11

The Submarine Observation Chamber

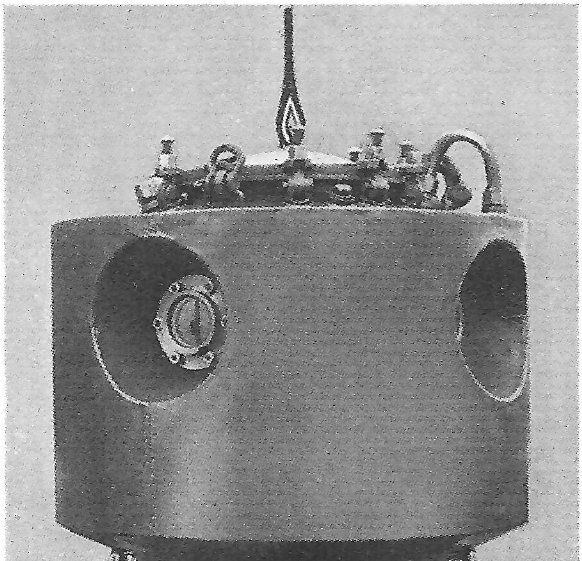


Fig. 175. Siebe, Gorman deep sea observation chamber with buoyancy tank and compressed air cylinders, as supplied to British Admiralty

