

(No Model.)

4 Sheets—Sheet 1.

D. T. FREESE & J. D. GAWN.
SUBMARINE BOAT.

No. 521,854.

Patented June 26, 1894.

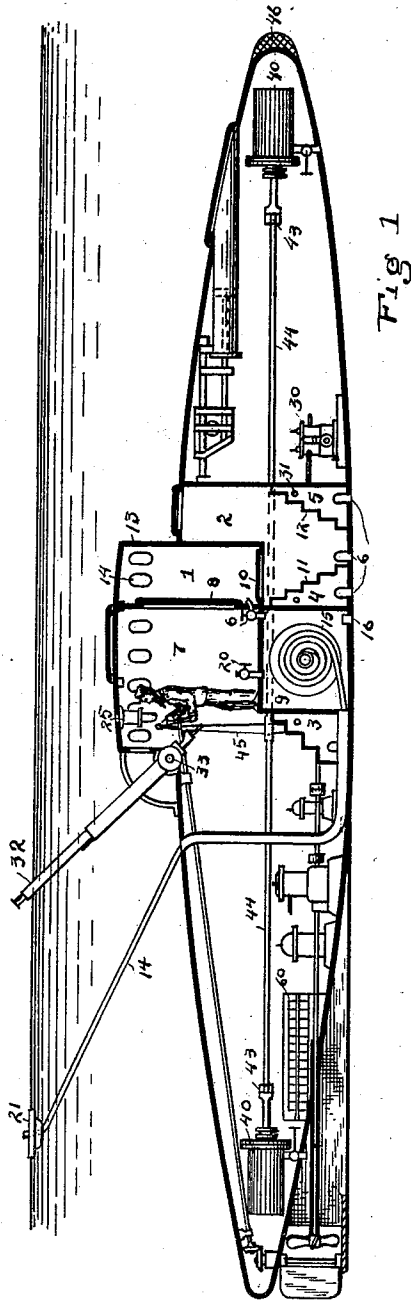


Fig 1

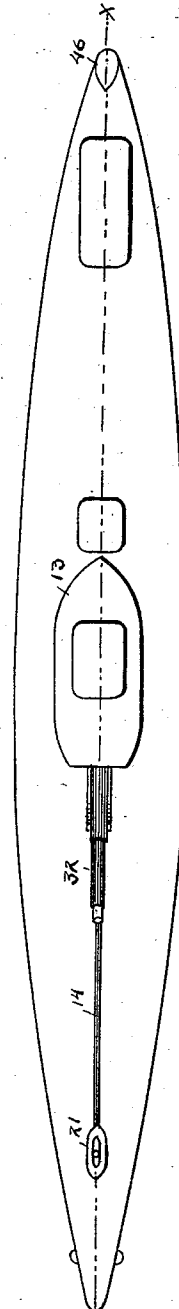


Fig 2.

WITNESSES.

