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TORPEDO OR THE LIKE

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Fig. 1

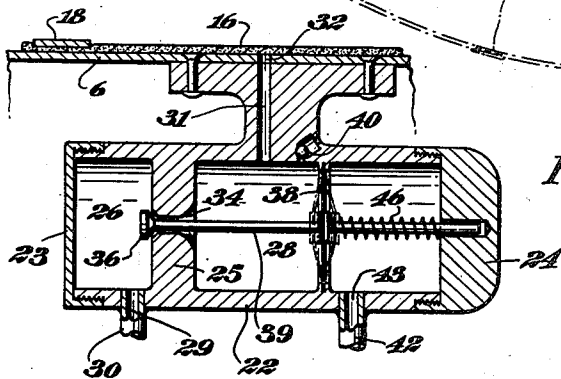
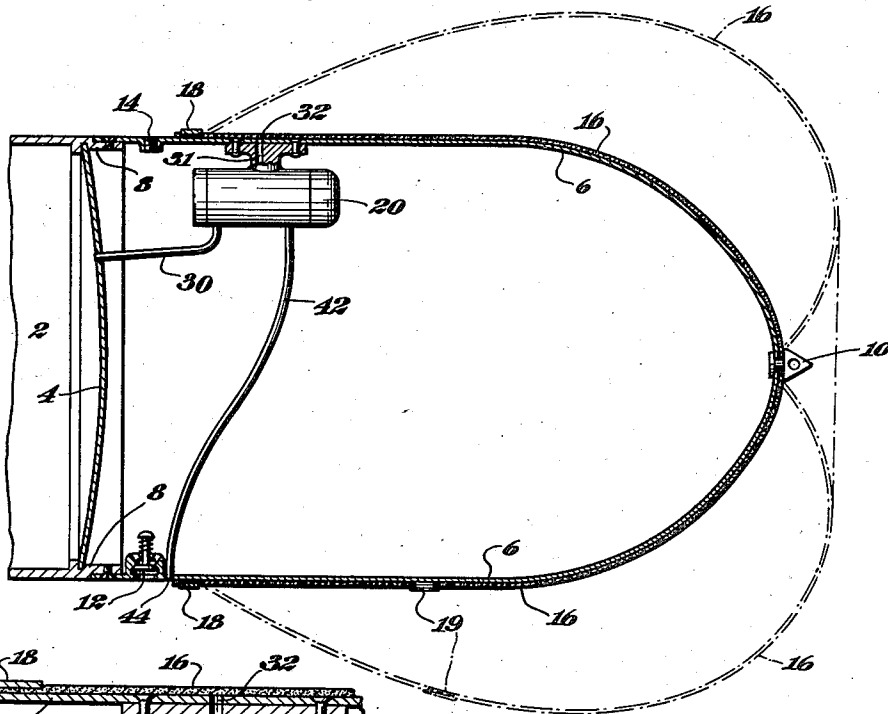
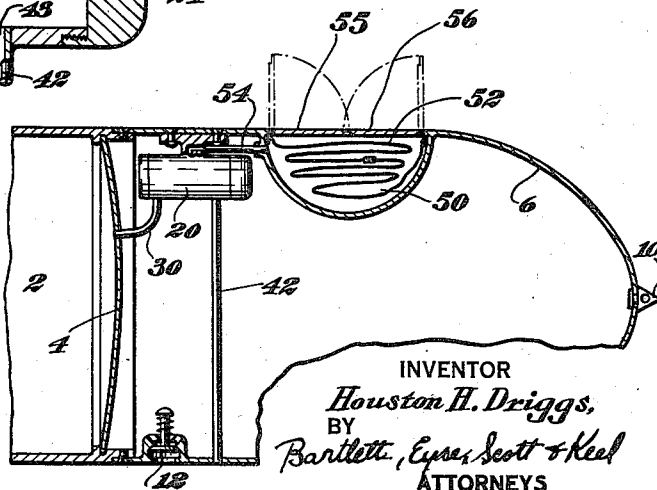


Fig. 2

Fig. 3



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TORPEDO OR THE LIKE

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3 Claims. (Cl. 114—20)

In making practice runs with torpedoes, the forward or war head of the torpedo is customarily removed and a practice head is substituted therefor. The practice head is filled with water and provided with means intended to blow out the water at the end of the run and to cause thereby the torpedo to float on the surface so that it may be recovered. As the possible buoyancy heretofore obtainable was limited by the dimensions of the head and by the thoroughness with which the water could be discharged therefrom, the number of torpedoes lost, either because of failure to expel the water completely or to expel it at the proper time, has been high.

