

No. 798,501.

PATENTED AUG. 29, 1905.

R. D'EQUEVILLEY.  
SUBMARINE BOAT.

APPLICATION FILED MAY 8, 1905.

Fig. 2.

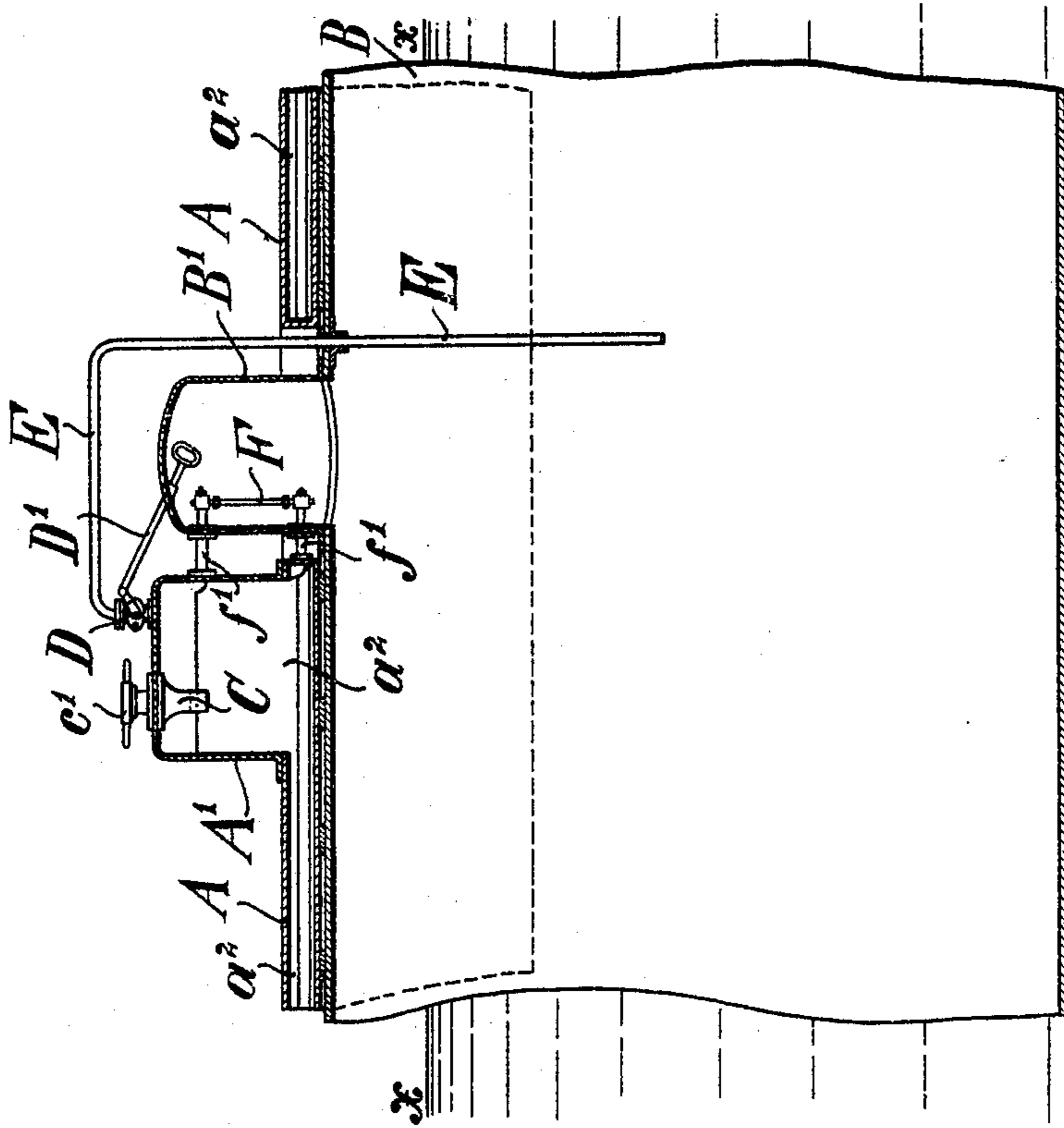
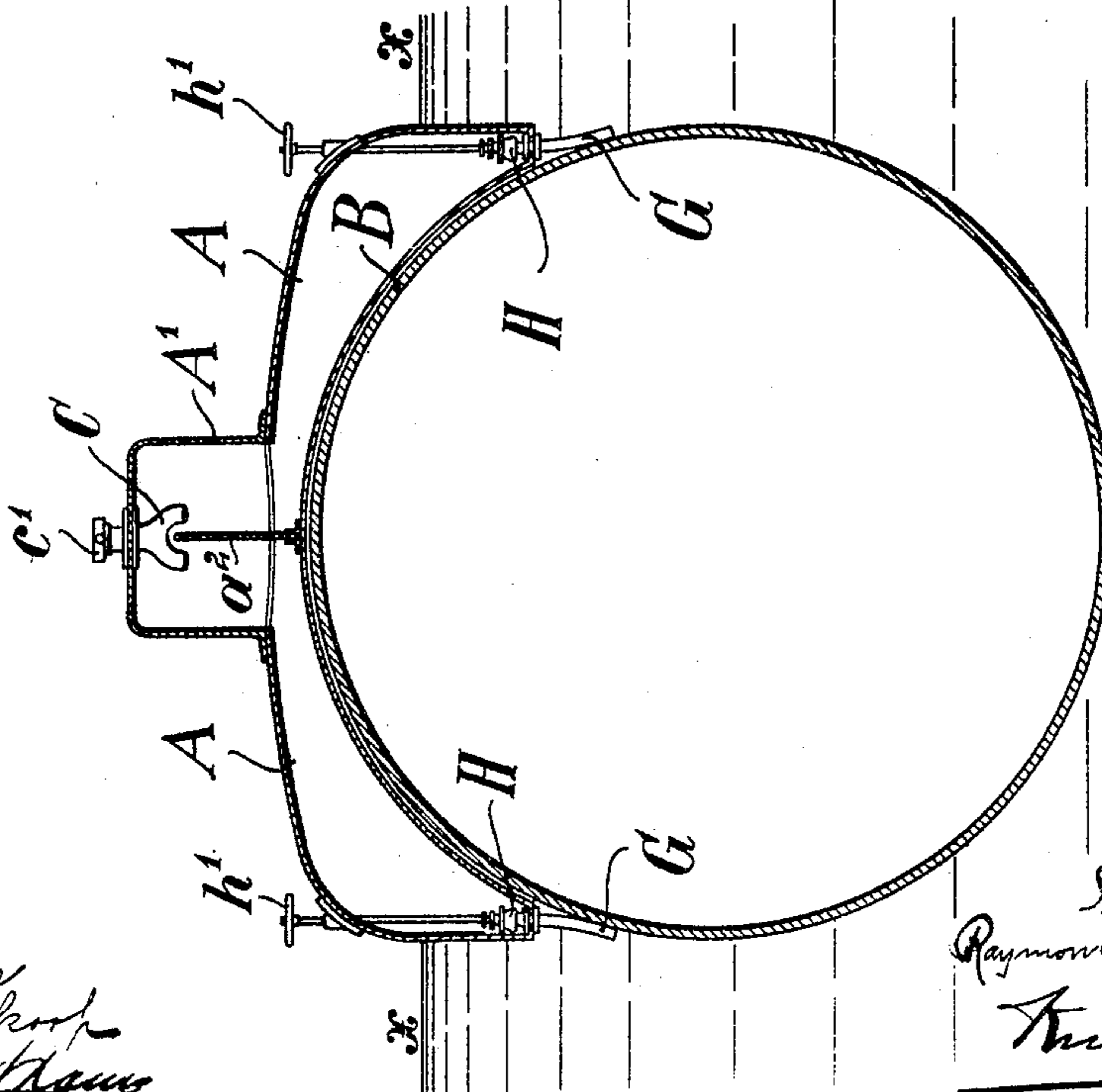