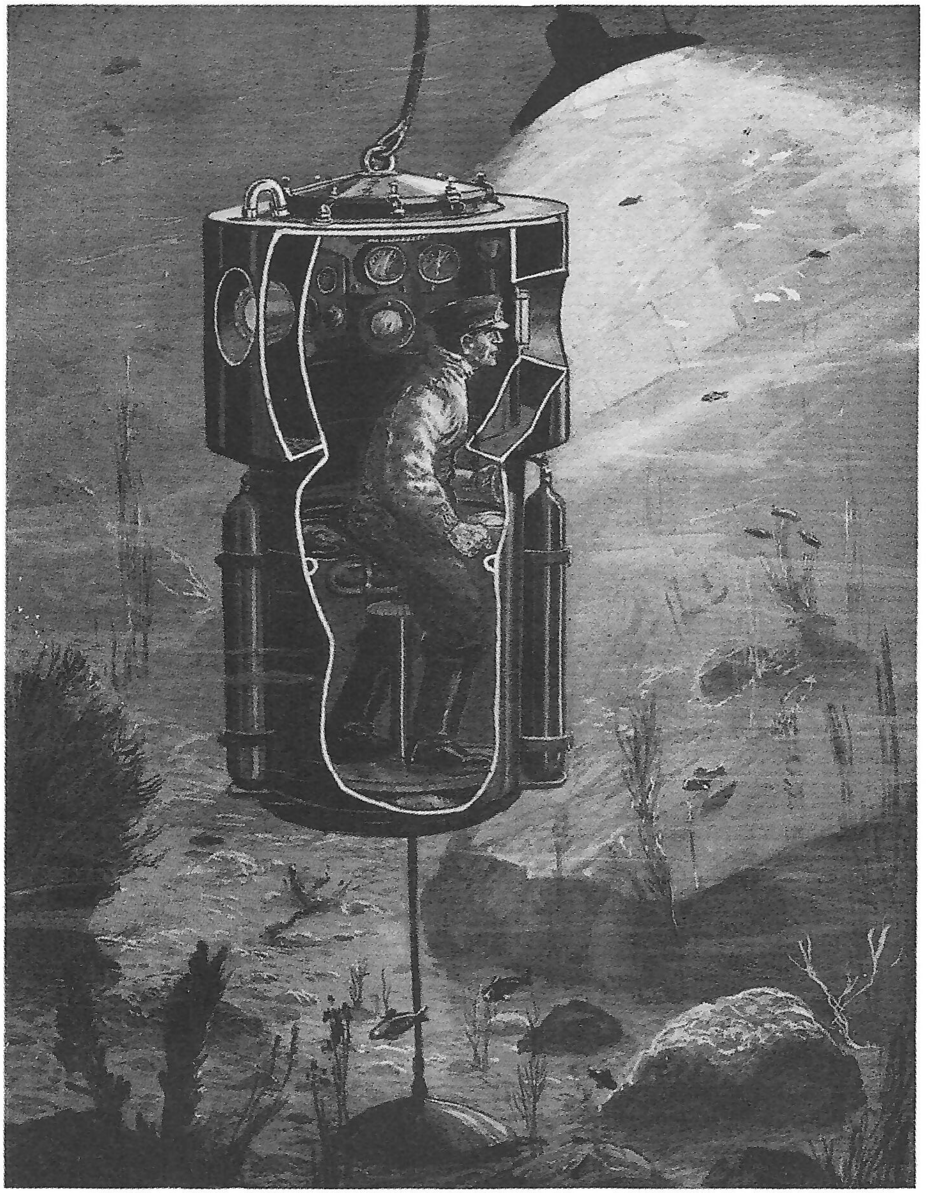


Fig. 176. Submarine observation chamber with air regenerating apparatus, buoyancy tank and compressed air cylinders

