

1,367,460.

Patented Feb. 1, 1921.

Fig. 1.

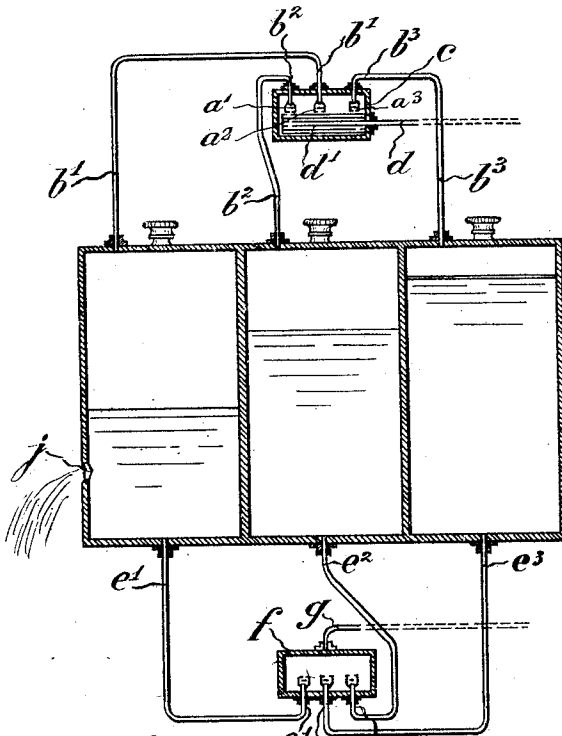
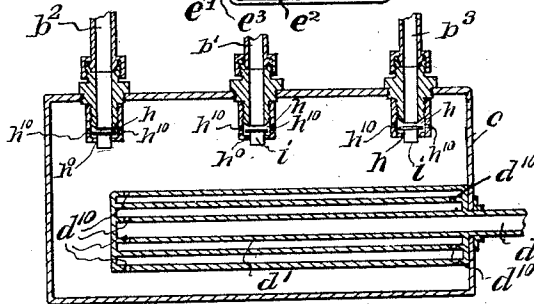


Fig. 2.



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TANK.

1,367,460.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, RENÉ CAUDRON, manufacturer, citizen of the French Republic, residing at Issy-les-Moulineaux, Department of Seine, France, have invented certain new and useful Improvements in Tanks, of which the following is a specification.

This invention relates to tanks or reservoirs, particularly for use on aeroplanes and airships, in which air or other fluid under pressure is employed to exercise pressure on the contents of the reservoir, the object being to provide means whereby in the event of the tank becoming pierced it can still continue in use.

According to this invention the reservoir is divided into several closed compartments, each provided with an inlet conduit for pressure fluid and an outlet conduit for the contents of the reservoir, say petrol, with suitable means for preventing automatically, when one of the compartments is pierced, the pressure fluid from continuing to exercise its action in that compartment.

The invention further includes certain other arrangements which will be more particularly referred to in the following description.

An embodiment of the invention will now be described with reference to the accompanying drawing, which is given merely by way of example.

Figure 1 shows a sectional view of an arrangement according to the invention.

Fig. 2 is a section, on an enlarged scale, of the compressed air distributor to the compartmented reservoir.

The reservoir, in this case, constitutes the petrol tank for an aeroplane engine, from which petrol is fed under pressure to the engine.

The reservoir is divided into a number, for example, three closed compartments a^1 , a^2 , a^3 , each of which, on the one hand, is connected by a conduit b^1 , b^2 or b^3 respectively, with a common distributor c , the conduits b^1 , b^2 , b^3 communicating with the upper parts of the compartments a^1 , a^2 , a^3 . The distributor c is, in turn, in communication with a source of fluid under pressure, for instance, by a pipe d with a pump. From the lower parts of the compartments a^1 , a^2 , a^3 extend pipes e^1 , e^2 , e^3 respectively, which enter the lower part of a common collector

f , which, in turn, communicates, by means of a pipe g with the engine, for instance, with its carbureter.

The interior of the distributor c is provided with suitable means for closing the conduits b^1 , b^2 or b^3 , corresponding respectively to the compartments a^1 , a^2 , a^3 as soon as the pressure in either of said compartments is reduced to a determined extent. These means, as shown, may consist of valves arranged in such manner that they only become seated and close the conduits b^1 , b^2 , b^3 when the difference between the pressures on their two faces is raised above a certain value. Preferably the conduits b^1 , b^2 , b^3 open into the distributor with their ends directed downward, these ends being formed into or provided with a kind of chamber h , the bottom of which is provided with a suitable hole h^0 in which is arranged a valve i of such shape and weight that as long as the difference between the pressures existing in the distributor and in the respective compartments a^1 , a^2 , a^3 does not exceed a given value, it will rise slightly, under the action of the air entering under pressure into the distributor c and entering the orifice h^0 , leaving between itself and the wall of the chamber h an annular space by which the air under pressure can enter the corresponding conduit b^1 , b^2 or b^3 and thus enter the corresponding compartment a^1 , a^2 or a^3 but as soon as the difference between the pressure existing in the distributor c and in the corresponding compartment a^1 , a^2 or a^3 exceeds a given value, it will be forced by the air pressure, against the lower end of the corresponding conduit b^1 , b^2 or b^3 and thus close that conduit.

On the other hand, in known manner, in the interior of the collector f are arranged suitable means for closing the conduits e^1 , e^2 or e^3 corresponding respectively to the compartments a^1 , a^2 , a^3 as soon as the pressure in the said compartments sinks to a certain degree, such means being more or less similar to those employed in the distributor c , with the difference that the pipes e^1 , e^2 , e^3 are arranged so that their free ends are directed upward in the collector f . The valves thus have a tendency, due to their weight, to seat themselves on the ends of the pipes and to maintain them closed as long as the pressure in the compartment corre-

sponding to the pipe is lower than the pressure in the collector.

