

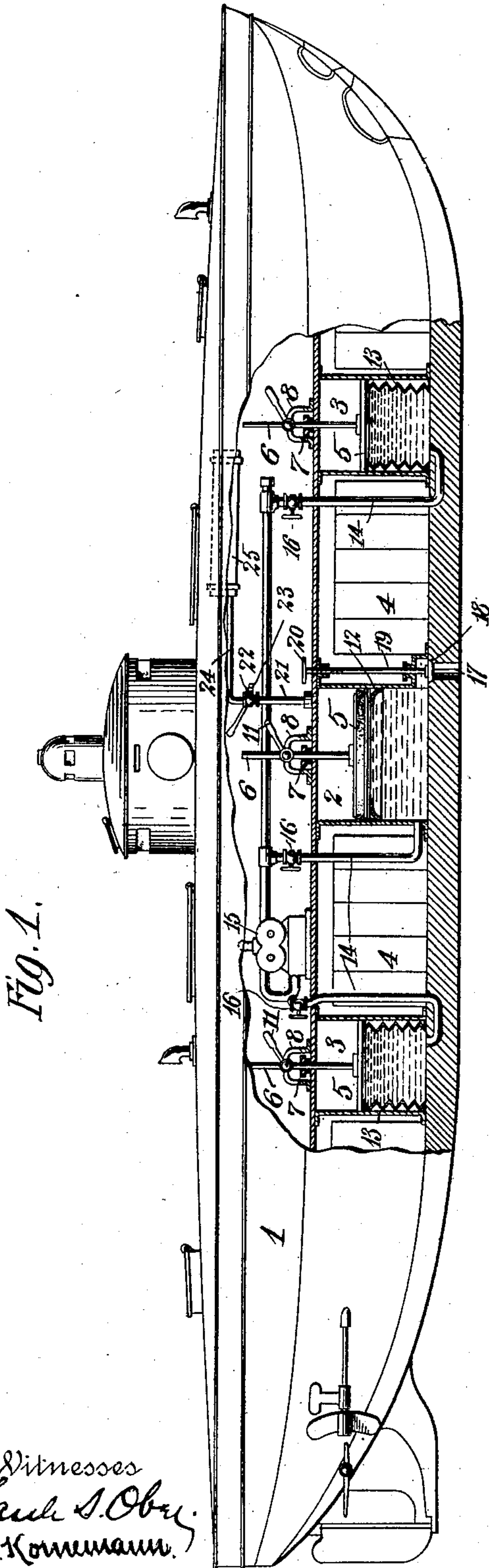
No. 754,222.

PATENTED MAR. 8, 1904.

