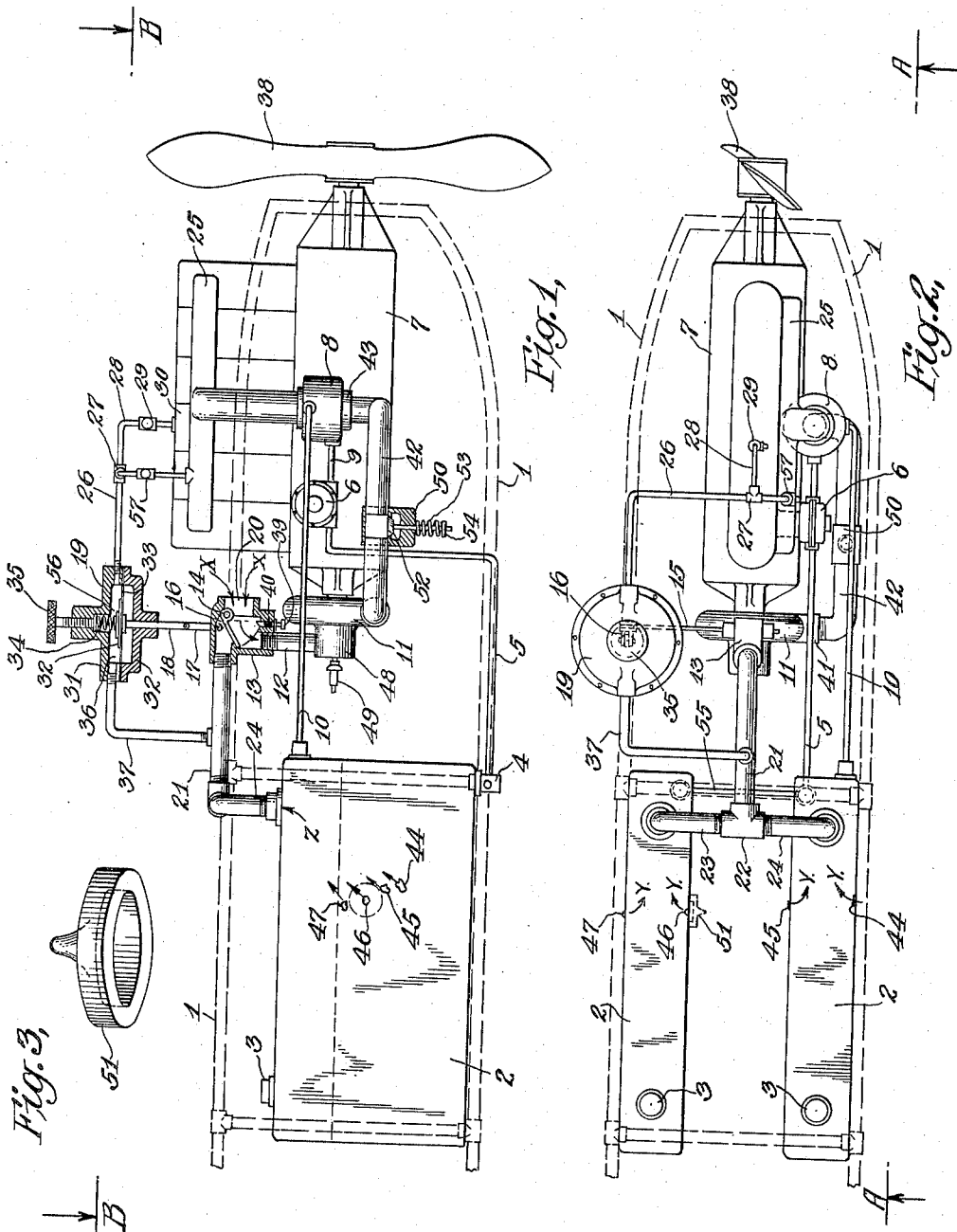


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SYSTEM FOR PREVENTING LEAKAGE FROM FUEL TANKS.
APPLICATION FILED APR. 27, 1918.

1,325,913.

Patented Dec. 23, 1919.



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UNITED STATES PATENT OFFICE.

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SYSTEM FOR PREVENTING LEAKAGE FROM FUEL-TANKS.

1,325,913.

Specification of Letters Patent.

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Application filed April 27, 1918. Serial No. 231,233.

To all whom it may concern:

Be it known that I, OSCAR A. ROSS, a citizen of the United States, residing at 154 West 57th Street, New York city, in the county of New York and State of New York, have invented a new and useful Improvement in Systems for Preventing Leakage from Fuel-Tanks, of which the following is a specification.

The invention upon which is based my present application for Letters Patent pertains to a system for preventing liquid from flowing out of an accidentally perforated vessel, such as a gasoline tank, and has for its more prominent object the attainment in a more economical and effective manner, of the results or operations specified below.

