SECTION X

S/T RECEIVERS

SUB-SECTION XA HYDROPHONES

SUB-SECTION XB HYDROPHONE INSTALLATIONS

XA2

MARK IV

Date of design:- 1918.

This is an old type of Hydrophone plate and is being replaced by the Mark V. It consists of a microphone (1) mounted on a diaphragm (2) by means of an insulator (3).

The microphone (figure f.) is of the ordinary carbon granule "button" type. Highly glazed carbon dust (10) fills the cavity about three-quarters full. At the front and back of the cavity are two carbon electrodes (11) with highly glazed surfaces, with which the carbon granules (10) are in contact. The two electrodes (11) are insulated from each other by the mica diaphragm (12). Conducting wires are connected to each electrode.

The microphone (1) should always be mounted on the diaphragm (2) in or near the vertical. If mounted horizontally the carbon granules (10) fall and will not make contact with the upper electrode. This breaks the circuit through the microphone, thereby putting it out of action. When correctly mounted on a vibrating diaphragm, the carbon granules in the microphone are agitated. This has the effect of varying the electrical resistance of the circuit.

The voltage applied to the microphone should not exceed 6 volts and the most efficient current is about 20 milliamps.

The diaphragm (2) is held in position by a moulded rubber ring (4) which is carried by the mild steel ring (5), the latter being bolted to the heavy lead inertia ring (6) which is secured to the pressure hull (7) by means of the riveted steel pad (8).

A watertight bung (14) at the back of the diaphragm (2) forms a damp proof chamber for the microphone (1). The cover (9) provides another damp proof chamber.

Diaphragms are so manufactured that they are all of approximately the same natural frequency.

MARK V

Date of design:- 1922

This is very similar to the Mark IV - the only important difference being that it has been designed to withstand greater external pressure.

The cover plate has been fitted with a gland (15) (as in Mark VI Hydrophone Plate) instead of the "pickle bottle" bung. The Mark V Hydrophone is shown in figure a.

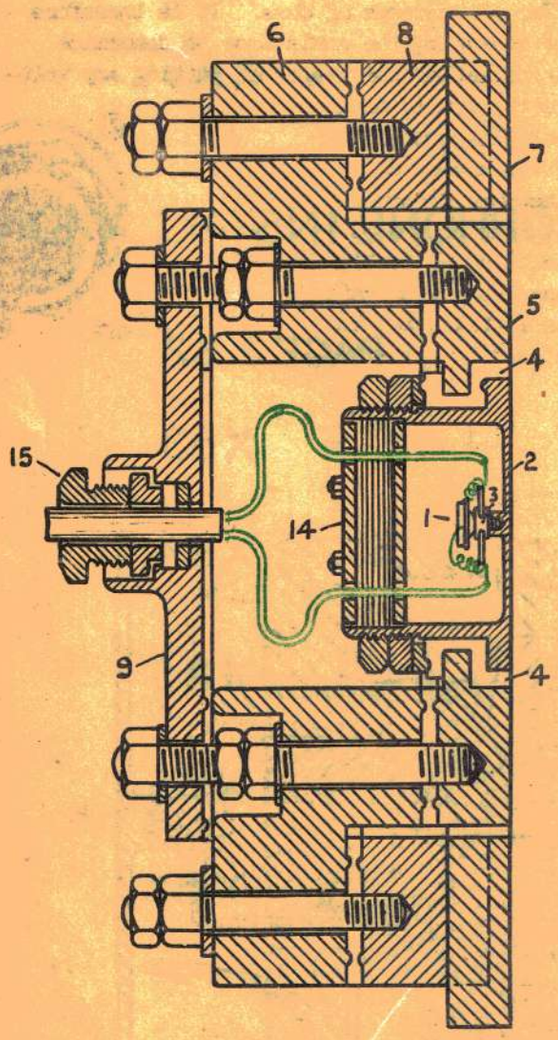


Fig. a.