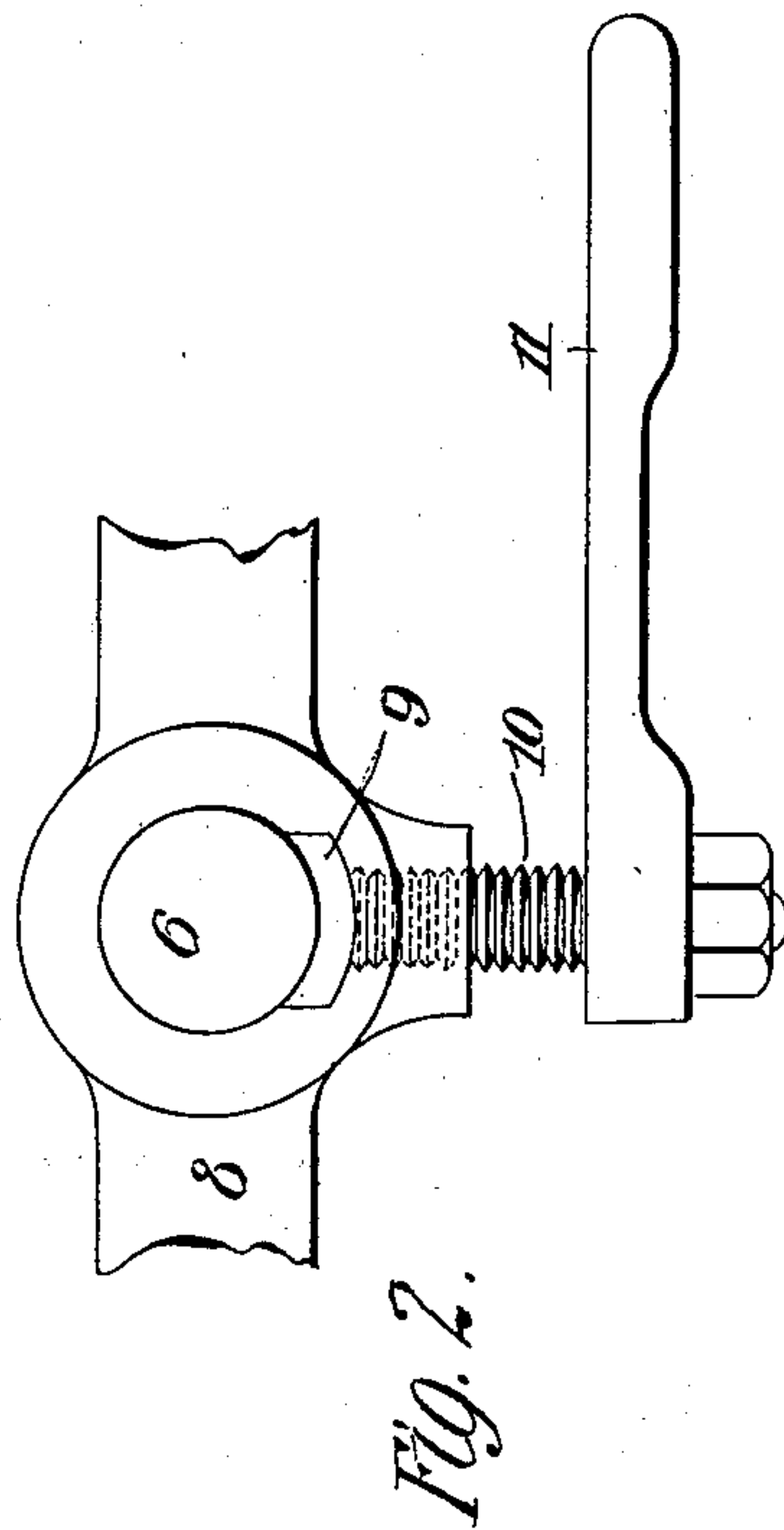
S. LAKE.  
BALLAST COMPARTMENT FOR SUBMARINE BOATS.

APPLICATION FILED NOV. 23, 1903.

NO MODEL.



Witnesses  
Frank S. Oby.  
H. A. Kormann.



Inventor  
S. Lake,  
By his Attorney  
Hury & Miller.



# UNITED STATES PATENT OFFICE.

SIMON LAKE, OF BRIDGEPORT, CONNECTICUT.

## BALLAST-COMPARTMENT FOR SUBMARINE BOATS.

SPECIFICATION forming part of Letters Patent No. 754,222, dated March 8, 1904.

Application filed November 23, 1903. Serial No. 182,217. (No model.)

*To all whom it may concern:*

Be it known that I, SIMON LAKE, a citizen of the United States, residing at the city of Bridgeport, in the county of Fairfield and State of Connecticut, have invented a new and useful Improvement in Ballast-Compartments for Submarine Boats, of which the following is a specification.

This invention relates to means for ballasting submarine boats to enable them to assume the various conditions of submergence or partial submergence requisite for the performance of the operations for which they are designed; and its object is to prevent the fore-and-aft shifting of the water ballast within the tanks or compartments commonly provided to receive it.

The invention consists, essentially, in the provision of the vessel with one or more water-ballast tanks or compartments each having means for adjusting its effective capacity for substantially the volume of water required to establish a given condition as to buoyancy and means for controlling the volume of water within said tank or compartment independently of the position of said adjusting means.

