upper end thereof and the outlet of the injector pump being connected to the said tank.

**2**. A system as claimed in claim **1** in which the volume of the priming reservoir is greater than the volume of the said piping by an allowance depending on the vapor pressure plus an allowance depending on the volume change in the piping, both the said allowances being determined in accordance with the most adverse conditions under which the system has to operate.