Hence assuming that the different compartments a^1, a^2, a^3 are charged with petrol to the same level, leaving a sufficient air space in their upper parts, and have been hermetically closed, and that the engine is started, the air forced by the pump into the distributor c , through the pipe d , will raise the valve i slightly, will pass around it and enter the compartments a^1, a^2, a^3 by way of the conduits b^1, b^2, b^3 in approximately equal quantities. The petrol will thus be forced out, in substantially equal quantities, into the collector f , and thence to the carbureter.

However, if either of the compartments starts leaking quickly, for example, if pierced by a bullet making a hole j in its wall, the petrol will commence to escape from the compartment, and if this escape takes place sufficiently slowly so that the compressed air cannot escape through the hole j , the air pump will maintain the pressure in the other compartments which will continue to feed the collector and carbureter, and it will be only when the compressed air can escape through the hole j that, owing to the pressure falling sharply in the compartment a^1 , such a difference of pressure will be produced between the two faces of the valve i that the valve will be seated, under the pressure of the air in the distributor c , against the end of the conduit b^1 , corresponding to the compartment a^1 , and the air under pressure will then only pass into the compartments a^2 and a^3 .

This action is further assisted by the fact that the air under pressure in the uninjured compartments tends, at this moment, to expand in the compartment where pressure no longer exists. At the same time, in the collector f , the end of the conduit e^1 corresponding to the compartment a^1 will be closed by its valve, the pressure in the compartment a^1 becoming too weak to keep the valve raised, and only the intact compartments will continue to feed the carbureter.

If one or more of the distributor valves close owing to a cause other than that of escape of fuel, the corresponding collector valves would act simultaneously, but the pressure of air which would leak in gradually, owing to the fitting of the valves never being completely tight, would, in due course, reestablish the equilibrium in the compartments and distributors.

The walls of the distributor and collector are preferably made of material sufficiently strong so as not to be penetrated by shrapnel bullets or splinters.

While the apparatus will act satisfactorily if constructed as described, it is desirable to prevent the compressed air from entering the distributor c in jerks caused by each stroke of the pump, which might produce, in

the distributor, such escape of compressed air as to produce a closing of the valves i . To this end in the interior of the distributor c , a chamber d^1 is arranged provided with baffles or passages whereby variations in pressure in air as it is forced in through the pipe d will be neutralized or destroyed. For example, the chamber d^1 may be provided with a series of concentric tubes closed at their ends, the central tube constituting a part of or prolongation of the conduit d , and being pierced at its ends with small holes d^{10} , the next outer tube being pierced with holes d^{10} at the opposite end and so on, so as to provide a long baffled passage for the incoming compressed air.

Preferably, to assist the working of the valves i , a small aperture, or apertures, h^{10} is made in the wall of the chamber h level with the top of the valve when the latter rests on the bottom of the chamber h , this orifice being such as to permit without raising of the valve, the normal entry of compressed air into the chamber, as long as the difference of pressure on the two faces of the valve is not sufficient to effect the raising of the valve.

It will be evident that the invention is not limited to the particular construction described, which may be varied in various manners.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A tank or reservoir, particularly for use on aeroplanes and airships, divided into a number of closed compartments, each provided with an inlet conduit for fluid under pressure, and an outlet conduit for its liquid contents, and having means for automatically preventing, when one compartment is pierced, the compressed fluid from continuing to exercise its action in said compartment.

2. A tank or reservoir as set forth in claiming clause 1 having a distributor connected, on the one hand, with each of the compartments by conduits opening into the upper part of their respective compartments, and on the other hand, with a source or supply of compressed fluid, such as air, means being provided in the distributor for automatically closing any of the conduits when the pressure in its compartment sinks to a determined extent.

3. A tank or reservoir as set forth in claiming clause 1, in which the conduits connecting their respective compartments with the distributor have their open ends in the latter directed downward, said ends being provided with valves so arranged that they only become seated when the difference of pressure on their two faces rises above a determined value.

4. A tank or reservoir particularly for use on airplanes and airships divided into a number of closed compartments each provided with an inlet conduit for fluid under pressure and an outlet conduit for its liquid contents, and a distributor connected with each of said compartments by said inlet conduits, said distributor being also connected with a source of compressed fluid, said inlet conduits terminating in said distributor in a chamber having an opening in its bottom for a lift valve and an aperture through the side wall of said chamber.

5. A tank or reservoir divided into a number of closed compartments each provided with an inlet conduit for fluid under pressure and an outlet conduit for its liquid contents and having means for automatically preventing, when one compartment is pierced, the compressed fluid from continuing to exercise its action in said compartment, each of said compartments being connected by its respective outlet conduit with a collector, each outlet conduit being provided within said collector with means for automatically closing when the pressure in

any of said conduits sinks to a determined extent.

6. A tank or reservoir divided into a number of closed compartments each provided with an inlet conduit for fluid under pressure and an outlet conduit for its liquid contents and having means for automatically preventing, when one compartment is pierced, the compressed fluid from continuing to exercise its action in said compartment, each of said compartments being connected by its respective outlet conduit with a collector, each of said outlet conduits being provided within said collector with means for automatically closing when the pressure in any of said conduits sinks to a determined extent, and a compressed fluid distributor provided with a baffle or equalizing device for the incoming compressed fluid.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

RENÉ CAUDRON.

Witnesses:

JOHN F. SIMONS,
PAUL BLUM.