

No. 714,921.

Patented Dec. 2, 1902.

S. LAKE.

STORAGE OF SUPPLIES FOR SUBMARINE VESSELS.

(Application filed June 23, 1902.)

(No Model.)

Fig. 1.

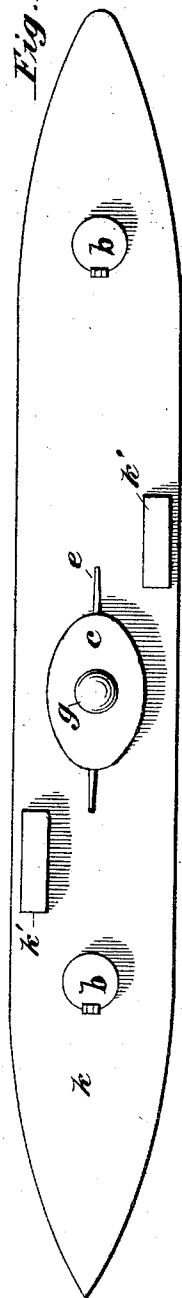


Fig. 2.

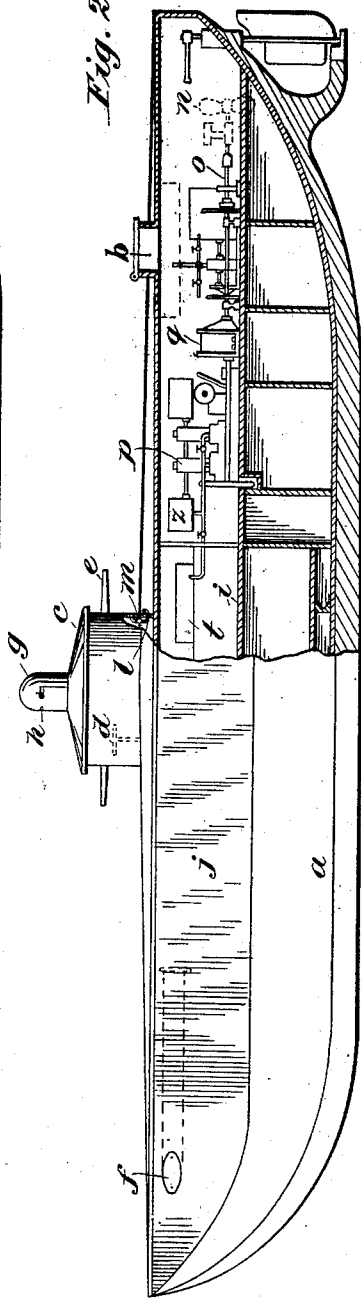
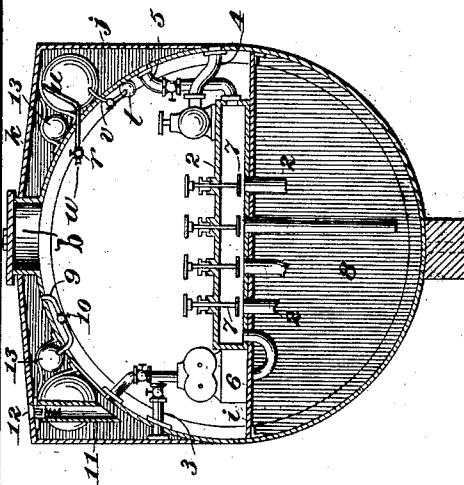


Fig. 3.



Witnesses:

J. Jaguith
H. A. Kornemann.

Inventor:

S. Lake,
By Harry J. Miller Atty

UNITED STATES PATENT OFFICE.

SIMON LAKE, OF BRIDGEPORT, CONNECTICUT.

STORAGE OF SUPPLIES FOR SUBMARINE VESSELS.

SPECIFICATION forming part of Letters Patent No. 714,921, dated December 2, 1902.