The ballast tank or compartment is preferably constructed with vertical walls to which is fitted the partition conforming in outline to the shape of the same and movably sustained therein by means of a stem or holding-rod passing through a stuffing-box into the living portion of the hull and there provided with means for securing it in any desired position of adjustment. When the ballast-compartment is of cylindrical form, the partition is constructed as a piston or plunger having a suitable peripheral expansible packing to prevent leakage of water intermediate the same and the walls of the compartment; but when such compartment is of rectangular or other shape in which it is impracticable to make a tight hydraulic packing such partition may be connected with one end of a bellows of suitable flexible construction securely attached at the other end to the bottom of the compartment, whereby all joints will be maintained permanently sealed in all adjustments of such partition. The movable partition under either arrangement may be shifted with sufficient

facility to maintain by its own weight a position upon the top of the water within the lower portion of the tank at all times when not secured rigidly in position, the holding means serving normally to retain it in fixed position between successive manipulations of the water ballast. It will thus be seen that the characteristic feature of the present improvement is the collapsible ballast-compartment of variable capacity whose available water-space is or may be determined by the volume of water contained within the compartment, the partition which is preferably provided therein serving as an adjustable division-wall between the filled and empty portions of the same.

The invention will be more fully understood by reference to the drawings annexed, in which—

Figure 1 is an elevation of a submarine boat embodying my present improvement, the central or midship portion being partially in section to expose the construction and arrangement of the ballast-compartments and the devices for controlling the volume of water ballast therein. Fig. 2 is a detail plan view of one of the devices for holding in position the movable partitions of the ballast-compartments.

In the drawings the vessel having the usual propelling and steering mechanism is shown with the lower portion of its hull 1 partitioned off beneath the floor into a central or midship ballast-compartment 2 and forward and after compartments 3, with intermediate storage-battery compartments 4.

Each of the ballast-compartments is shown with vertical side walls extending from the bottom upwardly parallel with the line of adjustment of the piston 5, fitted thereto, and provided with a stem or guide-rod 6, passing through a stuffing-box 7 in the floor and into the living-quarters of the boat, where it is journaled in a bracket 8, having a socket provided with a wearing-piece 9, adapted to be securely clamped against the rod 6 by means of the screw 10, provided at its outer end with the hand-lever 11.

The piston 5 of the central compartment 2, which is preferably cylindrical in form, is



provided with a cup-leather packing 12 to prevent leakage between the same and the walls of said compartment, and the tanks 3 are shown having flexible linings formed of bel-  
 5 lows 13, connecting their vertically-movable partitions 5 with their lower ends, each of said tanks, as well as the tank 2, being provided in its bottom with a port connected, by means of a pipe 14, with a hydraulic pump 15,  
 10 having also the usual outboard connection whereby water may be forced into or drawn from the said ballast-compartments by proper manipulation of the valves 16 in said pipe connections, the partitions 5 rising and fall-  
 15 ing with variations in the volume of water contained in each compartment when required in order to adjust the latter's effective capacity to correspond with such volume.

To provide additional means for controlling  
 20 the fluid contents of the central ballast tank or compartment 2, the latter is shown having at one side of the lower end an inlet and outlet passage 17, which may be controlled by a valve 18, whose threaded stem 19 passes  
 25 through suitable stuffing-boxes and enters the living-quarters of the boat, where it is provided with a hand-wheel 20 for turning the same to open and close said passage.

As shown herein, the top of the compart-  
 30 ment 2 above the partition 5 is connected, by means of an air-pipe 21, with a three-way valve 22, from which one branch, 23, constituting an air-discharge pipe, leads into the living-quar-  
 35 ters of the boat, while another branch, 24, extends upwardly to an air-supply tank 25. (Shown in dotted lines in Fig. 1.) After the valve 18 is opened the suitable manipulation of the hand-lever 11 to release the guide-rod 6 and the operation of the three-way valve 22  
 40 to connect the air-tank 25 with the compartment 2 causes compressed air to be admitted to the latter to force out the water therefrom, whereby the partition 5 is permitted to drop by its own weight as the water is expelled, so  
 45 that the water ballast may be constantly confined within a space just sufficient to hold it, by which its shifting is effectually prevented. By shutting off the air-supply and opening the discharge-pipe 23 the air confined in the up-  
 50 per portion of the tank or compartment 2 is released and the partition 5 permitted to rise under the pressure of the water entering through the passage 17.