One of the objects of the present invention is to provide means for insuring the necessary buoyancy of the torpedo at the end of a run even in case of failure of the water to be expelled from the practice head.

Another of the objects of my invention is to provide means for insuring the recovery of torpedoes, mines, and other submergible devices after practice use.

The several features of the invention, whereby the above mentioned and other objects may be attained, will be readily understood from the following description and accompanying drawing, in which:

Fig. 1 is a longitudinal sectional view of the forward end of a torpedo with a practice head thereon embodying the invention;

Fig. 2 is a sectional view on a larger scale of the air control device of Fig. 1; and

Fig. 3 is a longitudinal sectional view similar to that of Fig. 1 but illustrating a modified form of the invention.

In Fig. 1 is shown the forward end of a torpedo including a portion of the compression chamber 2, the bulkhead 4 at the forward end thereof and the practice or dummy head 6 secured to extensions 8 of the outer walls of chamber 2. The practice head 6 as customary is provided with towing nose 10, water discharge valve 12 and filling vent 14.

In the embodiment of the invention illustrated in Fig. 1, an inflatable member, comprising a covering or bag 16 of rubber or other elastic material impervious to air and water, envelops the head 6 and lies flush with the external surface thereof so as not to retard the speed of the torpedo. The bag 16 is held firmly in place by means of a clamping ring 18 which compresses the fabric of the bag and insures an air tight fit between the fabric and the head. The bag 16 is also suitably clamped or riveted to the shell 6 at the point where the

towing nose 10 is secured to the head. A suitable relief valve 19 is provided for deflation of the bag after the torpedo has been retrieved.

The means for controlling the inflation of the bag 16 comprises a valve device 20 positioned within the head and secured to the wall thereof. As shown best in Fig. 2, the valve device 20, in the particular embodiment of the invention illustrated, includes a cylindrical body portion 22 of metal or the like and end pieces 23 and 24 secured thereto. The interior of the cylindrical portion 22 is divided by a solid section 25 into two chambers 26 and 28 of which the former is connected by means of a port 29 and a pipe 30 with the compression chamber 2 of the torpedo and the latter, at the rear end thereof is connected by means of a passage 31 in device 20 and aligned passage 32 in the shell 6 with the space between the bag 16 and the outer wall of the shell. A passage 34 controlled by a valve 36 connects chambers 26 and 28. Chamber 28 is divided into two compartments by a diaphragm 38 mounted on the valve stem 39 of the valve 36. The rear compartment of chamber 28 is in communication not only with the interior of bag 16, as heretofore described, but also with the interior of the head 6 through a ball-check valve controlled port 40. The forward compartment of chamber 28 is subjected to the pressure of the sea water by means of a pipe 42 and ports 43 and 44 in the valve casing and shell respectively. Valve 36 is normally held seated by the pressure in chamber 26 acting upon the enlarged head of the valve in opposition to the pressure in the forward compartment of chamber 38 and also in opposition to the action of a coiled spring 46 positioned in that compartment. End pieces 23 and 24 are made removable to permit of adjustment or replacement of the parts, as, for example, the substitution of a spring of different strength for spring 46.

With the arrangement above described it will be apparent that no air will be admitted to the interior of bag 16 or to the inside of the head 6 so long as the air pressure is maintained in the compression chamber unless the pressure of the sea water acting upon diaphragm 38 increases to a value sufficient to overcome the pressure acting on the head of valve 36. At the end of a practice run, when the pressure in the compression chamber falls, spring 46 lifts valve 36 from its seat and air under pressure flows through passage 34 into chamber 28. From chamber 28 the air flows into the head 6, forcing water out through the exhaust 12 and also into the space between the bag 16 and the outer surface of the head, inflating the bag

into the shape indicated in dotted lines in Fig. 1 and giving to the torpedo a positive buoyancy sufficient to maintain the torpedo at the surface of the water.