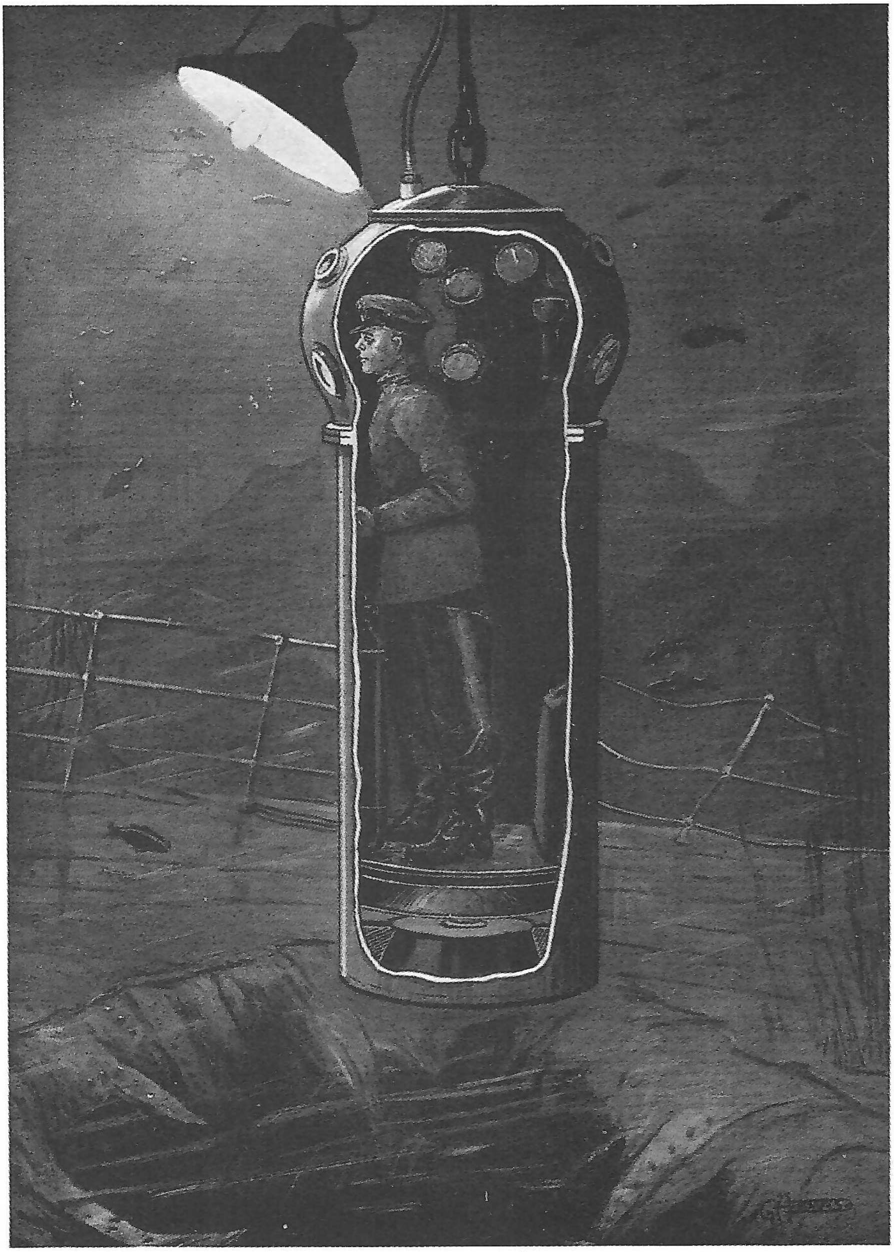


Fig. 177. Siebe, Gorman submarine observation chamber without buoyancy tank, and provided with air regenerating apparatus

The Submarine Observation Chamber or "The Submarine Eye", as it is sometimes called, has become an important auxiliary to the diving dress and the submersible decompression chamber, in salvage operations at great depths. By its aid, it is possible for the occupant, without exposure to pressure, to make preliminary survey of the wreck in order to ascertain the general state of things and the approximate extent of the damage, and so, by his observations, pave the wav for the dress divers and save a considerable amount of time.

There are cases, too, where a good deal of preliminary work can be done by telephonic direction of the observer, such as the lowering and firing of explosive charges for blasting a way through obstructions in order to facilitate the diver's entry into the vessel, and the lowering of grabs to lift material from the wreck preparatory to the diver descending to carry on and complete the job.

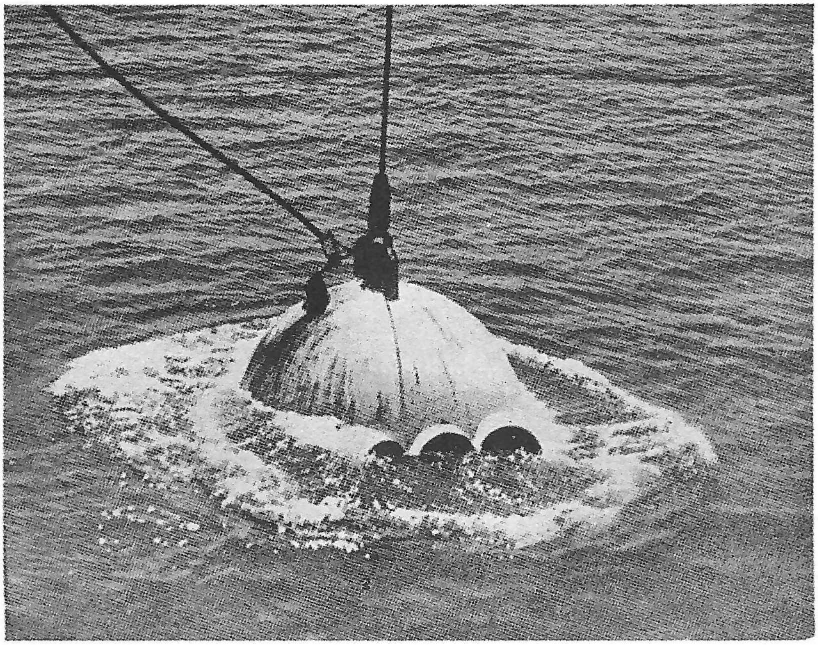


Fig. 178. Beebe's Bathysphere submerging (see also Part II)

For operations at depths beyond the reach of the flexible dress diver, the whole of the work can be carried out by telephonic direction from the observation chamber, as was done in the cases of the *Egypt* and *Niagara*. But at depths at which it was possible for him to work, the dress diver would certainly be employed, for he would be able to do in a given time far more work than could be accomplished by other means, since he would be able actually to enter and explore the wreck.