Original application filed May 28, 1901, Serial No. 62,207. Divided and this application filed June 23, 1902. Serial No. 112,824. (No model.)

To all whom it may concern:

Be it known that I, SIMON LAKE, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Storage of Supplies for Submarine Vessels, of which the following is a specification.

This application is a division of my pending application, Serial No. 62,207, filed May 28, 1901.

In the use of submarine boats deriving their motive power from heat-engines, and particularly such engines as employ hydrocarbon fuels, as gasoline, used explosively, it has not infrequently happened that the crews have been overcome by the accumulation of vapor or gas from leakage of such liquid fuel from storage tanks or receivers for the same so slight as to be incapable of detection by the naked eye or other senses of the human body. The accumulation of such fumes or gases when mixed with a certain proportion of air has also been known to cause violent explosions, resulting in the injury of both vessel and crew.

It is the object of the present invention not only to remove the dangers due to leakage of fuel from storage-tanks, but to avoid additional dangers from the overheating of such fuel-tanks by reason of their close proximity to the heat-generating engine which it is their function to supply.

The invention has also certain other objects which will appear in connection with the following description of the nature and purpose of the devices which combined constitute the improvement.

The invention consists, primarily, in the combination, with the hull of a submarine vessel shaped to resist the external water-pressure during the submergence, of means for propelling the same, including a heat-engine, a fuel storage tank or reservoir carried by said vessel external to and upon the upper side of its hull, and a connection from said fuel tank or reservoir to said heat-engine within the hull, whereby any leakage from said tank or reservoir is excluded from the interior of the hull, where its contents

could in any way cause the injury of the vessel or its occupants.

The invention further includes a superstructure surmounting the hull and inclosing such external fuel-receptacle, as well as such other stores as are adapted for introduction and carriage therein, and certain other features which will be hereinafter fully set forth and described and claimed.

In the accompanying drawings, Figure 1 is a plan, and Fig. 2 an elevation, partly in section, of a submarine torpedo-boat embodying the present improvements; and Fig. 3 is an enlarged transverse sectional view showing the means for manipulating the water-ballast in both hull and superstructure and the storage-tanks arranged in the latter.

The hull *a* is shown of the usual circular cross-section adapted to resist the high external pressures to which it is subjected under submergence, having contracted end portions and divided horizontally by a level floor or partition *i*, upon which are supported the operative parts of the vessel and beneath which are disposed the water-ballast tanks and battery-compartment, access being had to the interior of the hull through the hatches *b*, opening upon the deck *k*, or a hatch at the top of the conning-tower.

Surmounting the hull and preferably arranged directly over its center of buoyancy is the conning tower or turret *c*, containing the steering-wheel *d* and other devices for controlling, either directly or indirectly, the operation of the boat. It is shown provided with guns *e*, in addition to the torpedo-tubes *f*, arranged in the hull, as indicated in dotted lines in Fig. 2. The conning tower or turret is provided at the top with an inspection-dome *g*, having suitable dead-lights *h* in the sides. This inspection-dome or observation-chamber is adapted to receive the head of a lookout stationed in the conning-tower.

The hull is shown provided with a superstructure composed of the vertical sides *j*, rising tangentially from the outer portions of the circular hull, and the deck *k*, which joins the sides along their edges throughout the length of the boat and is slightly arched both athwartship and fore and aft toward the con-

ning tower or turret, which rises from the hull at its highest portion. The boat is provided with means whereby water may be admitted between this superstructure and the upper side of the hull to relieve the excessive external water-pressure thereon during submergence and for expelling water therefrom when the boat comes to the surface, the apparatus therefor being specifically described herein-
 10 after. The contained air displaced by and replacing the water thus admitted and expelled passes out and in through the vent-pipe *l* within the conning-tower, connecting the highest portion of the deck with the exterior of the same and provided with the
 15 valve *m*, by which such passage is controlled.