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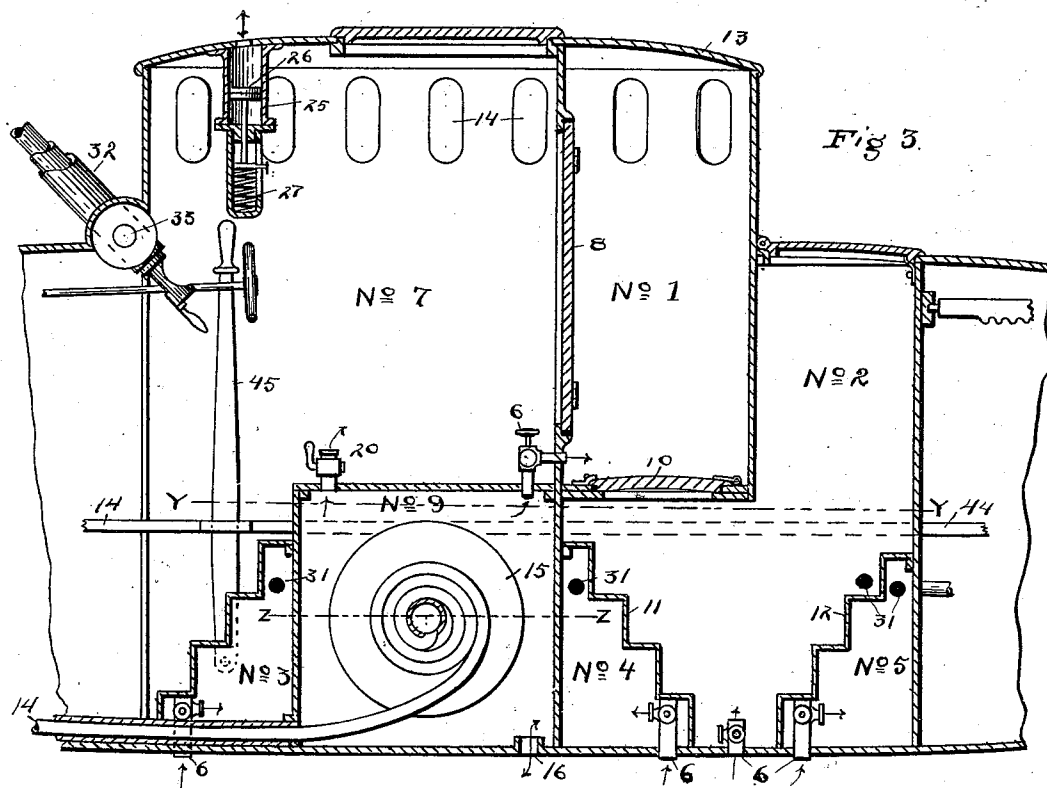


Fig. 3.

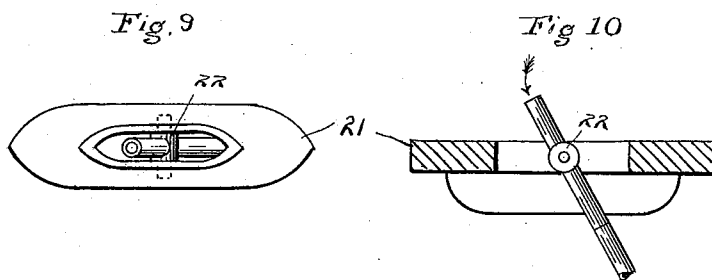


Fig. 9

Fig. 10

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Fig 4.

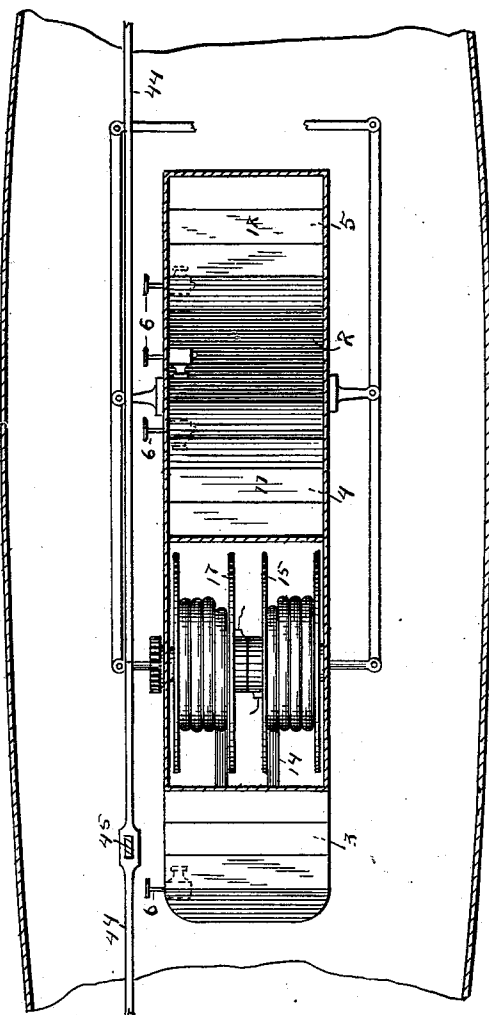
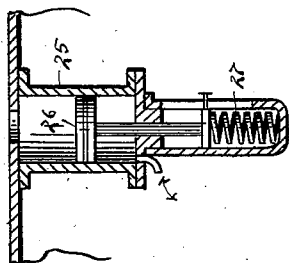