The steel chamber, Figs. 175, 176, cylindrical in form, is of such strength as to withstand the external pressure at great depths. Thus, the occupant, breathing at normal pressure only, is enabled to observe through the windows, of which there are four or more, sunken ships and other submerged objects, and deep-sea life and surroundings, without exposure to any of the risks due to great pressure of water, and to give the attendants at the surface directions by telephone to lower explosive charges, grabs, etc. The chamber is equipped with breathing apparatus on the regenerative system, which automatically absorbs the carbon-dioxide of the occupant's exhaled breath, and replaces the oxygen which he has consumed; thus, he is quite independent of air supply from the surface. The equipment also includes depth and pressure gauges, telephonic apparatus communicating between the chamber and the salvage vessel and vice-versa, clock, electric lamp, etc. Powerful submarine electric lamps, either attached to the observation chamber or worked separately therefrom, are also provided for illuminating submerged objects in dark water.

The chamber illustrated has a water ballast tank, the emptying of which, by means of compressed air in the steel cylinders which are charged to 120 atmospheres, causes the chamber to rise to the surface.

Where conditions make it desirable, the chamber is provided with a stockless anchor, or sinker, attached by chain to the bottom of the chamber. Thus, if the ballast tank is emptied and the suspending cable to the surface slackened, the chamber will float off the anchor and be unaffected by the rise and fall of the diving vessel. In case of need, the anchor can be released by means of a device which is fitted inside the chamber, so freeing the latter for ascent to the surface.

The same type of chamber is made also without water ballast tank, but with permanent iron or lead ballast in the bottom (Fig. 177).

Balanced spherical chambers, similarly equipped, are also built for the same purpose (Fig. 178).

Fig. 179 illustrates another type of cylindrical chamber designed and made by the firm for oil-prospecting under the sea-bed. It has an entrance door at the top, three large observation windows in the upper tubular extensions and three smaller ones in the lower extensions. It is fitted with telephone, electric light, etc., and carries a gravimeter under the observation of the occupant. (For a brief description of the origin of oil, see Part II.)

The "Bathyscaphe" designed by Professor Piccard, the Swiss scientist, with which he hoped to attain the remarkable depth of 14,000 feet or more, did not rely on a cable for controlling its ascent and descent, but on an intricate system of ballasting. As is well known, the attempt by this intrepid professor had to be abandoned, but it is understood that another will be made. It would, therefore, be premature to attempt to describe it here as a practicable diving proposition.*

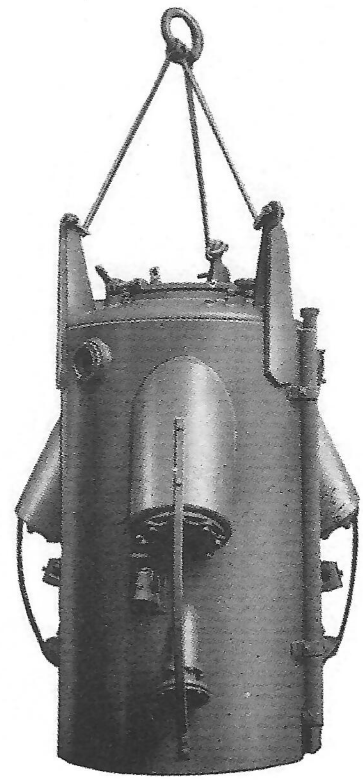


Fig. 179

SUBMARINE OBSERVATION AND DIVING CHAMBER FOR PROLONGED SUBMERSION

There might conceivably be conditions where underwater operations would be facilitated if it were possible for the diving staff to remain on the sea-bed for several days at a time.

Fig. 180 depicts a submersible chamber which combines living quarters and air-lock and diving compartments. The chamber has space for water ballast to give the whole combination stability when resting on the sea-bed. When raising the chamber to the surface, the water ballast would be expelled by means of compressed air, in order to reduce the weight to be handled when lifting it out of the water on to the attendant vessel.