When the volume of water ballast has been  
 55 suitably adjusted by means of either the hydraulic pump or the air-controlling apparatus, the valves 16 and 18 are preferably closed and the guide-rod 6 of the piston 5 is secured in place by the suitable operation of the hand-  
 60 lever 11, thereby insuring against the shifting of such partition through impulses of the confined water due to the pitching or careening of the vessel, and the adjustment of the capacity of the active portion of the ballast-  
 65 compartment may, if desired, be maintained

for succeeding operations of the vessel without special adjustment for each change of the ballast.

It will be readily understood that any desired number of ballast-compartments may be pro- 70  
 vided with the movable partition above described and that each may be provided with one or both of the ballast-controlling means shown herein, neither of which is affected in any man-  
 75 ner by the movable partition, and therefore acting entirely independently thereof.

From the foregoing description it is evident that the present improvement is not limited to any of the details of construction and arrange-  
 80 ment of parts herein shown and described, but may be widely varied from the embodiment herein disclosed without departure from the spirit of the invention, and it is therefore to be understood that the shape and maximum capac-  
 85 ity and the general character and arrangement of the ballast-compartments may be of any suitable or preferred description, as also the means of controlling their contents and the construction of the partitions which separate the filled  
 90 from the vacant portions thereof, the essential feature of the improvement being the construction of a compartment of variable effective capacity by means of a movable partition acting idly and independently of the means for  
 95 controlling the water within the same to separate the filled from the unfilled portion of said compartment.

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

1. In a submarine boat, the combination 100  
 with a water-ballast compartment and means for controlling its fluid contents, of a movable partition fitted to said ballast-compartment and acting idly in respect of the said controlling means to adjust the capacity of that  
 105 portion of said compartment containing the water ballast to correspond with the volume of its fluid contents.

2. In a submarine boat, the combination 110  
 with a water-ballast compartment and means for controlling its fluid contents, of a movable partition fitted to said ballast-compartment and acting idly in respect of the said controlling means to adjust the capacity of that  
 115 portion of said compartment containing the water ballast to correspond with the volume of its fluid contents, and means for securing said partition in any of its positions of adjustment.

3. The combination with a submarine boat, 120  
 of a water-ballast compartment, means for controlling the volume of water within said compartment, and means independent of said controlling means whereby the contained water is prevented from shifting therein.

4. The combination with a submarine boat 125  
 having a water-ballast compartment provided with inlet and outlet communicating with the exterior of the boat, of means for controlling the contents of said compartment through 130



said inlet and outlet, and a partition within said compartment movable toward and from said outlet and inlet independently of said controlling means whereby the volume of water contained in said compartment may be confined within an inclosed space therein of equal capacity.

5. The combination with a submarine boat having a water-ballast compartment and means for controlling the volume of water within said compartment, of a partition within the compartment movable vertically and independently of said controlling means for dividing off the filled from the unfilled space of said compartment.

6. The combination with a submarine boat having a water-ballast compartment and means for controlling the volume of water within said compartment, of a movable partition within the compartment for separating its filled from its unfilled space, and means for securing said partition in position.

7. The combination with a submarine boat, of a collapsible water-ballast compartment

and means operating independently of the effective capacity of said compartment for controlling its fluid contents. 25

8. The combination with a submarine boat, of a ballast-compartment, means for controlling the contents of said compartment, and means independent of said controlling means for controlling its capacity. 30

9. The combination with a submarine boat, of a water-ballast compartment and means for controlling its fluid contents, and a vertically-movable partition acting by gravity to maintain the effective capacity of said compartment in correspondence with the volume of water contained therein. 35

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 14th day of November, 1903. 40

SIMON LAKE.

Witnesses:

PATRICK KANE,  
H. J. MILLER.