Fig 11



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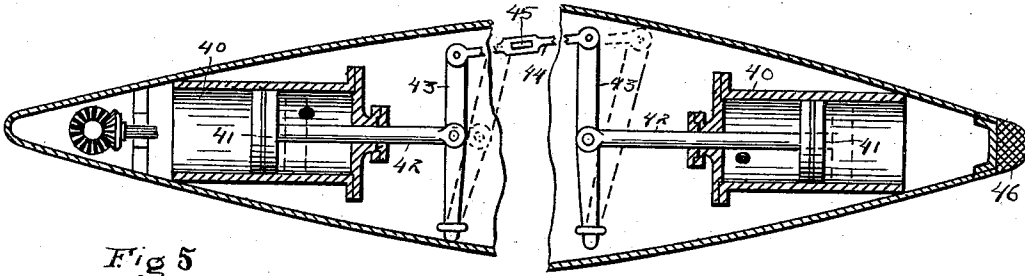


Fig 5

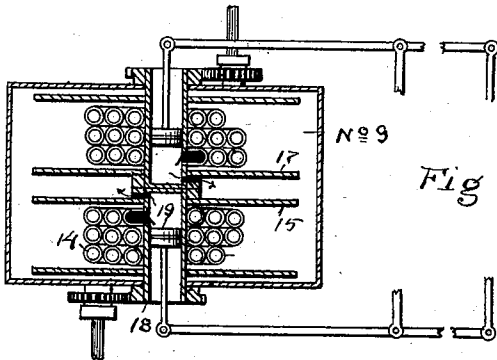


Fig 6

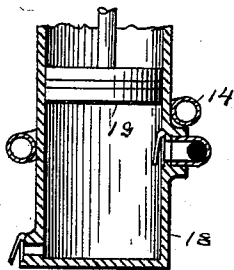


Fig 8

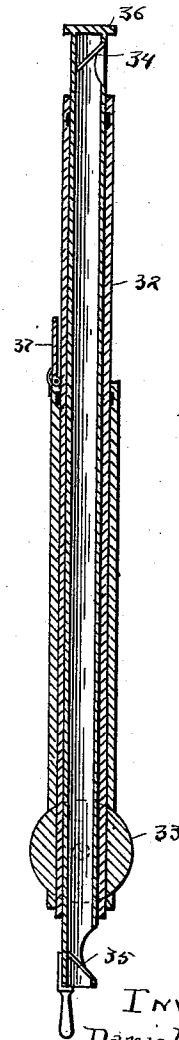


Fig 7

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UNITED STATES PATENT OFFICE.

DANIEL T. FREESE AND JAMES D. GAWN, OF NORTH AMHERST, OHIO.

SUBMARINE BOAT.

SPECIFICATION forming part of Letters Patent No. 521,854, dated June 26, 1894.

Application filed August 26, 1892. Serial No. 444,165. (No model.)

To all whom it may concern:

Be it known that we, DANIEL T. FREESE and JAMES D. GAWN, citizens of the United States, residing at North Amherst, in the county of Lorain and State of Ohio, have invented certain new and useful Improvements in Submarine Boats; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Our improvements relate to submarine boats; and they consist in the construction and arrangement of parts herein described and particularly pointed out in the claims, whereby the efficiency, economy of space, and management of this class of boats, may be greatly enhanced.

