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VENT VALVE FOR TORPEDOES

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INVENTOR:

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By Attorneys,

[Signature]
VENT VALVE FOR TORPEDOES.


To all whom it may concern:

Be it known that I, William Dieter, a citizen of the United States of America, residing in Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Vent Valves for Torpedoes, of which the following is a specification.

This invention provides means for venting pressure from a liquid compartment in an automobile torpedo, so that if any leakage of compressed air should occur into such compartment, such leakage will be vented to the exterior and will not result in any disadvantageous expulsion of the liquid.

The improved vent device is designed especially for the water compartment of a torpedo of the Bliss-Leafitt type, such as are standard in the United States Navy.

This water compartment is most conveniently located just aft the compressed air reservoir or flask, where a leakage of air through the joints would come directly into the water compartment. According to the present invention, such leakage is vented into the afterbody of the torpedo so as to avoid generating any pressure in the water compartment prior to the launching of the torpedo. The construction and advantages of the improved vent will be made clear as the description proceeds.

Figure 1 of the accompanying drawings is a vertical longitudinal mid-section of a fragment of a torpedo, the parts being rearranged so as to clearly show their connections;

Fig. 2 is a vertical longitudinal section upon a much larger scale, of the vent valve in its normal venting position;

Fig. 3 is a similar view showing the parts in a different position.

Referring first to Figure 1, A indicates the shell or hull of the torpedo and B the reservoir or flask of compressed air. From this flask an outlet pipe C leads to a pressure-reducing valve D, by which the air pressure in the flask is reduced to a lower-and-uniform pressure. From the low pressure side of this valve leads a pipe E which extends to the heater or superheater D, and from the latter a pipe F leads to the engine (not shown) which is commonly a turbine, and by which the screw propellers are driven in the well-known manner. At some suitable point in the pipe 55 or passage a is introduced a starting valve 55 or passage a is introduced a starting valve 55 or passage a is introduced a starting valve E which may be of any known construction, and whereon the air is admitted to the heater and engine at the instant of launching the torpedo.

Within a strong container F is provided the usual enclosure for the water and liquid fuel. This is commonly formed by extending the air flask B rearwardly in the form of a cylindrical wall C having a flange to 65 which is securely attached a disk or head 65. A chamber G formed within this container F is subdivided into two compartments by a partition H of comparatively thin metal, such as metal sheet or plate, which is preferably constructed in the form of an annular vessel having a central opening for the free passage through it of the pipe a, and which is supported within the container F in any suitable manner, as by brackets H, 70 The partition or vessel H thus divides the chamber G into two compartments, an outer compartment I, and an inner compartment J. In the construction shown the outer compartment I is designed to hold water 80 and the inner compartment J to hold alcohol or other combustible fluid; but this arrangement may be reversed by suitably altering the respective pipe connections which will be described.

In the reduced pressure pipe b is formed a slight contraction or choking g and between this and the reducing valve C a branch h leads to a valve shell i where the duct branches and leads to two valves K 90 and L. From the valve K a pipe 9k leads to the fuel tank or compartment J. From the valve L a pipe L leads into the water space or compartment I. From the bottom of the fuel compartment J there leads a pipe in which is introduced a check valve M, and which pipe j leads thence to a fuel nozzle m through which fuel is sprayed or otherwise introduced into the heater. From the bottom of the water compartment I leads a pipe p in which is introduced a check valve P, whence the pipe p extends to the heater D and terminates in a spray nozzle q for introducing water.

In operation, on the launching of the torpedo compressed air is admitted through the
starting valve E to the reducing valve C, and flows thence through the heater to the engine; compressed air under the reduced pressure flows through the pipe b and divides at i, and, opening the valves K and L, flows through the pipes k and l into the respective fuel and water compartments, and thereby exerts a pressure upon the fuel and water whereby the fuel is ejected through the pipe j to the heater and the water is ejected through the pipe p to the heater. The pressure available for thus forcing out the fuel and water is that due to the difference in pressures on opposite sides of the constriction g, this pressure being sufficient to cause a uniform and moderate but sufficient flow of both fuel and water during the entire time which the run of the torpedo should take. A suitable igniter (not shown) automatically ignites the fuel upon its first admission to the heater, so that a fierce combustion is maintained in the heater, whereby the air circulating through it is heated to a high degree and the spray of water is converted into steam; the commingling steam, air and gases flow thence to the engine or turbine in a volume so increased as to notably augment the power developed thereby. The function of the check valves M and P is to prevent any outflow of water or fuel to the heater prior to the turning on of compressed air at the instant of launching. The valves K and L are to prevent any possible back-flow of water or fuel into the pipes k and l, such as might occur in handling of the torpedo prior to launching in case it were rolled over. Each of these four valves therefore is held closed by a spring of sufficient strength to prevent any such flow of liquid through the valves by reason merely of the weight of the liquid and unaccompanied by the exercise of the force of compressed air.

