June 9, 1942. W. W. PAGET 2,285,830

SAFETY TANK AND FUEL SYSTEM FOR AIRCRAFT

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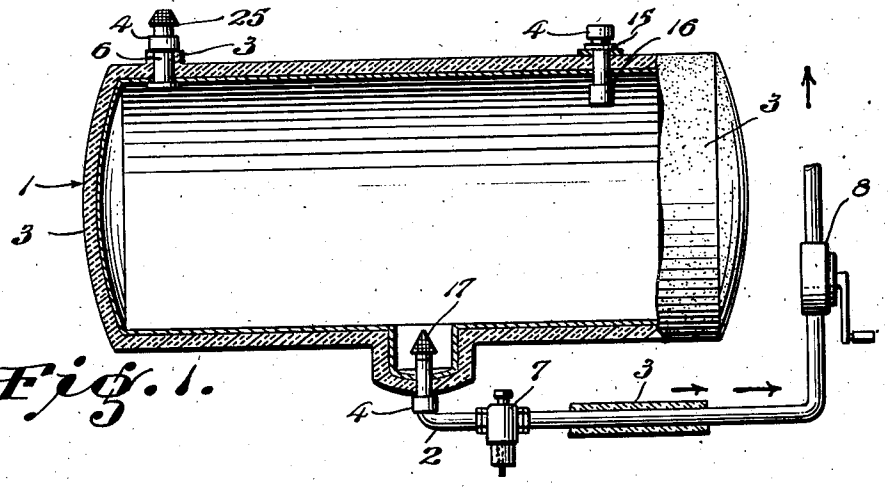


Fig. 1.

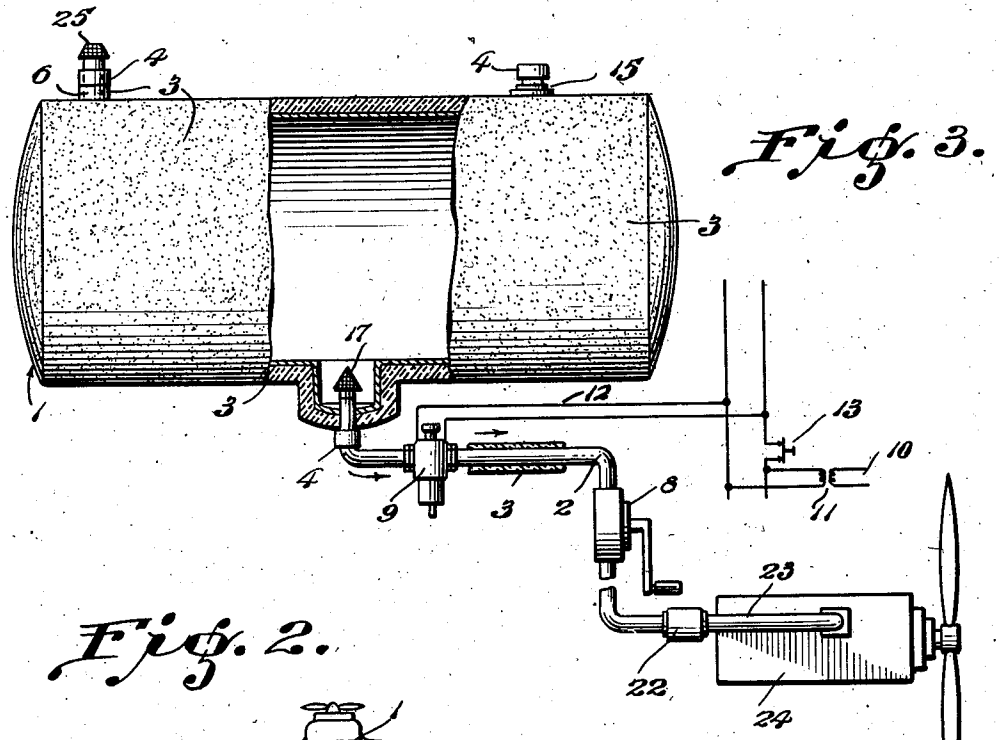
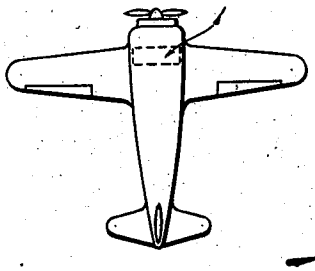


Fig. 3.

Fig. 2.



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SAFETY TANK AND FUEL SYSTEM FOR AIRCRAFT

William Willard Paget, Newark, N. J.

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6 Claims. (Cl. 158—46)

The invention relates to improvements in tanks and fuel systems for aircraft; the objects of the improvement are principally to provide a really safe fuel supply and fuel system and one with the particularly great hazards of fire heretofore present, and previously not elsewhere fully now clearly apprehended hereby, and now by this improvement most effectually remedied and removed.

Now a most exhaustive study and original research by the present applicant and inventor finally established the ultimate hypothesis heretofore not elsewhere fully apprehended of a definite relationship in the various phenomena attending fires in aircraft, and the several phases interrelated stages and aspects, thereof, which by great diligence and application and exceptional inventive ability ultimately led to the discovery by the present inventor as herein disclosed and described.

Heretofore in the midst of fire and flame the fuel tank or tanks rapidly become pressure kettles spurting and spouting blazing fuel under pressure from every opening in fuel line actually feeding the flames in progressive stages and increasing fury and intensity to its own ultimate end and destruction.