Referring to the accompanying drawings, Figure 1, is a longitudinal central section of a boat or vessel provided with our improvements, taken on a line corresponding to x, x , Fig. 2. Fig. 2 is a plan view of the boat or vessel. Fig. 3, Sheet 2, is an enlarged view corresponding in all particulars to the view shown in Fig. 1, and representing the central portion of the boat or vessel, as shown in said figure. Fig. 4, Sheet 3, is a horizontal section on line y, y , Fig. 3, with the ends of the boat broken away and illustrating only the central portion thereof. Fig. 5 is a horizontal section corresponding to line y, y , Fig. 3, and illustrating the extremities of the boat not shown in Fig. 4, and more especially designed to show means for balancing the boat. Fig. 6 is a horizontal section of the hose reel and air pump combined, taken on a line corresponding to z, z , Fig. 3. Fig. 7 is a longitudinal sectional view of the sight tubes shown in position in Fig. 1. Fig. 8 is an enlarged section of the cylindrical air-pump or spindle of the reel shown in Fig. 6. Fig. 9 is a plan view, and Fig. 10 a longitudinal section of a tube supporting float. Fig. 11, Sheet 3, is an enlarged longitudinal section of an indicator for determining the depth of the vessel or boat beneath the surface of the water.

In the construction of a submarine boat two things are primarily necessary. First, to provide means to submerge the boat more or less at will, and, second, to supply air to the boat for the occupants. Apart from the con-

struction and natural weight of the boat we employ water chambers for submerging purposes. And these chambers are so constructed as to take more or less water as greater or less depth of position beneath the surface is wanted. Thus referring to Fig. 3 we see chambers marked Nos. 1, 2, 3, 4 and 5, to which the water is admitted in submerging the vessel. Each of these several separate chambers is provided with a water inlet valve 6, the lower of which valves are located outside the water chambers where they are approached in the through passage ways of the boat. As seen in Fig. 4, more or less water may be admitted to each of these several chambers, and if all were filled the vessel would drop to the lowest level it could be brought to in this way.

Assuming that a person is in air chamber No. 7, and desires to pass to the outside of the vessel, he goes through door 8 into No. 1 and closes the door behind him. Here he puts on a diving suit, which for convenience should be connected to the vessel. Then by opening the cock 6, sufficient air is admitted to chamber No. 1 to keep the water down to a low level in said chamber. Then opening the trap door 10, in the bottom of chamber No. 1, the person passes into chamber No. 2, by steps 11, and out by steps 12 onto deck. By the use of the intermediate chamber No. 1 greater security in passing to and from the vessel is obtained. The boat here shown may be said to have a turret-shaped cabin 13, with windows 14, and this cabin is subdivided into two chambers Nos. 1 and 7, as above described. Atmospheric pressure is relied on to maintain certain equilibriums in the vessel in the presence of water itself under considerable pressure, and we shall now see how this air supply and equilibrium are maintained. It will be observed that a tube or hose 14 (Fig. 1) extends from the surface of the water down through the shell of the boat to the drum or reel, 15, supporting the said hose in chamber 9. This chamber has an open water inlet, 16, in its bottom, so that it is always filled with water, unless the water be expelled by the air that is forced into said chamber through hose, 14 and the pump mechanism connected therewith. This mechanism consists of a reel having a short cylin-

der, 18, and a pump piston, 19, in said cylinder, operated by suitable machinery to force the air under pressure into the air chambers or spaces of the vessel. These chambers or spaces of course comprise every part of the vessel not occupied by the water. This chamber 9 is, therefore, a combined water and air chamber, and air is supplied to chamber No. 7 and thence to the boat generally through the cock 20, or its equivalent. It will be noticed that this chamber 9 also serves as a ballast chamber and at the same time a receptacle for the reel and hose, thus utilizing this space for a double purpose. An extra reel, 17, is provided for emergencies.