* For latest descents see Appendix F.

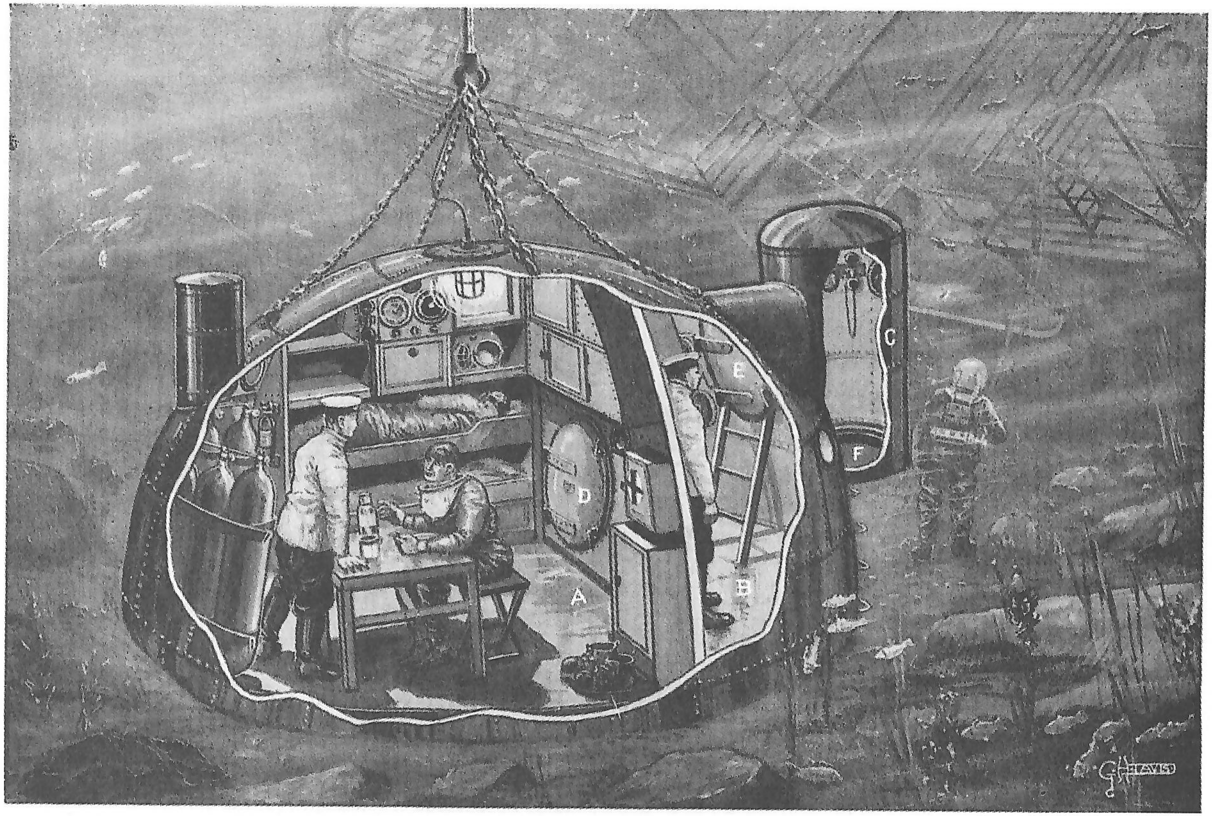


Fig. 180. R. H. Davis's proposed deep sea diving chamber for prolonged submersion, with air-lock chamber for exit of the diver to the sea-bed

The larger compartment, A, which serves as living quarters, contains batteries of compressed air and compressed oxygen, together with air regenerating devices for keeping the atmosphere pure and fresh for breathing purposes for several days at a time. Next to this compartment is an air-lock, B, and adioining the latter is the diving compartment, C.

