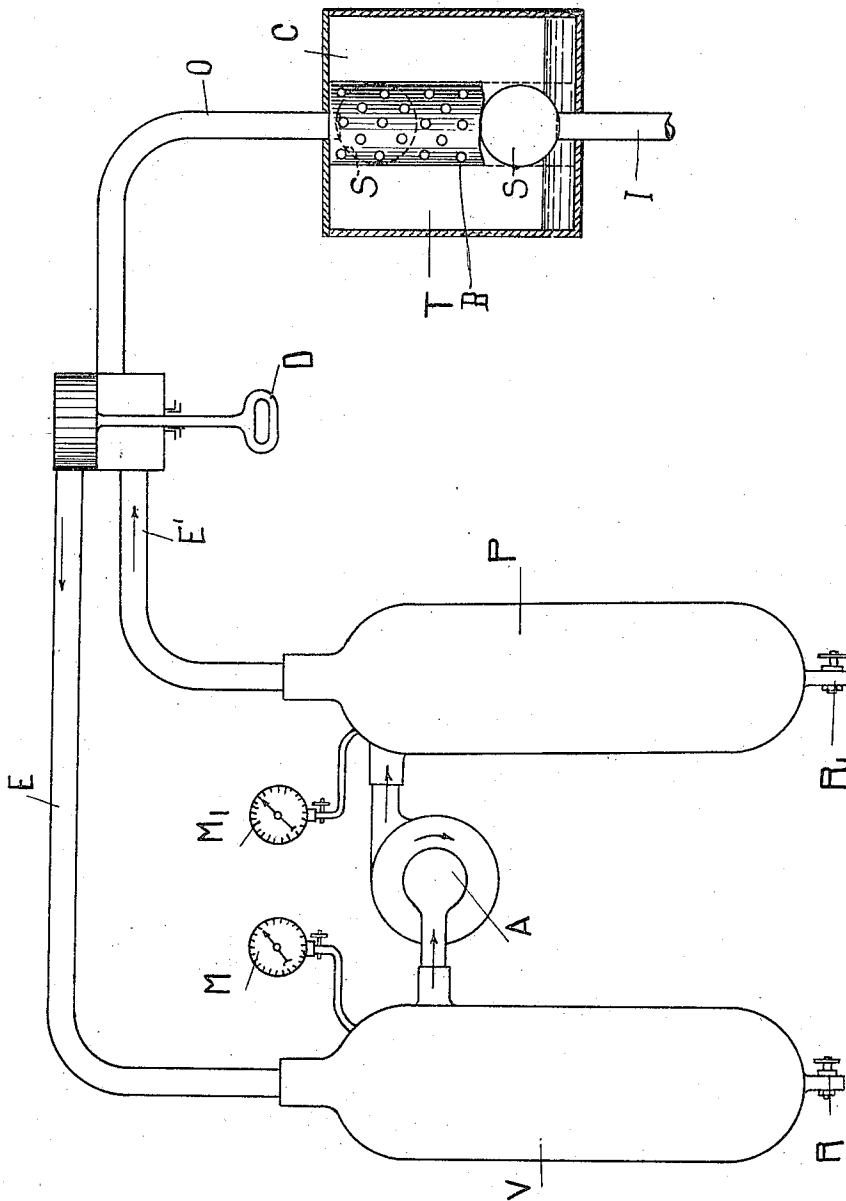


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 BALLAST CONTROL FOR SUBMARINES.
 APPLICATION FILED OCT. 10, 1916.

1,240,189.

Patented Sept. 18, 1917.



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UNITED STATES PATENT OFFICE.

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BALLAST CONTROL FOR SUBMARINES.

1,240,189.

Specification of Letters Patent.

Patented Sept. 18, 1917.

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To all whom it may concern:

Be it known that I, GUIDO FORNACA, engineer, of Turin, Italy, have invented certain new and useful Ballast Controls for
5 Submarines, of which the following is a full, clear, and exact specification.

The object of this invention is to provide means for enabling the depth of submergence of submarines such for example as
10 those that are lying in waiting to be quickly altered.

