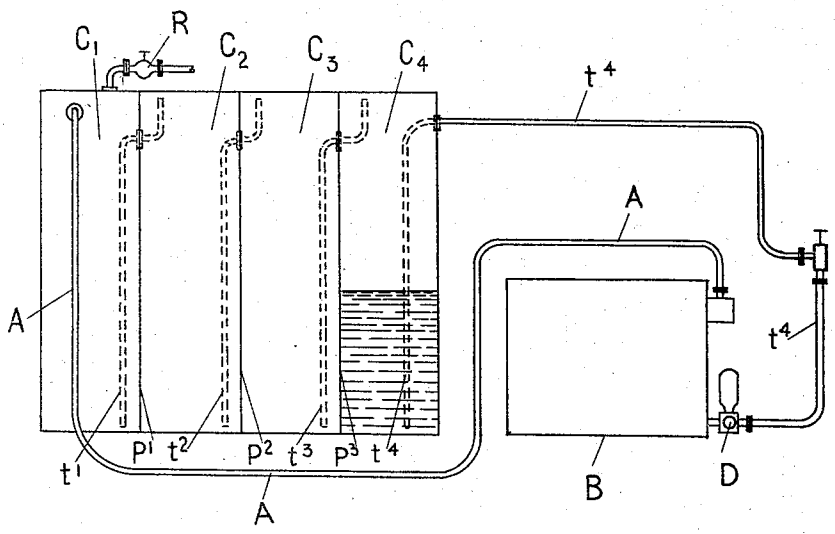
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LIQUID FUEL RESERVOIR.

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**1,219,115.** Patented Mar. 13, 1917.




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# UNITED STATES PATENT OFFICE.

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## LIQUID-FUEL RESERVOIR.

1,219,115. Specification of Letters Patent. Patented Mar. 13, 1917.

Application filed August 24, 1915. Serial No. 47,026.

*To all whom it may concern:*

Be it known that I, CESARE LAURENTI, of Turin, Italy, have invented certain new and useful Improvements in and Relating to Liquid-Fuel Reservoirs, of which the following is a true, full, and exact specification.

This invention relates to improvements in reservoirs for combustible liquids such as are employed in connection with motors on boats and floating bodies in which it is necessary that the weight shall not undergo any considerable variation and that the stability during the consumption of the combustible similarly shall not undergo any sensible variation.

The invention herein described is especially but not exclusively, adapted for use with submarine boats since in this type of boat it is particularly important that there should be no sensible variation either in weight or in the position of the center of gravity notwithstanding the consumption of the combustible contained in its reservoirs.

It is usual in submarine boats to retain a constant weight by gradually substituting water as the combustible is consumed, but in the case of large reservoirs, especially when they extend to a large degree in the longitudinal direction of the boat it happens that the heavier water sinks to the bottom of the reservoir and the lighter combustible comes to the surface so that at each longitudinal inclination of the boat a considerable displacement of weight in the longitudinal direction of the boat is produced, which in the case of a submerged submarine considerably and dangerously affects the position of the boat during navigation.

This invention has for its object to reduce this displacement of weight and consequent variation of longitudinal stability to a minimum. To this end the reservoir for the combustible liquid is divided into a series of water-tight compartments connected by a certain arrangement of pipes and fluid is admitted to one compartment under pressure and is caused to force the combustible from the reservoir gradually filling one compartment after another, the compartments being as numerous and as small as desired.

To enable the invention to be fully understood it will now be described by reference to the accompanying diagram in which the figure illustrates the invention as applied to a reservoir suitable for use on a submarine boat.

As shown the water-tight reservoir, which is arranged longitudinally of the boat is divided into a series of water-tight compartments or subdivisions $C_1$, $C_2$, $C_3$, $C_4$, by means of the water-tight partitions $P_1$, $P_2$, $P_3$. The pipe A conducts the combustible from the top of the compartment $C_1$ to the motor B or it may be to the furnace of a boiler. The various compartments $C_1$, $C_2$, $C_3$, $C_4$, are in communication one with the other by means of pipes $t_1$, $t_2$, $t_3$, each pipe extending from approximately the bottom of one compartment and passing through the partition at a point near the top of same and then being bent up to a point approximately at the top of the adjacent compartment as shown in the case of the pipes $t_1$, $t_2$, $t_3$. The last compartment $C_4$ has an additional pipe $t_4$ extending from substantially the bottom of the compartment and passing out near the top of same to a pump D which may be a circulating pump for an internal combustion motor or a special water pump. A cock R is provided on the top of compartment $C_1$ for allowing escape of air when the compartments are first filled, said cock also acting to indicate when the tanks are full according as air or combustible passes therethrough. Further, if water or other fluid issues from the cock, then it will be understood that no more combustible remains in the reservoir.