When it is desired to send a diver out to the sea-bed, he and his attendant enter the air-lock, B, closing the door, D, after them; the door, E, of the diving compartment is now opened. (The air inside all three compartments, it will be understood, is so far at atmospheric pressure only.) Compressed air is now discharged into the air-lock, B, and diving compartment, C, at a pressure equal to the depth at which the chamber is submerged. The outer door, F*, of the diving compartment, C, can now be opened, and no water will enter the latter. The diver now leaves the compartment and proceeds to his work, the attendant keeping in telephonic communication with the diver all the time he is away, and handling his life-line.

On returning to the diving compartment, C, the outer door, F, of the latter is closed, and the men enter the air-lock, B, closing the door, E, after them. The pressure in the air-lock, B, is then reduced in accordance with the decompression rules. On completion of their decompression, the inner door, D, of the air-lock, B, is opened, and the men return to compartment A.

Each compartment is fitted with an observation lens permitting a view of the interior of the adjoining compartment, and with another lens for viewing the sea-bed.

Powerful submarine lamps, supplied with electric current from the surface vessel, illuminate the sea-bed and objects on which the divers are engaged.

Another method is for the diver, with or without his attendant, to enter the diving compartment, C, and to close door, E. Compressed air is then discharged into the compartment until the pressure is equal to the water pressure, when the outer door, F, can be opened. On his return into the diving compartment, C, the outer door, F, is closed, and the process of decompression proceeds. If, now, it became necessary for an occupant of the living compartment, A, to go to the diving compartment, C, he would enter the air-lock, B, close the door, D, after him, and equalize the pressure with that of the diving compartment, C; the door, E, of the latter could then be opened. In returning to the living compartment, A, he would close the door, F, of the diving compartment, C, and remain in the air-lock, B, for the period of his decompression according to the rules, and when the air-lock was down to atmospheric pressure he would return to the living compartment, A, again.

Another form of chamber consists of living and diving compartments only, there being no intermediate air-lock. On entering the diving compartment, the men close the inner door; compressed air at a pressure equal to that of the water outside is discharged into the compartment, the lower door of which can now be opened, allowing the diver to emerge on to the sea-bed. On his return to the diving compartment, the lower door is closed, and decompression proceeds down to atmospheric pressure, when the inner door is opened and the diver returns to the living compartment. It will be understood that, if it were necessary for an occupant of the living compartment to enter the diving compartment when the latter was in use, compressed air would be supplied to the former to equalize the pressure with the latter, before the inner door could be opened, all the occupants then being subjected to the same pressure.

There is an intercommunication system of telephoning, enabling the occupants of each compartment as well as the divers to communicate with one another and with men on the surface vessel. If the surface vessel has for any reason to leave the scene of operations for a time, a special buoy marks the spot, the buoy containing telephonic instruments (see Chapter 14), so that, if desired, a boat could go off to communicate with the men below.