5 When, as sometimes happens, the operating mechanism of the torpedo fails the pressure in compression chamber 2 stays high and the torpedo starts to sink. The pressure of the sea water in the forward end of chamber 38 will then increase
10 with the depth to which the torpedo sinks, until, at a predetermined depth, the pressure acting on the diaphragm 38 overcomes the air pressure acting on the valve head and opens the valve. Air will then be admitted to the head, expelling the
15 water, at least partially, therefrom and to the bag 16 inflating the same. This will give sufficient buoyancy to the torpedo to raise it to the surface of the water. The torpedo will rise to the surface even if, at the time of the opening of valve
20 36, the torpedo should have sunk so far as to be resting upon the ground. This is an important advantage resulting from the provision of the inflatable bag which adds a positive buoyancy to the torpedo, and a result which was not obtainable
25 with means heretofore employed for releasing the air upon an increase in sea water pressure.

The embodiment of the invention illustrated in Fig. 3 differs from that above described only in the location of the inflatable member. Instead
30 of securing the inflatable member externally of the practice head, as in Fig. 1, a separate air and water tight chamber 50 is provided within the head and adjacent one wall thereof and an inflatable member 52, in this case not necessarily
35 elastic, is secured therein. Chamber 50, internally of the member 52, is connected by a pipe 54 and suitable passages (not shown) in device 20 with the rear portion of chamber 28. To permit member 52 to expand externally of the torpedo when
40 air is supplied to chamber 50, the adjacent wall of the practice head is provided with outwardly opening hinged doors 55 and 56 which are normally maintained closed by the external pressure of the water or, if desired, by suitable spring biasing means and which are opened by the expanding
45 of member 52 when under pressure.

The operation of the embodiment of the invention illustrated in Fig. 3 will be understood from the description already given in connection with
50 Figs. 1 and 2.

From the above description of two embodiments of the invention, it will be apparent that the provision, in connection with a torpedo practice head, of a member inflatable externally of the head,
55 makes it possible to obtain a positive buoyancy greater than that possible in torpedoes heretofore in use in which the buoyancy could never exceed that obtainable when the water was completely expelled from the head, and frequently
60 was substantially less than that due to incomplete expulsion of the water. Moreover, even the

maximum buoyancy heretofore obtainable was insufficient to raise a torpedo, once it was grounded, whereas with the inflatable bag or balloon of the invention, even grounded torpedoes will have enough buoyancy given to them to raise
5 them to the surface.

While the features described above are particularly adapted for use in torpedoes, it will be understood that certain features of the invention are also well adapted for use with mines and
10 other submergible devices.

As will be evident to those skilled in the art, my invention permits various modifications without departing from the spirit thereof or the scope
15 of the appended claims.

The following is claimed:

1. In a torpedo, a practice head, an inflatable member secured to the torpedo so as to move
bodily therewith, said inflatable member being arranged so that when inflated it increases the
20 buoyancy of the torpedo and said practice head and inflatable member having separate air supplying passages respectively leading into the interior thereof, a source of compressed air supply, and means normally closing communication
25 between said compressed air supply and both of said passages and acting automatically to open communication between said compressed air supply and both of said passages when a predetermined change occurs in the condition of the tor-
30 pedo in its travel.

2. In a torpedo, a practice head, an inflatable member enveloping the forward end of said head and permanently secured thereto, a chamber,
35 said practice head and inflatable member having separate air supplying passages in communication with the interior of said chamber, a source of compressed air supply, and means normally closing communication between said compressed
40 air supply and said chamber and acting automatically to open communication between said compressed air supply and said chamber when a predetermined change occurs in the condition of the torpedo in its travel.

3. In a torpedo, a practice head, an inflatable member secured to the torpedo so as to move
45 bodily therewith, said inflatable member being arranged so that when inflated it increases the buoyancy of the torpedo, an air supply chamber, said practice head and inflatable member having separate air
50 supplying passages in communication with the interior of said chamber, a source of compressed air supply, means comprising a valve serving when closed to close communication between said compressed air supply and said chamber, and when
55 open to establish communication between said compressed air supply and said chamber, and means responsive to a predetermined change in the condition of the torpedo in its travel to open
60 said valve.

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