This is effected by means of two reservoirs for air or gaseous fluid and an air or like compressor or other device, which are
15 adapted to place a third reservoir or chest in communication with the sea, under vacuum or pressure whereby sea water can be quickly drawn into or expelled from the chest respectively to vary the weight of the
20 vessel.

This invention is illustrated diagrammatically by an example in the accompanying drawing, wherein is shown a chest C, which is in communication with the sea by means of the pipe I while, by means of the
25 pipe O, opposite the first named, it communicates with an apparatus capable of compressing or rarefying the air in the chest. Within the chest C and in the interior of a large pipe B, having perforated walls, is situated a floating elastic sphere S, which can slide vertically in the pipe in accordance with the variations of water level in the chest.

35 The apparatus which serves to produce the requisite variation of pressure in the chest C consists of two vessels V and P, connected together by an air compressor A, which draws air from the reservoir V and
40 compresses it in the reservoir P. These two reservoirs may be provided with discharge cocks R, R' and pressure gages M, M', and other accessories. They communicate with the chest C, by means of pipes E, E' through a distributing valve D, or separate valves. The valve D in this case is so
45 arranged that it can place the chest C in communication with the vessel V or the reservoir P, according to the position of the piston F. It may be operated by hand
50 or automatically.

When the compressor A is operated, a vacuum is produced in the reservoir V, and a corresponding pressure in the reservoir P,
55 so that if communication be established

alternatively between one or other of the reservoirs V or P and the chest C, by means of the valve D, rarefaction or compression will be set up in the chest C, and consequently an indraft or discharge of sea water. 60

The effect of these two operations is to produce, in the vessel, an increase or diminution of weight, respectively, and consequently a tendency to rise to the surface or to sink deeper and to the desired depth. 65

The sphere S acts in the following manner. If, by reason of an excess of pressure in the chest, the water therein were entirely expelled, the sphere S, sinking along with the water level, would come to rest on the
70 mouth of the pipe I, communicating with the sea, and would prevent the escape of air.

Vice versa, if by reason of an excess of suction, the water were to fill the chest C, the sphere S, rising along with the water
75 level, would rest against the pipe O, communicating with the reservoirs V and P, and would prevent the access of water to the said reservoirs and therefore to the compressor. 80

The valve device in question however may be substituted by others.

What I claim is:

1. Means for quickly altering the depth of submergence of submarines, comprising
85 two reservoirs for air or gaseous fluid which are so arranged that one of the reservoirs is maintained in a condition of pressure and the other in a condition of vacuum, a third
90 reservoir or chest in turn in communication with the sea water, and means for placing either of said first-named reservoirs in communication with said third-named reservoir for the purpose of drawing in such water or
95 expelling it from the chest and consequently increasing or diminishing the weight of the vessel.

2. Means for quickly altering the depth of submergence of submarines, comprising
100 two reservoirs for air or gaseous fluid, which are so arranged that one of the reservoirs is maintained in a condition of pressure and the other in a condition of vacuum, a third
105 reservoir or chest in turn in communication with the sea water, and means for placing either of said first-named reservoirs in communication with said third-named reservoir for the purpose of drawing in such water or
110 expelling it from the chest and consequently increasing or diminishing the weight of the

vessel, and water-level controlled means adapted to cut said third reservoir off from said other reservoirs and from the sea, respectively, when the water-level in said third
5 reservoir reaches certain limits of emptiness and fullness.

3. Means for quickly altering the depth of submergence of submarines, comprising two reservoirs for air or gaseous fluid, which
10 are so arranged that one of the reservoirs is maintained in a condition of pressure and the other in a condition of vacuum, a third reservoir or chest in turn in communication with the sea water, and a distributing valve

for placing either of said first-named reser- 15
voirs in communication with said third-named reservoir for the purpose of drawing in such water or expelling it from the chest and consequently increasing or diminishing the weight of the vessel. 20

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

GUIDO FORNACA.

Witnesses:

FELICE GOZETTO,
NORAH WHITESTONE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."