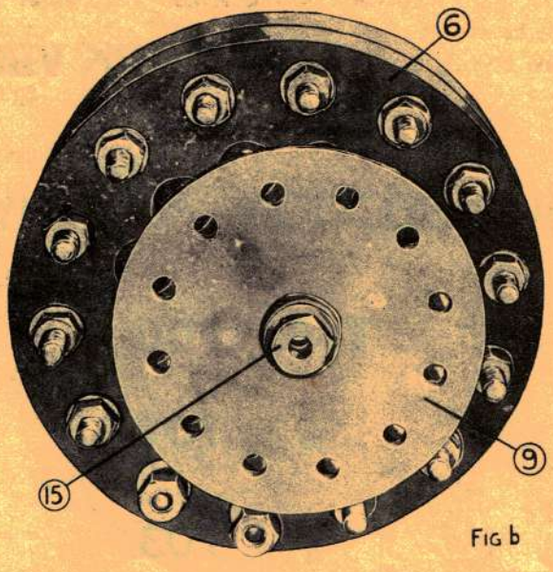


Fig b

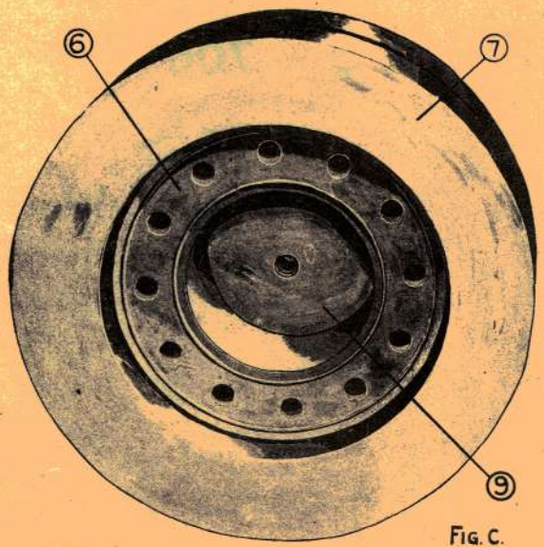


Fig. c.

MARK V

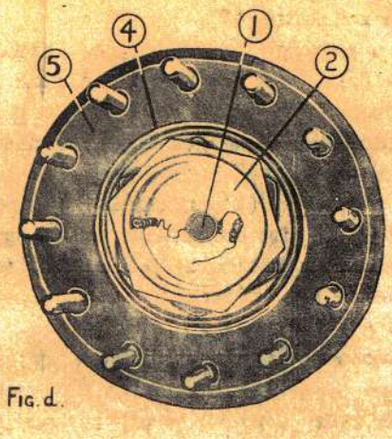


Fig. d.

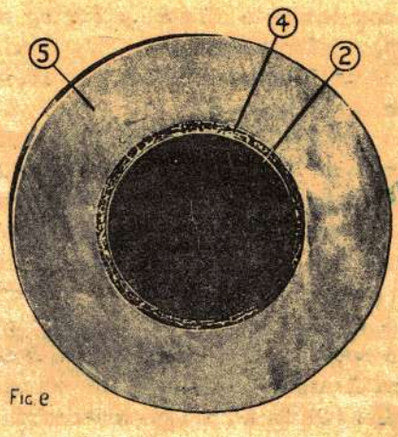


Fig. e

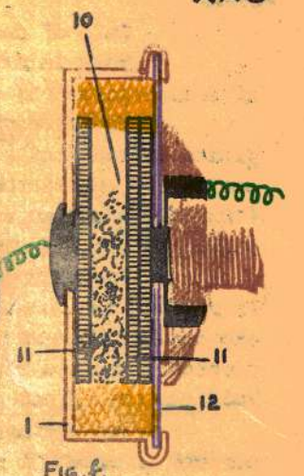


Fig. f.

MARK VI

Date of design:- 1924.

This is very similar to the Mark V type except that the microphone is replaced by a moving coil unit.

The moving coil consists of a small metal former (1) wound with enamelled copper wire (3), and is screened into the diaphragm (2) of the hydrophone.

