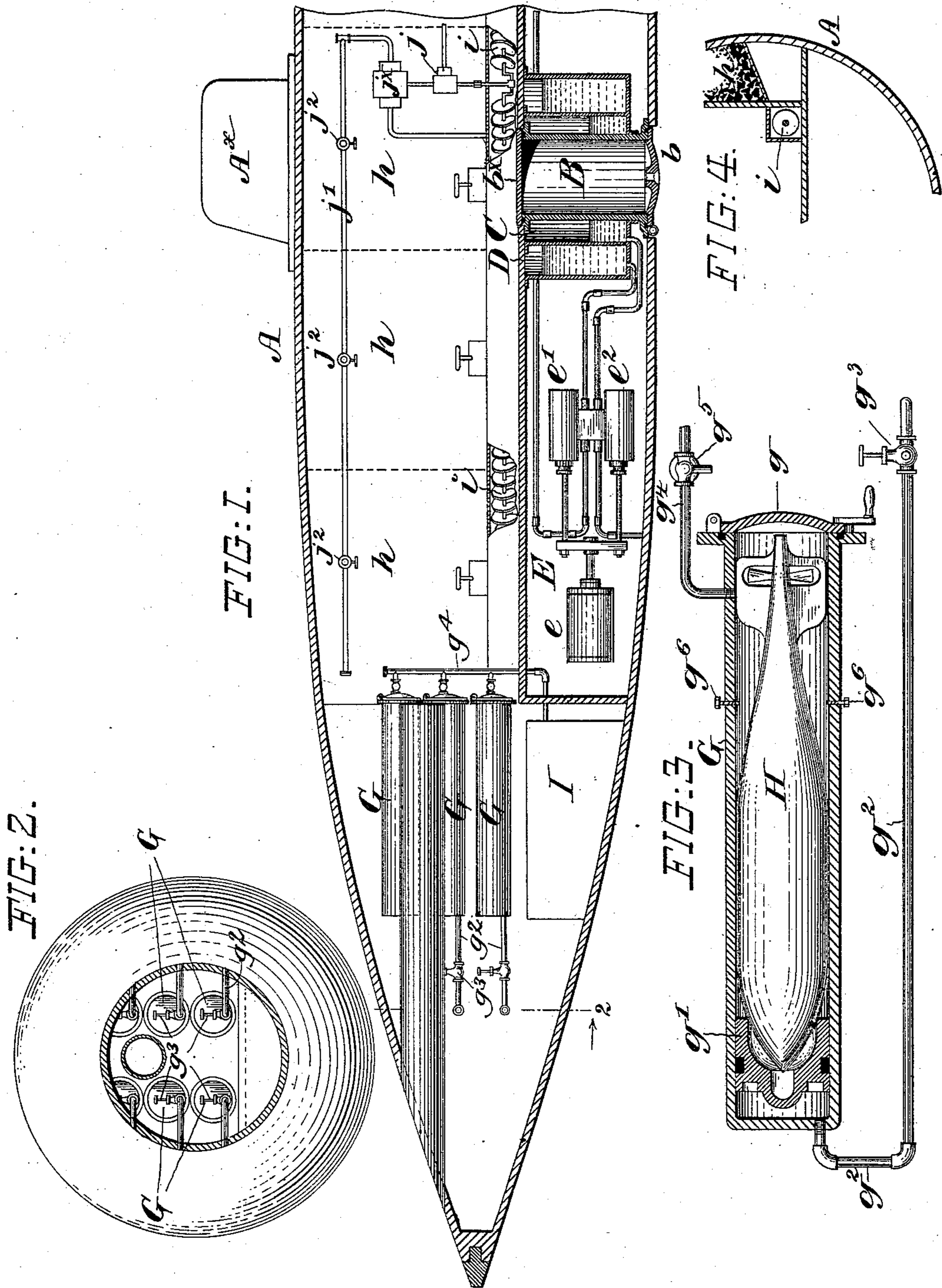


(No Model.)

J. P. HOLLAND.
SUBMERSIBLE BOAT.

No. 537,113.

Patented Apr. 9, 1895.



Witnesses:
J. H. Kimman
Peter A. Ross

Inventor:
John P. Holland
by Henry Coumbs
his Attorney

UNITED STATES PATENT OFFICE.

JOHN P. HOLLAND, OF NEWARK, NEW JERSEY.

SUBMURGIBLE BOAT.

SPECIFICATION forming part of Letters Patent No. 537,113, dated April 9, 1895.