Primarily, the object in view is to furnish a system, whereby should a tank containing an explosive, or combustible liquid become accidentally perforated, as for example, by a bullet, the contents of said tank will be prevented from flowing therefrom.

It is a well known fact that loss of life and loss of airplanes have been caused by the fact that the gasoline flowing from a fuel tank perforated by enemy bullets becomes ignited and thereby causes destruction of said airplane and injury or death to its occupants.

It is further aimed to provide a system which is entirely automatic in its operation.

It is still further the aim to furnish means, whereby the rarefied air of high altitudes is restored to atmospheric or greater pressure before entering the carbureter, as ordinarily employed in hydro-carbon motors which form the motive power for airplanes.

All of the above and other aims which have been sought are attained by my preferred form of system and apparatus therefor, which, for the purposes of specific illustration is shown in the accompanying drawing, in which:—

Figure 1, is a diagrammatic plan view of said system and apparatus therefor, taken on line A—A, of Fig. 2, and,

Fig. 2, is a diagrammatic plan view of the same system and apparatus therefor, taken on line B—B, of Fig. 1, and,

Fig. 3, is a perspective view of the preferred form of plug or stopper employed for stopping an accidental perforation in a fuel tank.

None of the parts or devices employed in my improved system, are, or need be of

any special or unusual construction, but for a more ready understanding of the device and of its operation a preliminary description of the parts and devices contained therein may be apposite.

Mounted, in a manner well known, on an airplane body as represented by the dotted outline 1, are the fuel tanks 2, having filler caps 3—3, and fuel outlet 4 connected to fuel line 5, terminating in fuel pump 6, driven by motor 7, said pump supplying fuel to carbureter 8, through pipe 9. All surplus fuel not consumed by carbureter 8, returns to tanks 2, through pipe 10.

Mounted on the crank shaft at the rear end of motor 7, is the exhaust blower or air pump 11, having inlet tube 12, on which is mounted valve housing 13, containing valve 14, secured to shaft 15, said shaft having mounted thereon lever 16, connected to link 17, said link being pivoted to rod 18, of control unit 19. The pressure end 41, of blower 11, terminates in tube 42, connected with the inlet 43, of carbureter 8. Valve-housing 13, has opening 20, to the atmosphere, adapted to be closed by valve 14, another opening in valve housing 13 is connected to tube 21, terminating in T 22, from which branch tube 23, terminating in one tank 2, and tube 24, terminating in the other tank. Valve 14, when closing aperture 20, is adapted to be locked into position by latch 39, under control of spring 40. Secured to motor 7, and connected with carbureter 8, is the usual inlet manifold 25, into which is secured pipe 26, having check valve 57, said pipe terminating in chamber 36, of control unit 19. Also connected to pipe 26, through T 27, is pipe 28, having check valve 29, said valve communicating with the interior of one of the cylinders as 30, of the motor 7.

Clamped between housings 31, and 32, of control unit 19, is diaphragm 33, to which is secured rod 18, by means of washer 32, and nut 56.

Spring 34, is interposed between nut 56, and adjusting screw 35. Control chamber 36, of control unit 19, communicates with pipe 21, through the medium of pipe 37.

Valve 50, has an opening to atmosphere normally closed by valve 52, seated by spring 53, through collar 54.

Motor 7, is supplied with the usual propeller 38.

The operation of my improved system and the preferred form of apparatus herein

shown is as follows:—Fuel to carbureter 8, is normally supplied through pump 6. If required for starting purposes said fuel may be pumped to said carbureter by a hand pump not shown, such a procedure being well known to those versed in the art.

After motor 7, is started a partial vacuum for reasons well known is caused in inlet manifold 25. This vacuum is communicated by means of pipe 26, to chamber 36, and likewise through pipe 37, to pipe 21, to tanks 2. Inasmuch as tanks 2 are sealed the vacuum in chamber 36, is substantially equal to that contained in the inlet manifold 25, or the cylinder 30. The tension of spring 34 is regulated by adjusting screw 35, whereby the vacuum existing in chamber 36, causes rod 18, through link 17, lever 16, and shaft 15, to actuate valve 14, to close the opening to tube 21, as shown. Under these conditions the vacuum created in pipe 12, of blower 11, causes air to enter opening 20, as shown by arrows X—X. Said air passes through the pipe 12, of blower 11, where its atmospheric pressure is increased through the action of the blower blades, thereafter passing through tube 42, to the inlet 43, of carbureter 8.

Due to the free access of air to opening 20, and the pressure generated by blower 11, the air passing through pipe 42, of carbureter 8, is under pressure. By thus compressing the air before entering carbureter 8, a larger volume of carbureted air is fed to the motor cylinders, thereby increasing its efficiency.