When the diaphragm (2) vibrates the coil is caused to oscillate between the poles of an electromagnet (10). Thus an alternating current is induced to the coil, the frequency of which is the same as the frequency of the diaphragm vibrations. This induced current is applied to the input terminals of the amplifier.

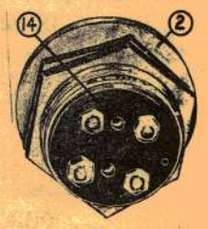


Fig. g.

The resistance of the field coil (12) is normally about 40 ohms and the exciting current through this coil should not exceed 0.5 amperes.

The resistance of the moving coil is of the order of hundreds of ohms. It is therefore possible by means of a single Menotti Test or actually by measuring the resistance to determine which are the fixed and which the moving coil leads; thus obviating the danger of putting any voltage across the moving coil.

A diagrammatic sketch of the moving coil unit is shown in figure a.

Owing to its complicated nature and costly maintenance the moving coil hydrophone installation is being replaced by the microphone.

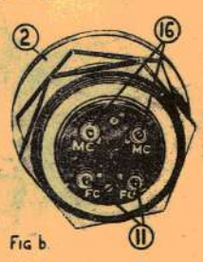


Fig b

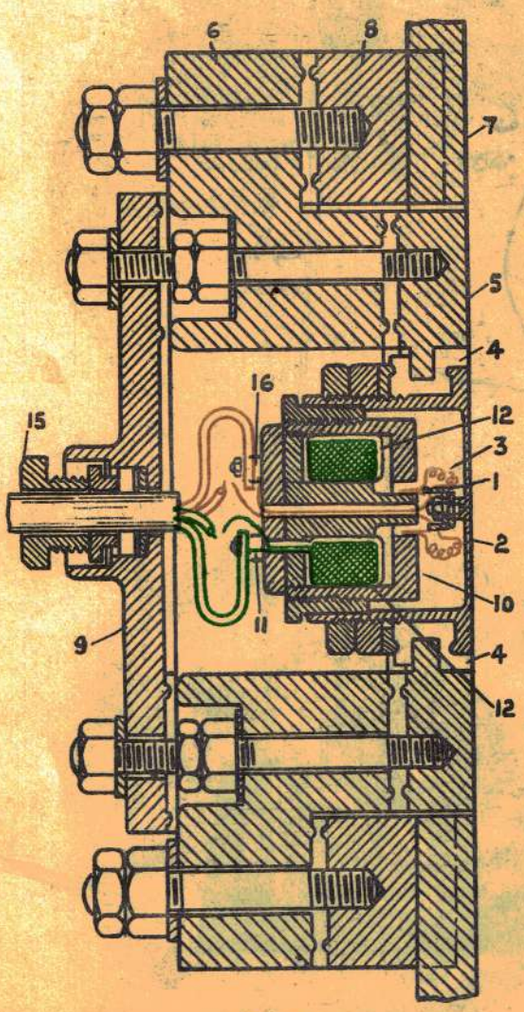


Fig. a.

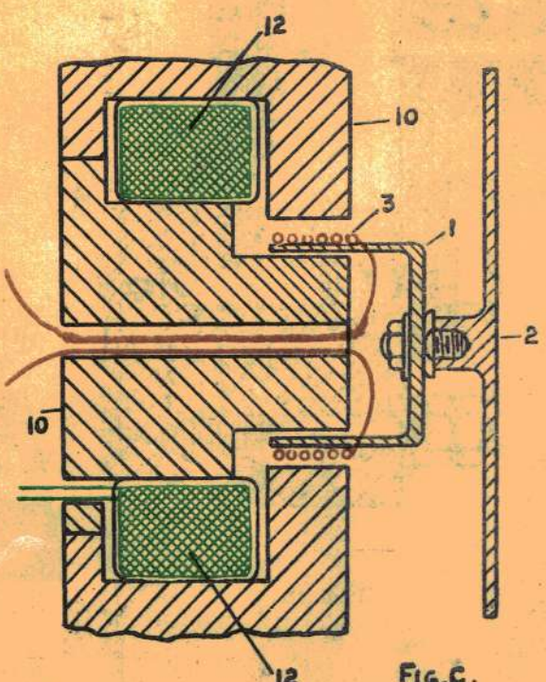


Fig. c.

