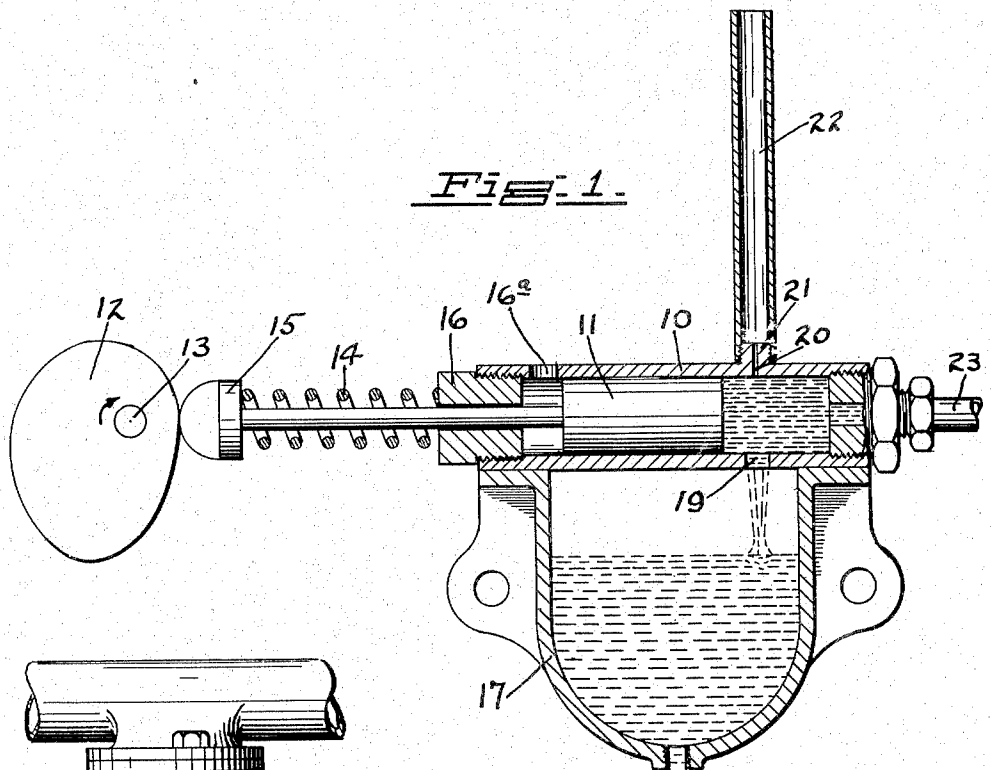
May 27, 1930. S. VERNET 1,760,387

INERTIA PUMP FOR SUPPLYING GASOLINE TO CARBURETORS

Filed Oct. 8, 1925

Fig. 1.