The operation of this arrangement is as follows:

Supposing the reservoir to be filled with combustible, a fluid preferably water under pressure is forced by the pump D through pipe $t_4$ to the bottom of the compartment $C_4$ which displaces the combustible and forces it through the pipes $t_3$, $t_2$, $t_1$, and tube A whence it passes to the motor or furnace. It will be understood that in course of operation the various compartments will become filled with water or other displacing fluid one after the other until all the combustible is consumed. It will be seen that even if the reservoir is very large the surface of liquid contact between the displacing fluid and the combustible will be in one compartment only at a time and such compartment may be made as small as desired.

The extent of this surface of contact be-

tween the two fluids having a considerable influence on the longitudinal stability of the boat it is possible in consequence to reduce this dangerous influence down to as small a degree as desired by means of the present invention.

It will be understood that the reservoir may be divided into any desired number of compartments. Liquids other than water may be employed for forcing out the combustible if desired.

What I claim is:

1. A submarine or the like, having a liquid fuel reservoir, comprising a plurality of liquid fuel containers, and means placing the containers in communication with one another, said means comprising a pipe leading from the top of one container to the lower part of a succeeding container, said pipe being adapted to conduct fuel serially from one container to a succeeding container, said containers and pipe being so constructed that said pipe also serves as a conduit for the expellant liquid, following the passage of the fuel, from one container to the next.

2. A submarine or the like, having a liquid fuel reservoir, comprising a plurality of containers arranged transversely of the longitudinal axis of the submarine, and means placing the containers in communication with one another, said means comprising a pipe running from one container to a succeeding container, said pipe having one end opening at the top of one container and its other end opening at the lower part of the succeeding container, said pipe being adapted to conduct fuel serially from one container to another, said containers and pipe being so constructed that said pipe also serves as a conduit for the expellant liquid, following the passage of the fuel, from one container to the next.

3. A submarine or the like, having a liquid fuel reservoir, said reservoir having transverse compartments therein and means placing the compartments in communication with one another, the said means comprising a pipe running from one compartment to a succeeding compartment, said pipe having one end opening at the top of one compartment and its other end opening at the lower part of a succeeding compartment, the said pipe being adapted to conduct fuel serially from one compartment to a succeeding compartment, said compartments and pipe being so constructed that said pipe also serves as a conduit for the expellant liquid, following the passage of the fuel, from one container to the next.

4. A submarine or the like, having a liquid fuel reservoir, said reservoir having transverse compartments therein, and means placing the containers in communication with one another, said means comprising a pipe running from one compartment to a succeeding compartment, said pipe being inside of said reservoir and having one end opening at the top of one compartment and its other end opening at the lower part of a succeeding compartment, said containers and pipe being so constructed that said pipe also serves as a conduit for the expellant liquid, following the passage of the fuel, from one container to another.

5. In combination, a liquid fuel reservoir for use in submarines or the like, and a water pump, said reservoir comprising transverse compartments and a pipe running from one compartment to a succeeding compartment, said pipe having one end opening at the top of one compartment and its other end opening at the lower part of a succeeding compartment, said pipe being adapted to conduct fuel serially from one compartment to a succeeding compartment, said water pump being connected to the lower part of a compartment at one end of the series, and said liquid reservoir having a fuel outlet at the opposite end of the series, the fuel and water being adapted to pass from one compartment to another through the same pipe.

6. A submarine or the like, having a liquid fuel reservoir, comprising a plurality of liquid fuel containers, a device in which the liquid fuel is utilized, means whereby the several containers may be connected in series with said device in which the fuel is utilized, and a pipe for introducing water into said containers in contact with the liquid fuel therein to displace the liquid fuel, said pipe leading from the upper part of one container to the lower part of a succeeding container, said pipe being the same pipe which conducts the liquid fuel from one compartment to another.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

CESARE LAURENTI.

Witnesses:
C. L. TEYLES,
ZELIE BAZETTA.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."