XA4

TANK HYDROPHONE

Date of design:- 1929.

The Hydrophone consists of the following units:-

(a) Hydrophone Tank.
(b) Hydrophone Diaphragm Unit.
(c) Filling Unit.

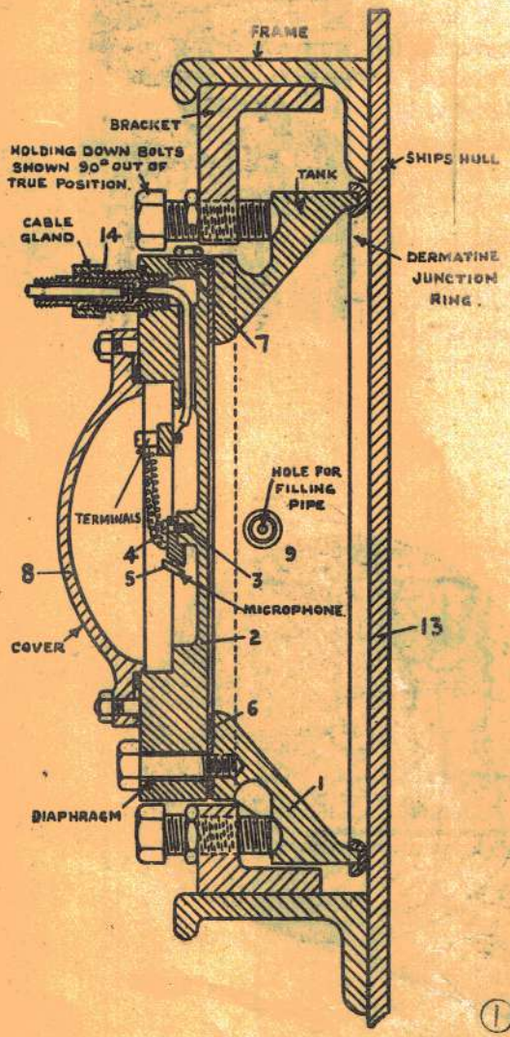
The Hydrophone Tank is of oval shape at its base with a circular face on top in which studs are mounted to take the Hydrophone Diaphragm Unit. The base of the tank is shaped to the curvature of the hull, the joint being made by a channel section dermatine washer. The tank is kept in position against the hull (13) by means of bolts passing through brackets (11) attached to the frames of the ship and which screw down on shoulders on the tank casting (1). A tapped hole (9) is provided in one side of the tank for the attachment of a water filling pipe.