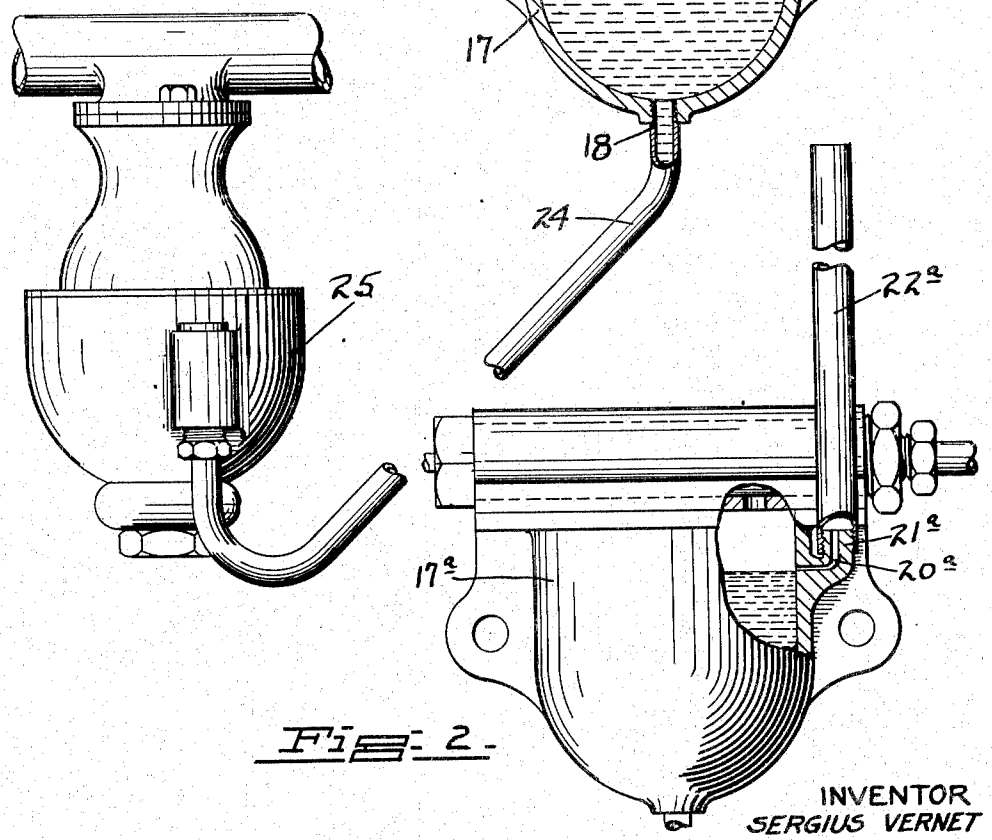


Fig. 2.

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UNITED STATES PATENT OFFICE

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INERTIA PUMP FOR SUPPLYING GASOLINE TO CARBURETORS

Application filed October 8, 1925. Serial No. 61,156.

This invention relates to pumps for supplying gasoline to the carburetors of internal combustion engines or for other purposes.

One of the objects of the invention is to provide a simple pump for pumping liquid, which will have a minimum of moving parts and still operate effectively.

Another object of the invention is to provide a pump of extremely simple construction and operation for supplying gasoline to carburetors, which will automatically cease supplying the gasoline when the carburetor is full, and automatically replenish the supply when the level of gasoline in the carburetor falls.

Another object of the invention is to provide a valveless reciprocating pump for supplying gasoline to carburetors of internal combustion engines.

A further object of the invention is to provide a pump which will not only supply gasoline to carburetors of internal combustion engines, but will also keep the supply pipe clear and free from sediment.

A further object of the invention is to provide a method for pumping liquid from one level to another by imparting to the column of liquid, a series of unidirectional impulses close enough together to prevent return of the entire amount of liquid advanced and to permit discharge of a portion of the liquid without the use of valves or other moving parts.

A further object of the invention is to provide a method for raising a liquid from one level to another which comprises the steps of setting a column of liquid in pulsating motion by unidirectional impulses and permitting discharge of a part of the liquid advanced solely by the momentum of the liquid column.

These and other objects of the invention will be apparent as the description of the invention proceeds.

In the drawings, which illustrate one of the many forms of embodiment of the invention,—

Fig. 1 is a sectional side elevational view of a pump embodying my invention; and

Fig. 2 is a side elevational view partly in section of a modification of the pump shown in Fig. 1.

Referring more specifically to the drawings, the pump comprises a cylinder 10 adapted to be rigidly attached to the casing of an internal combustion engine. A piston 11 is slidably mounted within the cylinder and may be forced inwardly by a cam 12 attached to a shaft 13 driven by the engine or other source of power, and outwardly by a spring 14 bearing against the cam follower 15 and the piston rod bearing 16 closing the cylinder 10. The cam 12 as illustrated may be shaped so that when driven in the direction of the arrow the inward movement of the piston is slower than the outward movement, but if desired the cam 12 may be symmetrical so that the inward and outward movements of the piston will be at the same rate of speed. A vent 16^a in the end of the cylinder adjacent the bearing 16 allows air to pass freely in and out as the piston moves back and forth. A reservoir 17 is attached directly beneath the cylinder 10, the only opening thereto being the outlet 18 in the bottom thereof and the inlet or port 19 through the lower wall of the cylinder 10. Directly above this opening 19 in the cylinder wall is a relatively small opening 20 in the upper wall of the cylinder. The cylinder wall is extended around this opening 20 to form a boss 21 which is threaded and upon which is screwed the stand pipe 22. An inlet pipe 23 from the gasoline tank or other source of fluid supply is connected to the end of the cylinder and an outlet pipe 24 is screwed into the opening 18 in the bottom of the reservoir 17 and leads to the carburetor 25.

