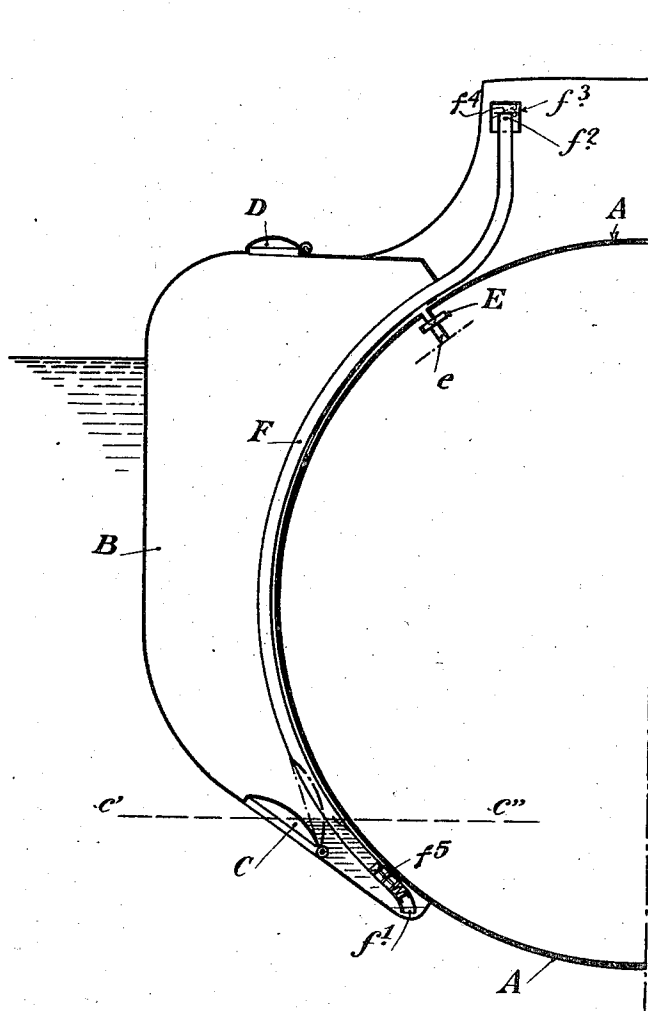


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E. SCHNEIDER
APPARATUS FOR EMPTYING THE WATER BALLAST TANKS OF SUBMARINES
AND OTHER SUBMERSIBLE VESSELS
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR EMPTYING THE WATER-BALLAST TANKS OF SUBMARINES AND OTHER SUBMERSIBLE VESSELS.

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To all whom it may concern:

Be it known that I, EUGÈNE SCHNEIDER, citizen of the Republic of France, residing at Paris, France, have invented new and
5 useful Improvements in Apparatus for Emptying the Water-Ballast Tanks of Submarines and Other Submersible Vessels, which is fully set forth in the following specification.

10 For emptying the water-ballast tanks of submarines and other submersible vessels, when it is desired to change from total or partial submersion over to surface navigation, there is generally employed a gas
15 under pressure which is forced into the tank to be emptied, by way of a pipe which opens at the upper end of the tank and which is fitted with an air-cock. The water-ballast is discharged through one or two
20 water valves situated near to the bottom of the tank. To refill the tank with water-ballast the said valves are opened, and at the same time air cocks are opened that are situated at the upper part of the tank.

25 In the great generality of cases, owing to the shapes of the water-ballast tanks, it is almost impossible to arrange the water valves at the lowest point of the tank, and it is impossible to empty such tanks completely, because a very appreciable quantity
30 of water ballast remains in the tank, being constituted by the quantity of water comprised between the water valves and the lowest point of the tank.

35 The present invention has for its object to provide an improved apparatus by means of which a water-ballast tank can be completely emptied of its water whatever may be the shape in section of the tank and
40 consequently the relatively elevated situation which the water valves have necessarily to occupy.