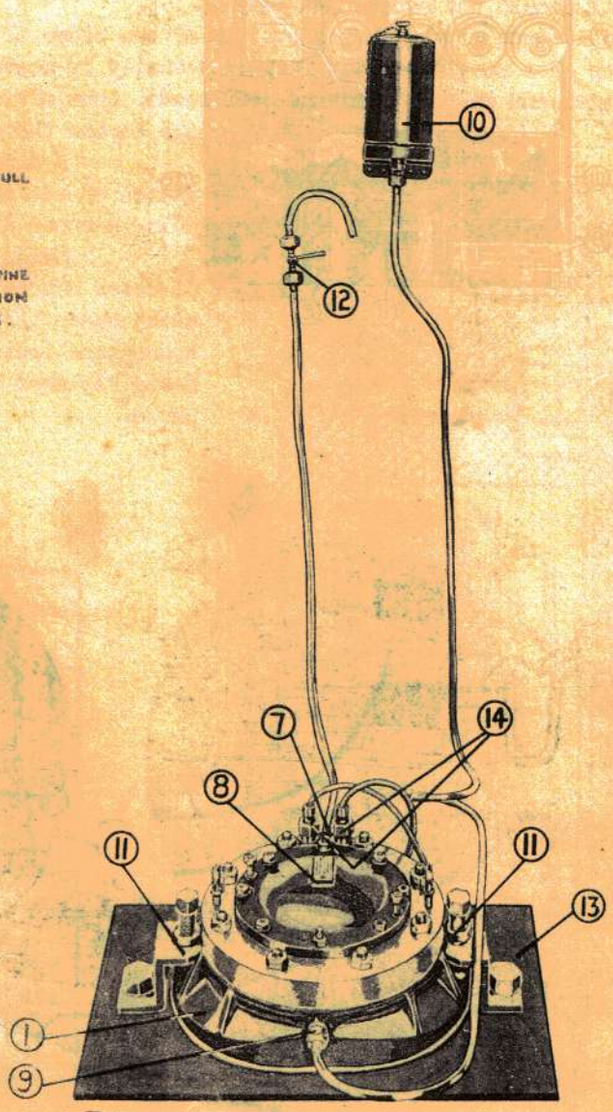
The Hydrophone Diaphragm Unit consists of a diaphragm (2) with a raised box (3) in the centre, on which is screwed a microphone unit consisting of a bakelite adaptor (4) and microphone (5) (see page XA8, figure f.) with electrical leads for connecting to two terminals inside the hydrophone. The external electrical leads are brought in through two glands (14).

A tapped hole (7) is provided at the side of the diaphragm (2) for the attachment of an air release pipe. This hole is in communication with the face of the diaphragm and allows air to escape when the hydrophone tank is being filled with water.

The Hydrophone Diaphragm Unit is bolted down to the top face of the tank, the joint being made by a dermatine washer (6). A domed cover (8) is bolted to the top of the Hydrophone Diaphragm Unit.

The Filling Unit (10) is a small water reservoir situated a few feet above the Hydrophone Tank. It is connected by a copper pipe to the tapped hole (9) in the side of the Hydrophone Tank. The air release pipe is fitted with a cock (12) to stop the water overflow when all air has been expelled from the Hydrophone Tank.





REVOLVING DIRECTIONAL HYDROPHONE MARK VIII XA5

Date of design:- 1925.

This instrument, as its name implies, is capable of being trained round in the direction of maximum intensity of the signal to be received. It consists of two diaphragms (1) fitted at each end of a drum case (2). The centres of the diaphragms are connected by a light tension rod (3).

A button type microphone (4) (see page XA3, figure f.) with an adoptor is connected to the centre of the tension rod.

Two baffle rubber bungs (5), rubber tape and a moulded rubber jacket are fitted to provide sound insulation.