The superstructure not only adds to the boat valuable deck-room, buoyancy, and surface stability, but affords increased capacity
 20 for the various storage-tanks with which such craft are of necessity provided, access to its interior being afforded by means of suitable doors or hatches *k'*, provided therefor either in the deck or in the hull beneath the super-
 25 structure, and protects such contents from the internal conditions of the hull as well as the occupants of the latter from serious consequences of accidental explosion of said tanks or reservoirs. The storage of liquid
 30 fuel in such portion of the boat also obviously removes all danger from leakage from tanks containing the same, which has heretofore existed in vessels of this nature hav-
 35 ing such tanks disposed within the hull.

As illustrated in the drawings, the boat is provided with twin screws *n*, mounted upon shafts *o*, driven by means of gasolene or other heat engines *p* when cruising upon the surface or by an electric motor *q*, deriving its
 40 electric current from a series of storage batteries arranged in a suitable compartment in the hull, suitable clutches being provided for coupling and uncoupling the shaft alternately to and from the different kinds of motors, as
 45 occasion may require.

The gasolene-engines *p* draw their fuel from the small auxiliary storage-tank *t*, which in turn is fed by the main storage tanks or reservoirs *u* placed in the superstructure and
 50 which are connected therewith by a valved pipe *v* and with the interior of the hull by the vent-pipe *w*, having a check-valve *r*, permitting the inflow of air to replace the fuel drawn out for consumption by the engines, but pre-
 55 venting the escape of air or fumes therefrom into the interior of the hull. It is obvious that the engines may be connected to be fed directly from the reservoirs *u*, so as to wholly avoid the use of a fuel-receptacle of any kind
 60 in the interior of the hull, if preferred. The engines are connected with an exhaust-tank *z*, from which the products of combustion are led by means of suitable pipes to the exterior of the boat. The engine air-supply tank is
 65 fed by air flowing in through its inlet check-valve directly from the engine-room.

While the specific means for controlling the

contents of the water-ballast compartments and the superstructure are not essential portions of the present invention, they are illus-
 70 trated in general arrangement in Fig. 3 of the drawings annexed hereto, in which 2 is a system of water-pipes having branches 3 and 4 connected with the exterior of the boat at the sides and another branch 5 connected with
 75 the interior of the superstructure, a pump 6 and valves 7 being interposed in said system by means of which and various other branch pipes connected with the water-ballast com-
 80 partments 8 water may be supplied to or drawn from the individual parts of the boat designed to regulate its condition as to buoy-
 85 ancy. As an additional means of emptying the superstructure of water one of the air-supply tanks 13 contained therein is connect-
 90 ed with its interior by means of a pipe 9, passing through the interior of the hull, where it is provided with a valve 10 for controlling the supply of compressed air from said tank 13
 95 admitted to the superstructure, the water-pipe 11 extending from the bottom of the latter and exhausting from the top of the same and provided with the normally open inwardly-closing check-valve 12, conducting the
 100 water outward from the superstructure under the pressure of the air admitted from said air-supply tank.

From the foregoing description it will be observed that the present construction and arrangement of the hull and its superstruc-
 105 ture bear a close relation to the heat-engine contained within the one and the fuel-tank therefor inclosed by the other, their coopera-
 110 tion as above described insuring a freedom from danger to the occupants of the boat by reason of noxious fumes or gases fouling the atmosphere or of the possibility of explosion
 115 from the admixture of such fumes due to leakage from said tanks with air in such proportions as to produce an explosive mixture, which has heretofore been a constant menace
 120 and has in some cases resulted in disaster in boats of previous constructions. Moreover, the heat generated by the engines is excluded from the compartment containing the fuel-
 125 tank, which is kept cool, when the circulation within the hull (ordinarily maintained when cruising upon the surface) is interrupted for submergence by admission of water to the superstructure, so as to surround such tank
 130 or receiver.