Fig. 1.



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## SUBMARINE BOAT.

No. 798,501.

Specification of Letters Patent.

Patented Aug. 29, 1905.

Application filed May 8, 1905. Serial No. 259,459.

*To all whom it may concern:*

Be it known that I, RAYMOND D'EQUEVILLEY, a subject of the King of Spain, and a resident of Kiel, in the Empire of Germany, have invented certain new and useful Improvements in Submarine Boats, of which the following is a specification.

The present invention relates to submarine boats which are provided on their exterior with reservoirs for liquid fuel. When the boat is submerged, such exteriorly-arranged fuel-reservoirs are subjected at all points of their surface exposed to the water to a pressure that increases with the depth to which the boat is submerged and which may increase to such an extent that there is danger of the walls of the reservoirs collapsing, especially if the shape of the reservoir is other than cylindrical.

In order to avoid the drawback above set forth, the present invention provides means whereby the interior of the exteriorly-arranged fuel-reservoir may be brought into communication with the water exterior thereto. By virtue of this arrangement the pressure of the liquid increases to the same extent both inside and outside of the reservoir when the depth at which the boat is submerged increases. Consequently when the boat is submerged the walls of the reservoir are entirely free of pressure, and the reservoir may be given any suitable shape without any risk whatever of the walls collapsing.

One embodiment of my invention is illustrated in the accompanying drawings, which show a submarine boat having a single exterior reservoir.

In said drawings, Figure 1 shows a vertical cross-section of the submarine boat and the reservoir, and Fig. 2 shows a part of the boat and the reservoir in vertical longitudinal section.