Application filed June 15, 1893. Serial No. 477,661. (No model.)

To all whom it may concern:

Be it known that I, JOHN P. HOLLAND, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Submergible Boats and Methods of Maintaining the Specific Gravity and Trim of the Same, of which the following is a specification.

This invention relates to the class of boats adapted to be submerged and those adapted to be nearly submerged, such as torpedo boats and the like.

It is well understood by those familiar with the construction and operation of this class of vessels that the preservation of the specific gravity of the boat as a whole, and the preservation of its trim, are of the highest importance. To maintain a constant depth of submersion, the specific gravity of the boat must be maintained, or at least be capable of nice variation by suitable devices within the control of those on board and managing the boat, and not open to chance variation; and it is equally important that the center of gravity of the boat shall not be subject to chance variation, and especially subject to variation fore and aft in such a manner as to arbitrarily affect the relative immersion of the bow and stern. This chance variation in the specific gravity and center of gravity is due, in this class of boats, partly to the consumption of fuel, partly to the launching of torpedoes or projectiles and partly to the expenditure of ammunition in firing, and the purpose of my invention is to compensate these. The method I employ in doing this is to automatically admit water to the spaces occupied by the thing or substance consumed or expended in the proper proportion to compensate by weight and position the weight lost by the boat as a whole by such expenditure. For example, if oil be consumed for fuel, water will be automatically admitted to the boat as the oil is consumed in the same proportion by weight as the oil, thus preserving the specific gravity of the boat intact; and as the water admitted will occupy substantially, or nearly the same position in the boat as the oil it replaces, the center of gravity will not be disturbed in any appreciable degree. On the other hand, if a torpedo or charge of am-

munition be withdrawn from its case and expended, the place occupied by the said torpedo or charge will be filled, automatically, by water from outside the boat, the water admitted being of the same, or substantially the same weight as the thing expended which it replaces.

In the accompanying drawings I have shown my invention embodied in a submarine boat adapted for the use of oil as a fuel for propulsion, and adapted for launching torpedoes. To avoid complexity and confusion I have not illustrated those features of a submarine boat which are common and well known, but limited the illustration to those features only which are comprised within my invention and those necessary to illustrate its operation.

Figure 1 is a longitudinal, vertical section of the forward half of a submergible boat of spindle or cigar shape and provided with compensating devices embodying my invention and illustrating my method. Fig. 2 is a transverse section of the boat in the plane of the line 2, 2, in Fig. 1. Fig. 3 is an enlarged sectional view of the devices for compensating a torpedo when launched. Fig. 4 is a fragmentary transverse section of the conveyer for solid or granulated fuel.

A represents the hull or shell of the submergible boat, which may be of the usual kind and be provided with a turret or conning tower, A^x. This boat may be driven by a propeller and have the usual rudders and steering gear for guiding its motions. It may also have the usual means for controlling its specific gravity so that the proper depth of submersion can be maintained. Devices and means are known for effecting these objects and such of these as are suitable may be employed.

In the center of the boat, directly under or below the conning tower, is arranged a diving lock, B, which has a hinged bottom, b, opening outwardly and a similar top or cover, b^x, opening inwardly. About this lock B, is an annular water chamber, C, and around this water chamber is an annular chamber, D, for oil or other liquid fuel.

E represents, as a whole, a steam pump, of which e is the motor cylinder, e' an oil pump cylinder, and e², a water pump cylinder. The oil pump takes oil from the oil tank and forces

it to the furnace and the water pump takes water from outside of the vessel or boat and forces it into the water tank. As these movements go on simultaneously, and as the two pumps will be constructed, as to capacity, of such relative size that they will pump like weights of the liquids, it follows that the consumption of oil will be compensated by the water taken in, and this will be effected in a regular and automatic manner.

Where the thing consumed or expended is a solid body, as a charge of ammunition or a torpedo, the means employed for effecting the compensation will be, or may be as will now be described with especial reference to Fig. 3.

Within the hull of the boat are arranged one or more cells, G, to receive each a torpedo or projectile, H. The cell will preferably be cylindrical with its outer end closed and its inner end provided with a removable hinged cover, g . In the cell is a piston g' which divides said cell with a water-chamber or receptacle and a torpedo or projectile chamber. A pipe, g^2 , connects the outer end of the water-chamber in the cell with the water of flotation through the shell of the boat and this pipe is provided with a cock g^3 . The other or projectile chamber in the cell is connected by a pipe g^4 with the usual compressed air reservoir, as I, in Fig. 1, and is provided with a cock g^5 .