The hose, 14, is connected at its outer end with a float, 21 (Figs. 9 and 10). This float has such buoyancy and size as will certainly maintain the hose 14 above the water's surface. As seen here it has a flat top surface and an opening through its center in which is journaled a support 22 for the immediate end of the hose and to keep the same above water. When the boat is under motion the float is drawn along by the hose, and the said float is so constructed that it will travel along upon the water with the boat. It is designed to be as unnoticeable as possible, especially in case the boat be used as a torpedo or like boat in times of war. It will be seen, however, that even if some water were to be sucked into the hose it would not be material, because the water when it got into chamber 9 would simply fall to the water level therein, while the air rises to the upper part of the chamber. This chamber as before stated is normally open to the outside water. We have thus seen how provision is made to ballast the vessel with water, and to supply it with air, and the elevation of the vessel in the water with respect to the surface will depend on the quantity of each of these elements in the vessel.

The level at which the vessel is riding is clearly revealed to the officer in charge through the indicator. This indicator comprises a small chamber 25 having a piston 26 exposed to the outside water, and a spring 27. As the vessel drops to a lower level the pressure on piston 26 of course increases, and this fact, and its extent, is told by a finger on the stem of the piston and a suitable dial or other means of denoting the location of the finger. In this way the officer in charge can know whether he is five feet or twenty feet or any other depth under water, and he has at his command the means to put the vessel higher or lower as he may desire, these means of course controlling the air and water supplies as hereinbefore described. That is to say in submerging we permit water to flow into chambers 2, 3, 4 and 5, and to raise the vessel the water is pumped out of these chambers by pumps 30 connected by pipes with said chambers through the opening 31. These or any other suitable means for exhausting the water chambers may be employed and the

pumps will of course be in control of the officer in charge of the vessel the same as the engines and other machinery.

In order that the officer in charge or engineer may observe what is transpiring on the surface of the water, though he be many feet below the surface, we provide a device 32. This device is made of three separate inter-sliding tubes, and they may be so constructed and connected that the engineer may extend or withdraw them at pleasure to suit the level he is in. The lower and larger tube is supported on pinion jointed bearings 33, so that the instrument may be turned and manipulated at will to take observations here or there and all around. The inner tube, Fig. 7, has a mirror or reflector 34 set at a suitable angle in its upper end, and a scarf is cut in the tube in front of the mirror to expose the same to view. A like mirror, 35, is set in the lower end of the instrument at a corresponding angle in view of the engineer, and the inner tube is adapted to slide freely in the middle tube and to close down on the end thereof with its flanged head, 36, in case the glass covering the said scarf be broken or for any other reason such withdrawal becomes necessary. Suitable rubber packing at the outer end of the middle tube excludes the water. The lower or base tube has a spring pressed cap, 37, and a water seal seat therefor to close said tube when the two inner tubes for any reason are withdrawn.

Now, in order that the boat may be balanced lengthwise, and kept in a horizontal position as it rises or falls or travels along, we employ a cylinder, 40, at each end of the boat, said cylinder being open to the outer water at some point so as to admit or exhaust water. Each cylinder has a piston, 41, and these pistons have rods, 42, and controlling levers, 43, connected by rod, 44. A power lever, 45, under control of the engineer or pilot in charge is connected with this rod, 44, and serves to control the two pistons conjointly; that is the two are operated together, and water is admitted to one cylinder while it is forced out of the other. These cylinders are large enough to make a difference in the balancing of the boat when more or less water is admitted or exhausted to or from one or the other. Both cylinders are located in the extremities of the boat. In each cylinder the water pressure is on the inner end, so that the said pressure counteracts itself between the two pistons, and hence said pistons are easily operated.

To avoid accident or severe concussions, if the boat should run against an obstruction, we have provided the bow of the boat with a cushion, 46.

The power for driving the boat may be any preferred power such as steam or electricity, but there are marked advantages in the use of electricity which render this power altogether preferable. We have, therefore, shown here what purports to be a storage battery,

60, which may be large or small as the needs of the boat demand, and suitable motor or motors are provided to supply power.