The reservoir A is arranged on the top of the boat B and is provided with a dome A', the interior of which communicates with the interior of the reservoir A. The reservoir A is divided into two equal and symmetrically-located chambers by a partition-wall  $a^2$ , which extends in the longitudinal direction of the boat and into the dome A'. On the dome A' is arranged a feed-pipe C, which is bifurcated at its lower end. A screw-cap  $c'$  serves as a closure for the upper end of the feed-pipe C. On the dome A' is further secured the housing of a cock D, and a suction-pipe E leads from said housing to the interior of the boat

B and communicates with a suitable suction and compression device, (not shown in the drawings,) through the medium of which the fuel can be drawn out from the reservoir A and forced to the place of consumption. The cock D may be opened and closed by means of a rod D', which leads to the interior of a dome B', communicating with the interior of the boat. In the interior of the dome B' is arranged a gage-tube F, whose inlet-pipes  $f'$  open into the reservoir A or dome A'. The partition-wall  $a^2$  is cut out where the pipes  $f'$  open into the reservoir or dome, so as to provide for communication with the liquid in both chambers of the reservoir. On both sides of the hull of the boat B and at the lowermost places of the bottom of the reservoir A are arranged pipes G, through the medium of which the interior of the reservoir communicates with the water on the outside. The pipes G are provided with cut-off valves H, which are located in the interior of the reservoir A, while their stems project outside of the reservoir and are provided with hand-wheels  $h'$ .

The above-described reservoir is adapted only for use for liquid fuels which have a specific gravity less than the specific gravity of the water and the other properties of which prevent a mixing or a chemical combination of the fuel with the water to an extent that makes the fuel unfit for use.

Let it be assumed that there is no fuel in the reservoir A, that the valves H and the feed-pipe C are open, and that the craft floats on the water having the level  $x x$ . In this event the water in the reservoir is in alignment with the level  $x x$  of the outside water. If liquid fuel of the aforesaid kind is introduced into the reservoir A through the feed-pipe C, the fuel will be equally distributed in the two compartments of the reservoir. The fuel being of less specific gravity remains on the top of the water, and when the pressure of fuel increases the fuel forces the water out through the pipes G. As soon as the outflow of fuel through the pipes G is perceived the attendant closes the valves H by turning the hand-wheels  $h'$ , completes the filling of the reservoir, and finally closes the feed-pipe C by means of the cap  $c'$ . If the valves H are subsequently opened, the fact that there is now no opening above causes the pressure of the outside water to prevent the fuel in the reservoir A from passing out. If the faucet D is opened and fuel is drawn off

through the pipe E, the pressure of the outside water will cause an equal amount of water to enter the reservoir until the reservoir is almost filled with water, when nearly  
 5 all the fuel has been drawn off. Furthermore, should the boat return to the surface with its fuel consumed to such an extent that the water-line within the reservoir is considerably above the exterior water-line, due  
 10 to the natural draft of the boat, the water-line will obviously not lower within the reservoir, but, on the contrary, will rise as the fuel is consumed, and thus float the remaining fuel always within reach of the feed-pipe E.  
 15 Through the gage-tube F it may be perceived from the interior of the boat when the fuel-supply in the reservoir A is pretty nearly exhausted, and the faucet D may then be closed in order to prevent water from passing  
 20 into the fuel-pipe E. Access of water to the reservoir may be regulated by means of the valves H, according to the degree of exterior pressure.

The arrangement and construction of the  
 25 fuel-reservoir according to the present invention present a new technical effect—viz., the entire counterbalancing of exterior pressure on the walls of the reservoir—in addition to the known advantages arising from the use of  
 30 exteriorly-arranged reservoirs—viz., removal of the danger of fires and explosions, enlargement of the available space in the interior of the boat, and protection of the hulk from collision with rocks or the like.

35 Since by reason of the equalization of pressure there is no danger of the force of the outer water pressing in the walls of the reservoirs even at great depths, the walls may be made considerably thinner than was possible  
 40 with exteriorly-arranged fuel-reser-

voirs as heretofore employed. Furthermore, the reservoirs may be of any suitable shape—for instance, conforming to the exterior of the boat—without necessitating special reinforcements.

Having thus described the invention, what I claim as new is—

1. In a submarine boat, an exteriorly-arranged fuel-reservoir, and means providing communication between the interior of said  
 50 reservoir and the water exterior thereto.

2. In a submarine boat, a fuel-reservoir arranged on the exterior of the boat, and having communication at its bottom with the water exterior thereto.

3. In a submarine boat, a fuel-reservoir arranged on the exterior of the boat, means providing communication between the interior of said reservoir and the exterior of the boat, and means providing communication between the  
 60 interior of said reservoir and the water exterior thereto.

4. In a submarine boat, a fuel-reservoir arranged on the exterior of the boat, means providing communication between the interior of  
 65 the boat and the upper portion of the reservoir, and means providing communication between the exterior water and the lower part of the reservoir.

5. A submarine boat having a fuel-reser-  
 70 voir arranged on the exterior thereof and means communicating to the interior of the reservoir the pressure of the water exterior thereto.

The foregoing specification signed at Kiel, 75 Germany, this 19th day of April, 1905.

RAYMOND D'EQUEVILLE.

In presence of—

JULIUS RÖPKE,

HEINRICH MÖLLER.