The method of operation of the pump is as follows:

Assuming the pump and reservoir to be empty and the piston moving back and forth within the cylinder, the suction stroke of the piston will cause the gasoline in the supply tank to rise a certain distance within the inlet pipe 23. As this rise in level is fairly rapid, the gasoline will have a certain amount of momentum when the piston opens the ports 19 and 20, and the inertia in the gasoline will cause the gasoline to continue to rise in the

pipe which is open through the vent 20 to atmospheric pressure. The port 19 is so placed with relation to the travel of the piston that on the return stroke of the piston it is covered before the momentum in the column of gasoline has been entirely used up and before the gasoline has returned to the level at which it was when the port 19 was uncovered. The remainder of the return stroke merely displaces an amount of gasoline in the supply pipe equal to the displacement of the piston as it travels from the port 19 to the end of the stroke. In other words, the port 19 is opened near the end of the suction stroke when the momentum in the gasoline is considerable, and closed near the beginning of the return stroke before any momentum has been built up in the opposite direction. When the cycle is completed, the gasoline has gained a new level in the inlet pipe 23. This new level may be only an inch or a fraction of an inch above the former level. However, the repetition of the cycle quickly draws the gasoline up into the inlet pipe 23 until it completely fills the pipe and the cylinder 10, at which time the amount raised by each suction stroke will flow out of the port 19 into the reservoir 17. The opening 20 in the upper wall of the cylinder 10 is small enough so that the gasoline will not readily pass therethrough. When the gasoline used by the engine is less than the amount supplied by the pump the reservoir 17 will fill with gasoline and when the level of gasoline reaches the opening 19 the gasoline in the cylinder must either be forced through the opening 20 into the stand pipe 22 or be merely moved back and forth in the pipe 23. As the opening 20, being small, offers considerable resistance to the flow of gasoline therethrough, a small quantity only of gasoline will pass through the opening 20 and the gasoline will slowly rise in the stand pipe 22. When the gasoline rises a certain distance in the stand pipe the weight of the gasoline, together with the friction in the opening 20, will prevent it from rising higher and the gasoline then in the inlet pipe 23 and cylinder 10 will move back and forth with the piston and no gasoline will be forced through either the opening 20 or the port 19. When some of the gasoline is drawn from the reservoir into the carburetor and the level falls below the opening 19, gasoline will again flow into the reservoir. It will thus be evident that the reservoir will always be kept supplied with gasoline and when filled completely the pump will cease to function although the piston continues to move backward and forward as long as the engine is turning over.

It will be understood that the piston must move at a speed great enough to set up momentum in the column of gasoline in the pipe 23 and that the pipe 23 must be long enough to provide a sufficient column of gasoline.

The constant surging backward and forward of the gasoline within the pipe 23 prevents any sediment collecting there and insures the gasoline feed being clear at all times. The size of the reservoir 17 is sufficient to permit starting and operation of the engine for a long enough period to start the gasoline flowing from the pipe 23 to the reservoir 17.

In Fig. 2 I have shown a modification of the pump shown in Fig. 1 in which the small opening 20^a is in the side of the reservoir 17^a, the pipe 22^a being attached to the boss 21^a in the same manner as the pipe 22 in Fig. 1. In this modification, when the gasoline rises to the level of the opening 20^a the amount of gasoline flowing from the pump will gradually become smaller until the gasoline has risen to a certain distance in the stand pipe 22^a, when the pump will cease to function for the same reason that the flow of gasoline into the reservoir is stopped in the pump shown in Fig. 1. Thus the reservoir 17^a will be kept filled with gasoline at all times.