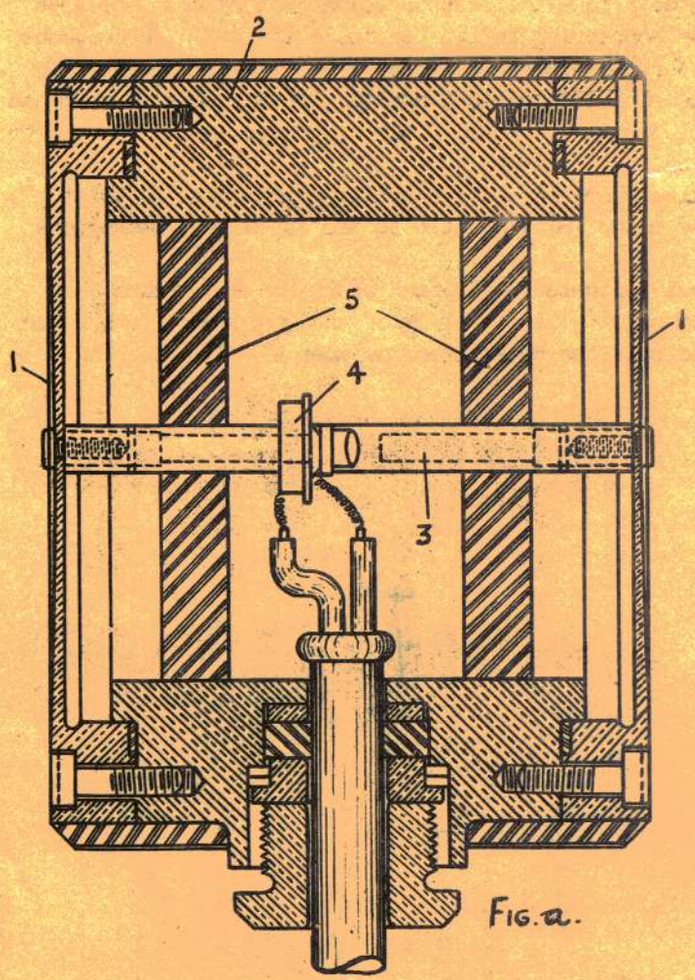


FIG. a.

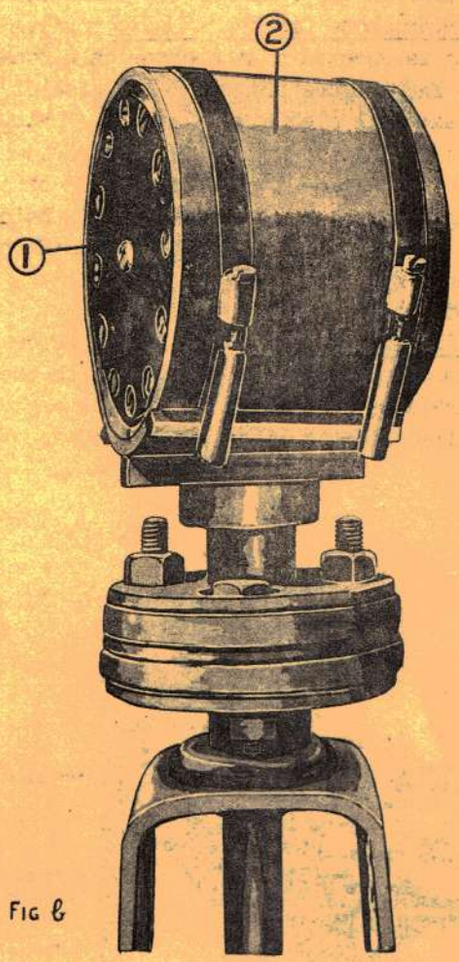


FIG b

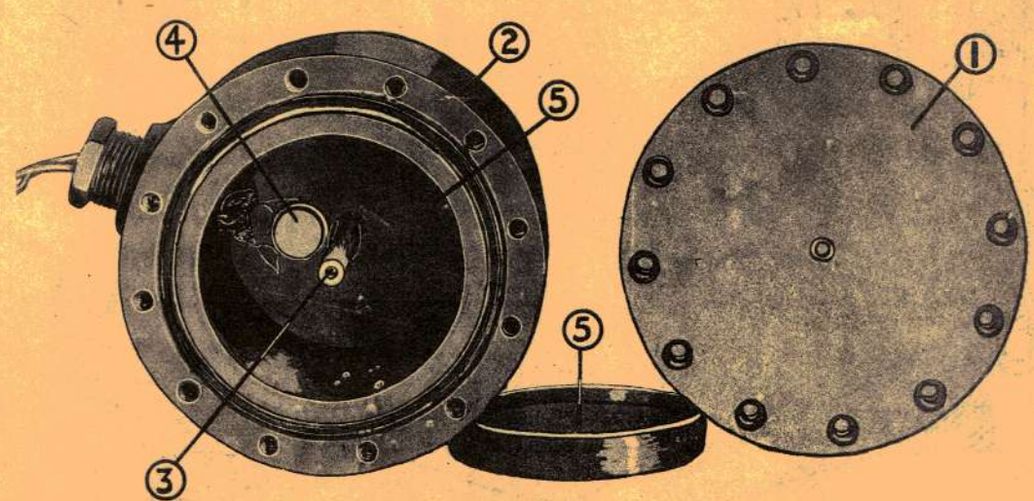


FIG. C.