One constructional form of the improved apparatus of this invention is illustrated
45 diagrammatically in the accompanying drawing which is a partial cross-section of a water tank of a submarine.

In the illustrated example:—A is the inner hull of the submarine; B is the water-
50 ballast tank in the lower part of which there is provided a water valve C (shown as a clack); D is an air outlet valve (shown as

a clack); E is a cock mounted on the inlet pipe *e* by which air or gas under pressure can be admitted into the tank B.

According to this invention, a delivery pipe F open at both ends is provided in the ballast tank, preferably close against the inner hull, and so that the open end *f*¹ of said pipe shall be situated at the lowest
60 point of the tank B. The open upper end *f*² of this pipe F which preferably projects to the outside of the tank and is carried up beyond the top of the said tank, is open to the atmosphere.

With this improved apparatus, on proceeding to empty a water-ballast tank in the usual manner, that is to say, by closing the valve D and opening the water valves C and the air inlet cock E for admitting
70 compressed air, it will be perceived that instead of the discharge of the water ballast stopping, as in the known arrangements, when the water-ballast has reached more or less the level *c'*—*c''*, the action of the com-
75 pressed gas or air will have the effect of causing the water-ballast to be discharged by way of the pipe or pipes F, so that the said water-ballast will escape at the upper end *f*² of the said pipe F provided that the
80 water valve C has first been closed.

A warning that this closing of the valves C is required, is given by the boiling at the surface of the outside water due to the
85 escaping air. The discharge of the water-ballast will only stop when the lower ends *f*¹ of the pipes F have become uncovered.

The upper end *f*² of pipe F may be covered with a lantern or cap *f*³ supported on said pipe in spaced relation with the wall there-
90 of, which lantern or cap will allow the water-ballast, as well as any excess of compressed air or gas, to escape, whilst however preventing the entry of spray or sea water from the outside by reason of rough seas. For
95 this purpose, the upper end *f*² of pipe F may also be fitted with a very slightly weighted valve *f*⁴. Likewise, the lower end *f*¹ of the pipe F may be furnished with an upwardly opening non-return valve *f*⁵
100 which will prevent any return of the ballast water back into the tank.

Having now particularly described and ascertained the nature of my said invention

and in what manner the same is to be performed, I declare that what I claim is:—

1. An apparatus for completely emptying the water-ballast tanks of submarines or other submersible vessels by means of compressed air or gas, comprising a water filling and discharging valve at the lower part of the ballast tank, an air discharging valve at the upper part of said tank, and a delivery pipe having one end disposed at the lowest point of the ballast tank and its opposite end projecting through the top of said tank exteriorly of the vessel.

2. An apparatus for completely emptying the water-ballast tanks of submarines or other submersible vessels by means of compressed air or gas, comprising a water filling and discharging valve at the lower part of the ballast tank, an air discharging valve at the upper part of said tank, an open ended delivery pipe having one end disposed at the lowest point of the ballast tank and its opposite end projecting through the top of said tank exteriorly of the vessel and a lantern or cap covering the projected end of said pipe for preventing the entrance of water therein from the exterior of said vessel.

3. An apparatus for completely emptying the water-ballast tanks of submarines or

other submersible vessels by means of compressed air or gas, comprising a water filling and discharging valve at the lower part of the ballast tank, an air discharging valve at the upper part of said tank, an open ended pipe having one end disposed at the lowest point of the ballast tank and its other end projecting through the top of said tank exteriorly of the vessel, and an upwardly opening non-return valve in the lower end of said pipe.

4. An apparatus for completely emptying the water-ballast tanks of submarines or other submersible vessels by means of compressed air or gas, comprising a water filling and discharging valve at the lower part of the ballast tank, an air discharging valve at the upper part of said tank, a delivery pipe having one end disposed at the lowest point of the ballast tank and its other end projecting through the top of said tank exteriorly of the vessel and a weighted clack or lift valve on the projected end of said delivery pipe.

In testimony whereof I have signed this specification.

EUGÈNE SCHNEIDER.

Witnesses:

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