While I have described the form of embodiment of the invention as using a reciprocating pump, a rotary pump may also be used or any other type of pump in which the column of liquid to be pumped is given a momentum and that momentum used to cause the liquid to flow out of the pump. The method of operation is the same in each case. I have also described the present embodiment of the invention as a pump for supplying carburetors of internal combustion engines with gasoline, but it is evident that such a pump may have other uses, especially where it is desirable to have a simple, cheap pump with a minimum of moving parts, such as in pumping certain chemicals, and it is therefore not my desire to limit the embodiments of the invention to any specific use or particular embodiment of the parts, but to interpret it broadly within the scope of the appended claims.

Claims:

1. The combination with a valveless reciprocating pump of a reservoir receiving liquid from said pump and hydrostatic means to render said pump inoperative when said reservoir has been filled to a predetermined level.

2. A valveless reciprocating pump comprising a cylinder, an inlet and an outlet opening in said cylinder, a piston, a reservoir receiving liquid from said cylinder, and a stand pipe communicating with said reservoir.

3. A valveless reciprocating pump comprising a cylinder having an opening in the side thereof an inlet in said cylinder, a piston slidably disposed within said cylinder, a reservoir communicating with said opening, said reservoir having a vent in the side near the top thereof, and an open stand pipe in communication with said vent.

4. A valveless pump comprising a cylinder having adjacent inlet and outlet openings therein, a piston slidably disposed within said cylinder, a reservoir communicating with said outlet opening, said reservoir having a vent in the side near the top thereof and an open stand pipe connecting with the vent in said reservoir.

5. A valveless reciprocating pump comprising a cylinder having an inlet opening near the end thereof, a piston slidably disposed therein, a reservoir beneath said cylinder having an opening communicating with said cylinder near the inlet of said cylinder and a stand pipe adjacent to said reservoir and having a relatively small opening into the upper portion of said reservoir.

6. A valveless pump for supplying fuel to carburetors of internal combustion engines comprising a cylinder, a piston within said cylinder, a supply pipe connected to said cylinder, means to reciprocate said piston to cause pulsations in the liquid in said supply pipe to fill said cylinder and means to permit hydrostatic discharge from said cylinder of a small portion only of the fuel drawn into said cylinder by said piston.

7. A pump for supplying fuel to carburetors of internal combustion engines comprising a cylinder having a supply pipe connected thereto, a piston within said cylinder, means to reciprocate said piston, a reservoir adjacent said cylinder and communicating therewith, and hydrostatic means preventing further discharge into said reservoir during continuous reciprocation when said fuel in said reservoir remains above a predetermined level.

8. In a valveless reciprocating pump of the type described, the combination of a cylinder, a piston, means to reciprocate the piston in the cylinder, a liquid inlet line, a liquid outlet and a restricted air vent from said cylinder, and a stand pipe communicating with said vent.

9. The method of maintaining the level of liquid in a vessel which comprises the step of imparting a series of unidirectional pulsations to a column of the liquid, such pulsations being strong enough to force a portion of the liquid in the column into the vessel by overcoming the low static head when the liquid in the vessel is below a predetermined level but not strong enough to overcome a high static head after the liquid in the vessel reaches a predetermined level.

10. A pump for supplying fuel at a low level to carburetors at a higher level for internal combustion engines or the like, a supply pipe connected to said pump at the higher level and to the source of supply, a piston reciprocating in said pump to cause pulsations to the fuel in the supply pipe, the said piston withdrawing at a greater rate from the column of fuel than it moves toward said column, a reservoir, and a valveless discharge orifice in said pump communicating with said reservoir whereby on the pulsation of the column of fuel a portion will be discharged through said orifice into said reservoir.

11. The method of raising a liquid from one level to another which comprised the steps of alternately evacuating the air from a portion of a cylinder at the higher level in communication with the liquid in the lower level and imparting uni-directional impulses to the freely movable column to force a portion of the liquid from the column at the higher level and subsequently hydrostatically balancing the column when the predetermined quantity is obtained at the upper level.

In testimony whereof I have affixed my signature to this specification.

SERGIUS VERNET.