Broken fuel lines in crashes presented further complications and added to the interrelated phenomena of this fire and explosion hazard problem; a broken fuel line meaning usually direct free and ready access and ingress of flames and fire through the broken fuel line to the interior of tank and contents with resultant explosion attendant thereupon. This being a part of the original discovery by the present applicant and inventor; and further great "spillage" of fuel likewise followed these breaks in fuel lines. The anti-explosion devices or flame-arresters 4, are therefore provided in the fuel lines interdependently and cooperatively working in conjunction and combination with the heat and flame impermeable insulating jacket 3, and the automatic self-closing valves 7 and 9 also provided in close interrelated turn. An automatic self-closing valve cannot dependably be counted upon to operate quickly enough to prevent the flashback through said valve before it is fully closed for the anti-explosion device or flame-arresters are provided to efficiently and effectually cooperate with and support said self-closing valves 7 and 9 in combination therewith to effect and accomplish efficiently the long sought desideratum and purpose. But the flame-arresters 4, of themselves alone will not operate dependably or successfully over long periods of time and, therefore, it in turn requires the automatic self-closing valve herewith provided by the present applicant and inventor to operate in conjunction and in combination with same and both require and need the heat and flame impermeable insulating jacket 3 to themselves operate dependably at all or over long periods of time as described.

All of which demanded the equally cooperative structure and interrelated combination of elements devolved, developed, and discovered by the present applicant and inventor as herewith set forth and described.

One form and embodiment of the invention as typically shown in an optional specimen fuel system layout is here illustrated in the accompanying drawing.

And while the form or embodiment of the invention is here shown comprised in a typical or specimen fuel system layout it will be readily seen and understood that there are a number of modifications hereof all properly within the aim, scope, field, and purport of this invention, and so as such by me here reserved and claimed. To wit— the improvement is highly adapted to the so called "self-sealing" type and other tanks over which it may be truly looked upon as a markedly advanced improvement.

In the drawing Figure 1 is a side elevation view of a fuel tank in part sectioned and showing some of the connections of the fuel line. Figure 2 illustrates an aircraft in which is provided the safety tank and fuel system embodied in Figs. 1 and 2. Figure 3 is a diagrammatic view in part sectioned of a complete typical fuel system for aircraft provided with the improvement.

With reference to the drawing in Figure 1, the numeral 1 indicates a fuel tank, 2 is the fuel line, 3 is the all important heat and flame impermeable insulating jacket which may comprise mineral wool, asbestos, magnesia or aluminum foil, and 4 are the anti-explosion devices, or flame arresters, so called effectually interdependably, and successively progressively operating cooperatively in turn with 3, and 7 which is an automatic self-closing shut-off valve, preferably of the differential spring loaded or other equally suitable type. 16 is a non-return or back-pressure or self closing check valve as provided in said fuel inlet; 8 is a fuel pump. In Fig. 3 9 is another type of automatic or self-closing valve; 10 and 11 are an optional electric control circuit and current source respectively, as used in a

modification; 12 is a part of said electric control circuit; and 13 is a switch as employed in said modified system; 15 is a filling pipe provided with a nonreturn valve 16 as shown in Fig. 1; 17 is a strainer; 22 is a carburetor in an aircraft; 23 is manifold; 24 is an engine, and 8 is a typical fuel pump. Fig. 2 illustrates an aircraft in which is installed a fuel tank of the type shown in Figs. 1 and 3.

And while I have here shown the form or embodiment of the improvement provided in a conventional or typical fuel system piping layout with one or more fuel tanks and essential parts, it will be readily understood and apprehended that the herewith described safety system is readily adapted to any method of fuel piping or other tank types or modifications thereof, and all properly well within the aim, scope, field, object, and full purport of the invention and so as such by me reserved and claimed.

I claim:

1. In a safety fuel system for aircraft comprising a safety fuel tank, fuel lines, pump and carburetor or the like, said safety fuel tank comprising and being provided with a substantially heat and flame impermeable jacket of suitable, preferably mineral substance or material adapted to prevent the transfer of external heat to the tank interior with resultant dangerous pressures, ebullition or explosion of the contents in event of external flame or fire.

2. A safety fuel tank of so-called self-sealing military or other type comprised in a safety system for aircraft, and said fuel tank having or being provided with a special high temperature heat and flame impermeable insulating jacket; said high temperature heat and flame impermeable insulating jacket being especially suited and adapted to effectively prevent the transfer of heat to the interior contents of tank during the period of external flame or fire, and said heat and flame impermeable insulation jacket itself being of material incombustible and immune to heat or fire.

3. A safety tank for aircraft comprising a fuel container provided with a high-temperature heat and flame impermeable insulating jacket composed preferably of a suitable mineral substance or material such as mineral wool, asbestos, or the like or the equivalent thereto as means for inhibiting or preventing the ingress of heat or flame to the interior and fuel contents of said tank in event of fire.

4. A safety tank and fuel system for aircraft, said safety tank and fuel lines comprising or being provided with an especial heat and flame impermeable jacket specially adapted to effectively prevent the transfer or transmission of heat to the interior of tank and contents during the period and progress of external flame or fire and said heat and flame impermeable insulating jacket being essentially incombustible, non-inflammable, and immune to heat and fire.

5. In an airplane or the like, a fuel tank of so-called military "self-sealing" or other type and said military or other type of tank being suitably provided with a heat and flame impermeable jacket preferably of asbestos, magnesia, or the like or equivalent, specially and suitably adapted to prevent the transfer, transmission or access of heat or fire to the interior of said tank or contents during the successive stages and progress of external flame or fire with resultant explosion and destruction of said tank or tanks and plane.

6. A safety tank and fuel system for aircraft, said tank comprising and being provided with a heat and flame impermeable high temperature insulating jacket, thereby to prevent effectively the transfer of heat to interior of tank and contents during the course and period of external flame or fire.

WILLIAM WILLARD PAGET.