So far as described, the construction is the same essentially as is set forth in patent to F. M. Leavitt, No. 1,092,486, dated April 9, 1912.

It will be observed that the air flask B is closed at its aft end by the head B' in the well known manner. This construction leaves a joint at a where the respective flanges fit together, through which joint there is a possibility of leakage of compressed air. There is also another joint at a', where the outlet pipe a is coupled to the head. Leakage of air through either of these joints would generate a pressure in the water reservoir I, if this pressure were not relieved.

In my Patent No. 1,125,979, dated January 26, 1915, is set forth a relief or vent valve for venting pressures due to slow leakage into the water reservoir, such pressures being vented directly outward into the surrounding water through an opening coincident with the filling plug through which water and alcohol are introduced. The present invention provides an alternative and improved means for venting air pressure from the chamber or compartment I.

The present invention provides a vent valve Q which is applied preferably outside of the compartment, and which communicates therewith through a tube 5 which passes through the rear wall or flange at 6 and terminates in an opening 7 which is located at the top of the compartment I and at approximately the middle thereof in fore and aft direction, and preferably at a point directly above the center when the torpedo lies trim or level. The construction is such that any air pressure in the compartment I flows to this opening 7 and thence through the tube 5 to the shell of the valve Q, and from the latter through a tube 8 to any suitable connection with the conduit A. For clearness this connection is shown as an external pipe, but in practice it may be joined directly to the passage within the shell i of the valves L, K. The leakage outflowing through 8 and h enters pipe b, through which it flows into the superheater D, and thence by tube e to the turbine, and thence into the afterbody of the torpedo, which is freely vented. The valve Q is so constructed that a free ventage occurs by the route just described whenever the valve is open, as it is designed to be at all times after the air pressure is pumped up in the air flask, and before the torpedo is being prepared for firing.

In preparing a torpedo for firing it is customary in testing the steering apparatus, to roll it over laterally. It is important to prevent outflow of water from the reservoir through the tube 5 and its described connections, which would be liable to occur when the torpedo is rolled far enough to submerge the outlet 7. For this purpose provision is made for closing the valve Q so as to shut off communication between the tubes 5 and 8.

The construction whereby this is accomplished will be apparent from Fig. 2. The valve Q is formed with a valve shell 9 of suitable construction, formed in any suitable way with an internal seat 10 against which seats a tappet valve 11 which is normally pressed up by a spring 12. The valve 11 is normally held open by some suitable means for holding it open, which in the construction shown is a screw plug 13 actuating through a movable internal stem 14. When the screw plug is screwed fully down, the valve 11 is unseated enough to permit a free flow of air from tube 5 into and through the spring chamber 15, thence between the valve and its seat, and through the valve seat to a chamber 16 on the upper side of the seat, and thence out through 8.
tube 8 and its connections to the afterbody, this being the normal open position of the valve.

When, however, it is desired to close the valve to prepare the torpedo for launching, the screw plug 13, which is accessible from the exterior, is unscrewed to a suitable extent (for example, two turns), which permits the valve 11 to be lifted by its spring 12 and closed against the seat 10, thereby shutting off outflow of air. Or the screw plug 13 may be wholly removed, if preferred.

The same closing of the valve should be accomplished before the filling of the compartment I with water, in order that when the water rises to the normal water level and thereby traps the air above, the latter may not be vented or escape, and will thus act in the normal manner to prevent filling in water above the proper level.

When the torpedo is ready to be entered into the launching tube, the screw plug 13 should be screwed down against its seat so as to restore the parts to the position shown in Fig. 2. If, however, this should be forgotten, or if the plug 13 has been removed and not replaced, the proper functioning of the torpedo will not thereby be interfered with.