When it is desired to withdraw the torpedo or projectile H from its cell for launching or use, the cover g is removed and the cock g^3 in the water inlet pipe opened. The incoming water, under a head or pressure due to the submersion of the boat, forces the piston g' toward the inner end of the cell, thus driving the torpedo out so that it may be readily withdrawn for use. The movement of the piston is limited by a suitable detent or detents, g^6 , which, as here shown, are screws or pins set in the wall of the cell but so arranged as to arrest the piston but allow the torpedo to pass. These detents will be so placed with respect to the length of the cell that when the movement of the piston is arrested thereby the weight of water in the cell beyond the piston will equal the torpedo in weight, or substantially so.

To drive out the water and return the piston to its first position, the cover g will be closed and the cock in the air pipe g^4 opened. The compressed air will enter the inner end of the cylinder and force the piston to the outer end, driving out the water. The cock in the water-inlet pipe will then be closed, and the compressed air cut off.

As the interior arrangements of a submergible boat may be varied greatly, I do not limit myself to that shown in the drawings, which are somewhat diagrammatic. For example, the pipe g^2 may be as shown in Figs. 1 and 2 of the drawings, or it may turn and extend back to the inner ends of the cells, as shown in Fig. 3, so as to bring the controlling cock therein within more convenient reach of the

operator. The cock in the air-pipe g^4 is, or may be a two-way cock, so that when the air is cut off from the compressed air holder the air confined in the inner end of the cell will escape at said cock. Such variations in the construction are within the common experience of good workmen in this art and will not require detailed illustration.

The air reservoir or holder may be stowed in any convenient space.

Figs. 1 and 4 illustrate the manner of feeding and compensating the expenditure of solid or granulated fuel. This fuel may be kept in bunkers, h , at the sides of the boat and separated by partitions. Alternate bunkers only will be filled and the others left empty. A screw conveyer, i , extending along the base of the bunkers and rotated by an engine, j , conveys the fuel let into the conveyer casing from any bunker to the point desired, the pump, j^x , connected with the engine j , at the same time pumping water from outside the boat into the adjacent empty bunker by way of a pipe, j' , connecting by cock-controlled branches, j^2 , with the several bunkers.

I may employ both liquid and solid fuel at the same time, or under different conditions of service the different kinds of fuel may be used.

I am aware that in submerged torpedo boats to be controlled by electricity from shore and employing compressed gases for operating the engine, it has been proposed to admit water to chambers in the boat adjacent to the gas tank during the time the engine is running, the water being cut off when the engine stops; but my invention differs from this in that I admit water in direct proportion, by weight, to the expenditure, whereby the specific gravity of the boat and its center of gravity are maintained; and this proportion is maintained automatically.

Having thus described my invention, I claim—

1. A submergible vessel or boat having a fuel receptacle and a water receptacle adjacent thereto, a feeding means for feeding the fuel from the fuel receptacle to the furnace, and a simultaneously operating water supplying mechanism which supplies water to the water receptacle in quantity equal in weight to the fuel expended and proportionately as the latter is expended, substantially as set forth.

2. A submergible vessel or boat having a receptacle for liquid fuel, a receptacle for water adjacent to the fuel receptacle and a pump comprising a pump cylinder and pipes for pumping out the liquid fuel to be expended and a pump cylinder and pipes for pumping water from outside the vessel into the water receptacle, the capacity of displacement of said pump cylinders being proportioned to the difference in specific gravity between the liquid fuel and water, substantially as set forth.

3. A submergible boat or vessel having a cell for a torpedo or the like, closed at the outer

end and connected thereat with the water outside of the vessel, and closed at the inner end with a removable cap and connected at said inner end with a receptacle for compressed air, said cell being provided with a piston, and a detent to limit the extent of travel of said piston, and having cocks to control the flow of water and air through the respective pipes, substantially as set forth.

4. A submergible boat or vessel provided with a torpedo cell in the form of a cylinder having in it a piston and furnished with a detent for limiting the travel of the piston, said cell being connected at its closed outer end with the water outside of the vessel and provided with means for controlling the influx of

water to said cell back of the piston, substantially as and for the purposes set forth.

5. A submergible vessel or boat having a projectile chamber, and a water-chamber adjacent thereto, and means for supplying water to the water-chamber to compensate for the weight of a projectile removed from the projectile chamber, substantially as set forth.

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

JOHN P. HOLLAND.

Witnesses:

HENRY CONNETT,
PETER A. ROSS.