Should the foul air in the boat become objectionable there can be suitable provision made to pump the same out of the boat. It will also be understood that if for any reason at any time it becomes desirable or necessary to withdraw the fresh air tube from the surface and to depend upon air in the boat, the air at all times in the boat when it is submerged will be found sufficient to remain under the water for several hours.

As hereinbefore stated, the divers who may go out from the boat will have air supplied to them from within the boat, and the air supply tubes by which they are furnished may be connected with the boat at any convenient or suitable place. We do not deem the connection an important one in this description, because it forms no part of our claim, and it is not necessary to understand the invention.

Each of the reel cylinders is, of course, provided with a suitable outlet valve from the cylinder as well as with an inlet valve into the cylinder from the hose, so as to make the air pump of which said cylinder forms a part operative.

The hose may be attached to either reel as shall be found desirable, and a second reel is provided simply to serve for emergencies when the other reel may for any reason become inoperative.

What we claim as new, and desire to have patented, is—

1. The combination with a submarine vessel provided with a water-ballast chamber 9 having an aperture 16 communicating with the outside of the vessel and an opening 20 through which air may be supplied to the interior of the vessel, a pump having its induction port communicating with the interior of the ballast chamber, and a pipe or hose constructed so that one end may be extended to the atmosphere above the water in which the vessel is submerged and having its other end connected with the induction port of said pump, substantially as described.

2. The combination with a submarine vessel provided with a water-ballast chamber having an aperture 16 communicating with the outside of the vessel and an opening 20 through which air may be supplied to the interior of the vessel, of a rotatable pipe or pump cylinder 18 having its induction and induction ports located within the ballast chamber, and a hose constructed so that one end may be extended to the atmosphere above the water in which the vessel is submerged and having its other end connected with the induction port of said pipe or cylinder whereby the hose may be wound upon said pipe

and within the ballast chamber, substantially as described.

3. The combination in a submarine vessel, of the chamber No. 7, water chamber No. 1, intermediate chamber No. 7 and water chamber No. 2, a door between chambers Nos. 7 and 1, means for supplying compressed air to chamber No. 1, the said water chamber No. 2, a door between chambers Nos. 1 and 2, and a door leading from the latter to the outside of the vessel, substantially as described.

4. The combination with a submarine vessel provided with a chamber No. 7, substantially as described, of a speculum comprising a water-tight tube constructed so that one end may be extended beyond the surface of the water in which the vessel is submerged and its other end located within said chamber, and reflectors in the ends of the tube, and the casing or tube 32 into which the speculum may be drawn having a water-tight cap 37, substantially as described.

5. Means for maintaining a submarine vessel in a horizontal position comprising two water chambers one at or near each extremity of said vessel and each having an opening for the admission and discharge of the water, movable diaphragms or pistons to vary the amount of water in the chambers, means rigidly or positively connecting said diaphragms constructed so that the pistons or diaphragms may be moved simultaneously to increase the amount of water in one of the chambers and reduce it in the other, and vice versa, the said means also constructed so that when either one of said pistons be moved in either direction the pressure of the water upon one will counteract that upon the other, substantially as described.

6. Means for maintaining a submarine vessel in a horizontal position comprising two chambers 40, 40 having an opening for the admission and discharge of the water, one at or near each extremity of said vessel, pistons 41, 41 in said chambers to vary the amount of water therein, rods 42, 42, each connected respectively with one of said pistons, levers 43, 43 connected with said rods, and the bar 44 joining said levers, whereby the pistons may be moved simultaneously in opposite directions with respect to the chambers and when one of said pistons be moved in either direction the pressure of the water upon one of the pistons will counteract that upon the other, substantially as described.

Witness our hands to the foregoing specification.

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JAMES D. GAWN.

Witnesses:

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E. C. LATHAM.