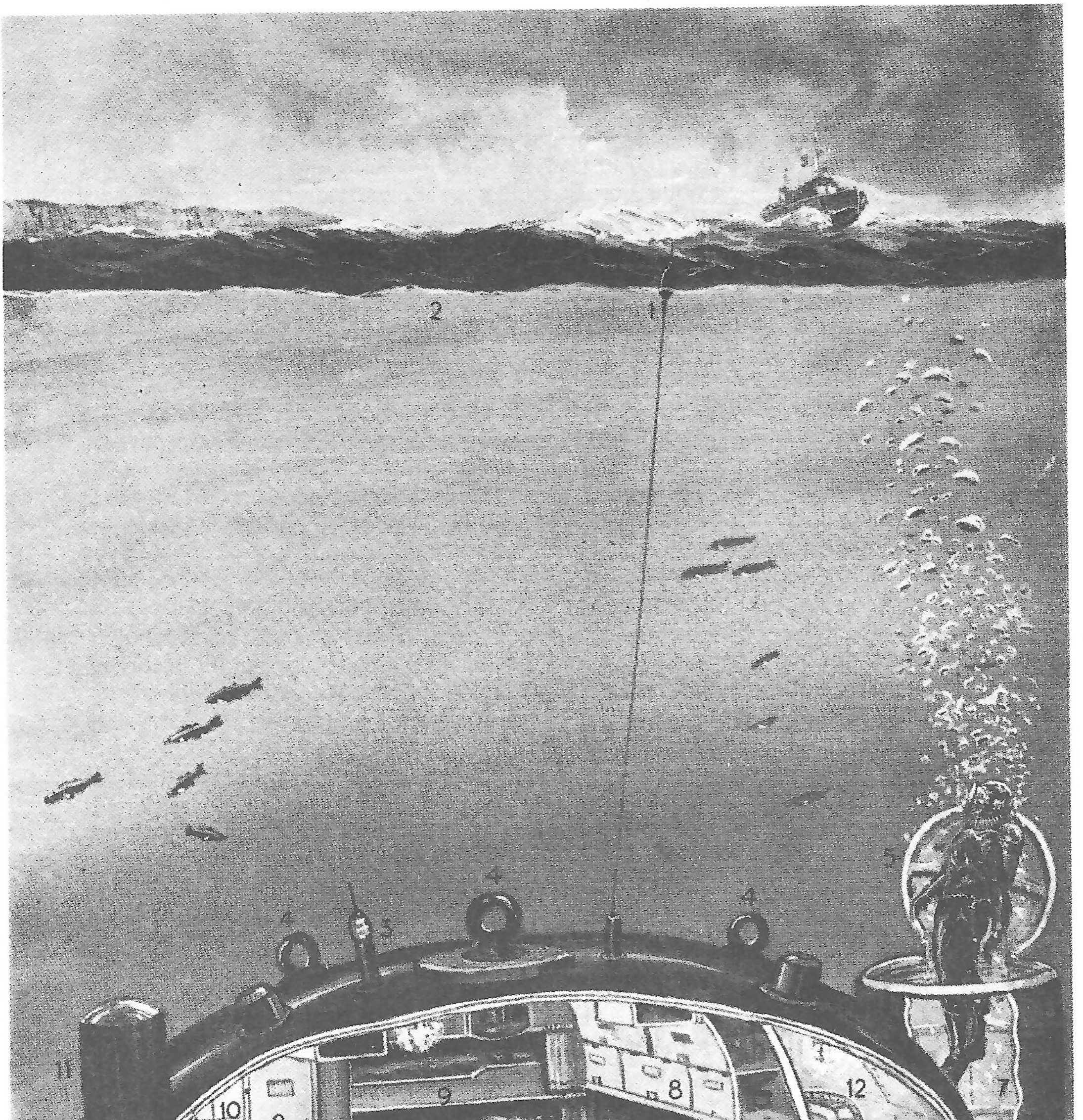
* Door F is open and cannot be seen in the drawing.

ROBERT H. DAVIS'S PROPOSED DIVERS' "HOME FROM HOME"

FOR PROLONGED SUBMERSION EQUIPPED WITH LISTENING DEVICES FOR DETECTING THE PRESENCE OF ENEMY SUBMARINES

KEY TO DRAWING ON PAGE 220B

1. Detection Buoy on surface
2. Surface of sea
3. Detection Buoy retracted into housing
4. Lifting eyes
5. Diver wearing self-contained breathing apparatus emerging through hatch of Diving Chamber
6. Ventilation ducts
7. Diving Chamber
8. Lockers
9. Bunks
10. Galley
11. Entry hatch for steel cylinders containing air, oxygen, etc.
12. Diving Compartment
13. Watertight door to Diving Compartment
14. Radar Screen
15. Second Diver waiting to enter Diving Chamber
16. Diver's Attendant
17. Compass
18. Detecting equipment control panel
19. Storage compartment for cylinders of air, oxygen, etc.



R. H. Davis's Divers' "Home from Home" (see page 220A)