When the superstructure is flooded for submergence, the tanks or receptacles therein containing the stores occupy a large proportion of the space inclosed thereby, and thus
 135 increase the displacement of the boat at a point considerably above its center of gravity, so as to produce a material buoyant moment to counteract the weight of the deck and side walls of said superstructure, thereby adding
 140 appreciably to the stability of the boat when the normal surface stability is otherwise to a certain extent impaired by admission of water-ballast for overcoming the buoyancy. It will

therefore be seen that not only does the storage of supplies in suitable tanks or receptacles outside of and above the hull proper serve to increase the available space within said hull and insure against danger from leakage into the living compartments thereof, but also provides additional buoyancy to compensate for the additional weight of the superstructure, which latter serves the various other purposes before described.

For convenience in designating the several parts of the structure of the boat I have herein employed the term "hull" to denote the lower portion of circular cross-section built to resist high external water-pressures, which submarine vessels of all descriptions are required to withstand, while the term "superstructure" is applied to that part of the structure above the hull proper, which is merely an auxiliary to the latter and, while serving the various functions above described, is not designed or required to resist the external water-pressure when the vessel is submerged.

Having thus set forth the nature of the invention, what I claim herein is—

1. A submarine boat comprising a hull shaped to resist the external water-pressure during submergence and means for closing the same water-tight from the exterior, means for propelling the same including a heat-engine, a fuel tank or reservoir carried by said boat exterior to and upon the upper side of the said hull, and a connection from said fuel tank or reservoir through the wall of the hull to the said heat-engine.

2. A submarine boat comprising a hull shaped to resist the external water-pressure during submergence and means for closing the same water-tight from the exterior, means for propelling the same including a heat-engine, a fuel tank or reservoir carried by said boat exterior to and upon the upper side of the said hull, a connection from said fuel tank or reservoir through the wall of the hull to the said heat-engine, and a superstructure applied to the upper portion of the said hull and inclosing said fuel tank or reservoir.

3. In a submarine boat, the combination with the hull shaped to resist the external water-pressure during submergence and a superstructure covering the upper portion of the same and provided with means for flooding said superstructure with water, of a storage-tank within said superstructure capable of being immersed in water therein, and a pipe connection leading from said storage-tank into said hull.

4. In a submarine boat, the combination with the hull shaped to resist the external water-pressure during submergence and a superstructure covering the upper portion of the same, of storage tanks or reservoirs within said superstructure for supplies required in the operation of the boat, and means for drawing the contents of said storage tanks or reservoirs into the hull.

5. In a submarine boat, the combination with the hull shaped to resist the external water-pressure during submergence and a superstructure covering the upper portion of the same, of a door or hatch for providing access to the interior of said superstructure, and storage tanks or reservoirs within said superstructure and suitably-valved pipes passing through the intervening wall of the hull for drawing off the contents of said supply tanks or reservoirs into the interior of the hull.

6. In a submarine boat, the combination with the hull shaped to resist the external water-pressure during submergence and a superstructure covering the upper portion of the same, of means for propelling said boat comprising a suitable heat-engine, a fuel storage or supply tank or reservoir within said superstructure, a supply-pipe passing through the intervening wall of the hull between said heat-engine and fuel storage tank or reservoir, and a vent-pipe from said fuel storage tank or reservoir to the interior of the hull.

7. In a submarine boat, the combination with the hull shaped to resist the external water-pressure during submergence and a superstructure covering the upper portion of the same, of means for propelling said boat comprising a suitable heat-engine, a fuel storage or supply tank or reservoir within said superstructure, a supply-pipe passing through the intervening wall of the hull between said heat-engine and fuel storage tank or reservoir, and a vent-pipe from said fuel storage tank or reservoir to the interior of the hull having a check-valve opening outwardly from the latter to admit air to said tank from said hull.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 19th day of June, 1902.

SIMON LAKE.

Witnesses:

L. B. MILLER,
H. J. MILLER.