The vacuum contained in chamber 36, as hereinbefore stated is communicated by tubes 21, 23, and 24, to tanks 2.

Assume now, for example, that a bullet has pierced said tanks 2, causing openings as 44, 45, 46, and 47. The vacuum in tanks 2, causes atmospheric air to flow into said tanks as shown by arrows Y—Y, etc. This causes a rush of air through said openings into said tanks and into tube 23, 24, and 21, and to pipe 37, and chamber 36. Due to the small size of the pipe 26, the air coming through aforesaid perforations reduces the vacuum in chamber 36, therefore diaphragm 33, and the parts attached thereto are lowered under pressure of spring 34, and as rod 18, moves downward it carries with it link 17, and lever 16, causing rotation of shaft 15, in turn moving valve 14, to the dotted lines shown, said valve becoming locked in position by latch 39. Opening 20, is now closed and the vacuum caused by blower 11, is conducted through by pipe 12, valve housing 13, tubes 21, 23, and 24, to tanks 2. Due to the large capacity of air which said blower is capable of handling, a powerful vacuum is created in tanks 2, causing large quantities of air to flow through openings 44, 45, 46, and 47, in this way preventing

any possibility of egress of the fuel contained within tanks 2, irrespective of whether the perforations 44, 45, 46, or 47, are above or below the level of the fuel contained in said tanks.

Simultaneously with valve 14, becoming locked under latch 39, the abnormal vacuum produced in pipe 12, and extension 48, of blower 11, causes audible signal 49, to be sounded, thereby calling attention to the fact that the fuel tanks have been perforated. After such signal is sounded the observed, or pilot of the airplane places stoppers as 51, shown by Fig. 3 over the various perforations, one of such stoppers being shown as closing perforation 46. After a perforation has been closed in this manner, the latch 39, is withdrawn and air is again permitted to enter through opening 20, and motor 7, may be speeded up to its normal revolutions.

Valve 50, is supplied as a precautionary measure to provide air to carbureter 8, in case the perforations as 44, 45, 46, and 47, do not permit of sufficient air to pass through whereby the motor can be operated at a reasonable speed. Also to supply air to said carbureter 8, at such times as said perforations have been all covered with the stoppers 51, and before latch 39, releases valve 14, to permit air to flow into opening 20.

Should, in certain class motors, the vacuum in manifold 25, be insufficient, said vacuum may be secured during the intake stroke of one or more of the cylinders. This is illustrated by pipe 28, having check valve 29, and connected to cylinder 30. Valves 29, and 57, permit air to pass from chamber 36, to the motor, but prevent movement of said air from the motor to said chamber.

What I claim is:—

1. In a system of the kind described, a hydro-carbon motor, one or more fuel tanks therefor, means for feeding fuel from said tanks to said motor, means for normally maintaining a partial vacuum in said tanks, vacuum developing means normally disconnected from said tanks, and means controlled by said first named vacuum means for controlling said last named means.

2. In a system of the kind described, a hydro-carbon motor, one or more fuel tanks therefor, means for feeding fuel from said tanks to said motor, means for normally maintaining a partial vacuum in said tanks dependent for operation upon the operation of said motor, vacuum developing means normally disconnected from said fuel tanks, and controlling means for connecting said last named means with said tanks.

3. In a system of the kind described, a hydro-carbon motor, one or more fuel tanks therefor, means for feeding fuel from said tanks to said motor, means for normally

maintaining a partial vacuum in said tanks dependent for operation upon the operation of said motor, vacuum developing means normally disconnected from said fuel tanks, and controlling means for automatically connecting said last named means with said tanks.

4. In a system of the kind described, a hydro-carbon motor, one or more fuel tanks therefor, means for feeding fuel from said tanks to said motor, means for connecting said motor and said fuel tanks whereby said motor develops a partial vacuum in said tanks, means for developing a vacuum normally disconnected from said fuel tanks, and means for automatically connecting said last named means with said tanks.

5. In a system of the kind described, a hydro-carbon motor, one or more fuel tanks therefor, means for feeding fuel from said tanks to said motor, means for normally maintaining a partial vacuum in said tanks dependent for operation upon the operation

of said motor, vacuum developing means normally disconnected from said fuel tanks, and controlling means for connecting said last named means with said tanks dependent for operation upon a predetermined reduction of vacuum in said tanks.

6. In a system of the kind described, a hydro-carbon motor, one or more fuel tanks therefor, means for feeding fuel from said tanks to said motor, means for normally maintaining a partial vacuum in said tanks dependent for operation upon the operation of said motor, vacuum developing means normally disconnected from said fuel tanks, and controlling means for automatically connecting said last named means with said tanks dependent for operation upon a predetermined reduction of vacuum in said tanks.

In testimony whereof OSCAR A. Ross has signed his name to this specification this 22nd day of April, 1918.

OSCAR A. ROSS.