Upon the launching of the torpedo the air, entering at say 400 pounds pressure from tube 8, will press downward the valve 11, and, if the plug 13 is insufficiently unscrewed, will force upward the stem 14 in its effort to escape through the plug opening. In the latter action the stem 14 acts as a check valve to stop the flow, by having a flange 16 which seats against a seat 17 within the shell. On the other hand, the pressing down of the valve 11 shuts off any outflow of air through the tube 5 by reason of the stem portion of the valve 11 being formed as a piston valve 18 which, as it moves down, enters within a bored 19 in the valve shell in which the stem portion of the valve is guided, and thus acts to shut off the outflow of air to the tube 5. The stem portion has a central bore 20, and lateral openings 21 through which, in the normal position of the parts, as shown in Fig. 2, the air may freely flow. The stem 14 also is bored through tubularly, and has a lateral vent opening for admitting compressed air within it to start the separating movement of the stem 14 and valve 11, which move in contrary directions to the respective positions shown in Fig. 3.

The purpose of closing the valve 11 by its abnormal descending movement to the position shown in Fig. 3 is to shut off the flow of air from 8 to 5, and thence into the water compartment, is to prevent the generation of premature pressure on the water in advance of the pressure which expels the alcohol, and which might result in expelling the water too rapidly, so that the water spray in the superheater would occur in advance of the alcohol spray and thereby hinder or prevent ignition.

The preferable construction of valve Q is that shown, wherein the shell 9 has a flange 22 which is fastened to a ring or flange 23 which is united to the hull or shell of the torpedo, through which is formed the opening 24 for the plug 13. The valve shell is divided, its lower part being formed as a separate piece 25 to which the tube 5 is coupled, and within which the stem of the valve 11 is guided. The seat 10 is formed on a disk 26 which is clamped between the two halves of the shell. This is a convenient construction, but may be varied or modified as desired.

The filling plug R is of the usual construction, with the usual alcohol filling plug S in alignment beneath it. The shell of the plug R is extended downward by a sleeve 4, as in said Patent No. 1,125,979, but without the internal vent or safety valve of that patent.

The present invention is not limited to the precise details of construction set forth, as these may be greatly varied within the scope of the appended claims.

What I claim is:

1. In a torpedo having a liquid compartment, means for freely venting gaseous pressure therefrom to the interior of the torpedo, and a normally-open valve for closing such vent at will.

2. In a torpedo having a liquid compartment, means for freely venting gaseous pressure therefrom to the interior of the torpedo, comprising a tube leading from above the liquid level to a conduit discharging to the afterbody, and a normally-open valve for closing such vent at will.

3. In a torpedo having a liquid compartment, a pressure reducer, a superheater, a valved conduit from beyond such reducer to the top of said compartment for conducting pressure to such compartment after launching, a valved conduit from the lower part thereof for conducting liquid to said superheater, and a normally-open vent for discharging gaseous pressure from said compartment to the conduit beyond the reducer, before the charged torpedo is launched, and means for closing said vent at will.

4. In a torpedo having a liquid compartment, means for freely venting gaseous pressure therefrom to the interior of the torpedo, and a normally-open valve for closing such vent at will, said valve having opening means accessible from the exterior of the torpedo.

5. In a torpedo having a liquid compartment, means for vents gaseous pressure therefrom to the interior of the torpedo, and a valve for closing such vent at will, said...
valve comprising a shell containing a valve seat, with a tappet movable against said seat, and opening means for unseating it.

6. The combination of claim 5, the valve having a seating spring whereby on the withdrawal of the opening means it seats to close the vent.

7. The combination of claim 5, the opening means being a screw plug.

8. The combination of claim 5, with a movable valve stem interposed between the opening means and tappet.

9. In a torpedo having a liquid compartment, means for venting gaseous pressure therefrom to the interior of the torpedo, and a normally-open valve for closing such vent at will, such valve being adapted to prevent a return flow of pressure through such vent into the compartment.

10. The subject-matter of claim 9, with opening means for unseating the valve to render the vent operative, the valve adapted to close against a return flow of pressure toward said compartment.

11. In a torpedo having a liquid compartment, means for venting gaseous pressure therefrom to the interior of the torpedo, and a valve for closing such vent at will, such valve comprising an opener and two valve elements, the one adapted to close the vent or to open the vent when displaced by said opener, and the other adapted to prevent escape of pressure when the opener is retracted.

12. In a torpedo having a liquid compartment, means for venting gaseous pressure therefrom to the interior of the torpedo, and a valve for closing such vent at will, such valve comprising a shell, a spring-pressed valve therein tending to close such vent, an opener comprising a screw plug, and an intervening stem whereby the screwing in of the plug opens said valve, and a second valve formed on said stem and adapted to close when the screw plug is retracted to prevent escape of pressure through the plug opening.

In witness whereof, I have hereunto signed my name.

WILLIAM DIETER