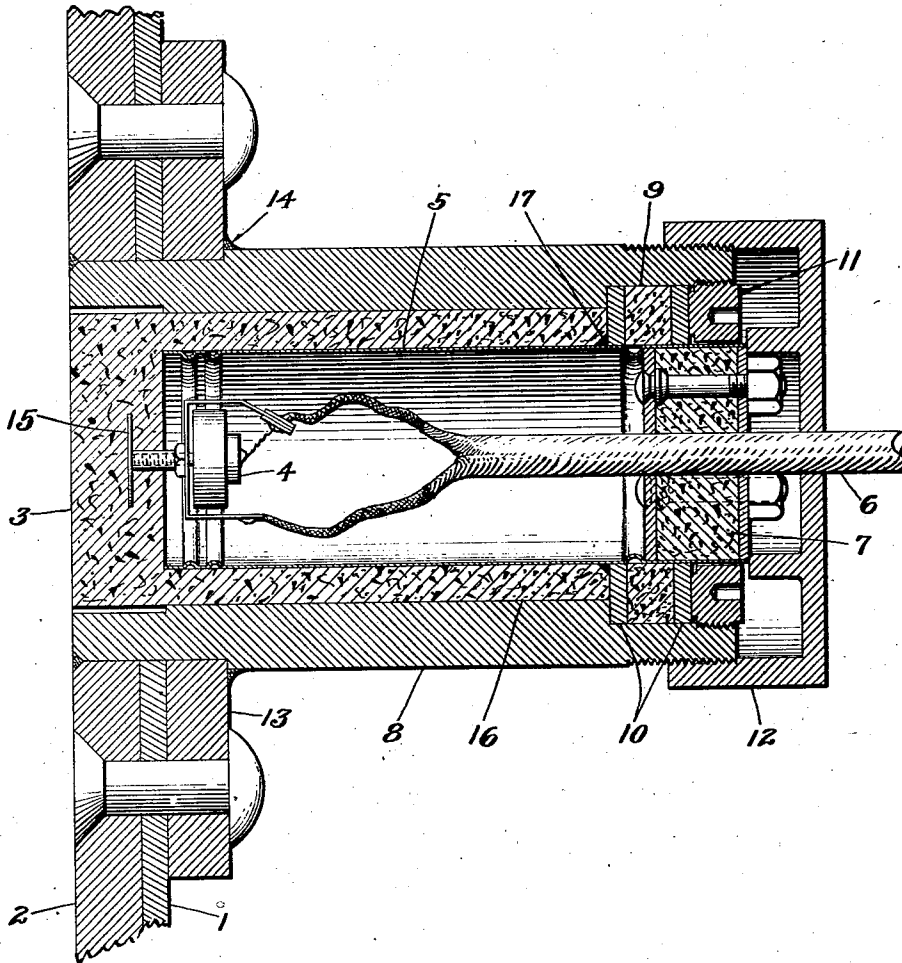


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SUBMARINE SOUND RECEIVER
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SUBMARINE SOUND RECEIVER.

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My invention relates broadly to submarine sound receiving units and more particularly to the mounting of the microphone used therein.

5 It has been demonstrated that the successful reception of submarine sounds requires some type of receiver that responds more efficiently to outside sounds which it is desired to hear than to the numerous local
10 disturbing noises such as are caused by propellers, engines, auxiliary machinery, shifting cargo, slapping waves, and the like. It has also been found that these local noises reach the receiving units, for the most part,
15 through vibrations carried along the ship's plating. It has further been found that the intensity of these disturbing sounds decreases somewhat rapidly in a direction outward perpendicular to the surface of the
20 plates. As a result of these discoveries it has been customary to place the receiving units outside the ship's skin as great a distance as the principles of good construction will permit and to cover them with a blister
25 shaped construction made of thin metal or wood having a streamline form. And to further protect the receiving units from the above noises they are again backed by sound screens. But this construction is a very
30 expensive one.

It is an object of my invention to so mount a receiving unit in a vessel's plating that undesirable sounds communicated along the ship's skin will not affect the diaphragm of
35 the microphone, and to provide a unit that is cheap to manufacture and install and efficient in operation.

It is a well known principle in sound wave propagation that a portion of the wave energy will be reflected back wherever the medium conducting the sound waves changes density or cross-section. The principle of my invention, which I call a "spark plug
40 type installation" depends upon protecting the receiving units from the skin vibrations by making that portion of the skin carrying the receiving units much heavier than is the adjacent plating. This results in reflecting
45 back a part of the skin vibrations when they meet the heavier metal surrounding the receiving units and offers a still further protection from the fact that the part of the vibratory energy that is not reflected back
50 but enters the thick plating will have its

amplitude of vibration reduced within the 55 thick plating because the wave front extends to cover the greater cross-section.

The heavy plating not only serves to protect the region where the receiving units are mounted from the local skin conducted
60 noises but provides a region where the outside sounds can be more sensitively received because the increased inertia of the heavy plating prevents the release of the pressure impulses of the sound waves and thus pre-
65 serves the sound energy for energizing the receiving units.

With the above and other objects in view the invention consists in the novel construction, combination and arrangement of parts
70 as will be more fully hereinafter described.

Referring more particularly to the accompanying drawing, forming part of this specification and in which the figure illustrates a cross section of a receiving unit
75 installed in accordance with my invention, 1 represents the skin or plating of a vessel having a heavy inertia plate 2 riveted thereto. A rubber diaphragm 3 is inserted through openings formed in the skin and
80 inertia plate and carries an inertia microphone 4, which is attached thereto by a threaded stud extending into an interiorly threaded member 15 which is embedded in the body of the diaphragm. The diaphragm
85 is the end portion of a rubber housing 16 extending into the vessel in cylindrical form and which is cemented to a reinforcing metal tube 5. This tube with its rubber housing forms a sliding fit into a heavy cylindrical
90 member 8 except for the length occupied by the diaphragm which is relieved to allow the diaphragm freedom of movement. Watertightness between the tube 5 and member 8 is secured by a soft rubber gasket 9 com-
95 pressed between rings 10 by means of a threaded ring 11. The inside of the inner ring is welded to the tube 5, as at 17. A cap 12, adjustable upon the member 8, serves as a protection to a cable 6, passing through
100 a watertight sandwich type of packing 7 from the microphone chamber, and which carries the two microphone leads. This cap also holds the tube 5 in place. A flange 13 forms an integral part of the member 8 or
105 may be a ring welded thereto around the junction 14. The outer face of the diaphragm 3 comes flush with the outer surface

of the inertia plate 2 in order to preserve the streamlining and prevent eddies which always produce receiver noises.

It will be understood that the shape and dimensions of the inertia plate will be dependent upon the number of and spacing between the receiving units employed and also upon the thickness of the ship's skin. The shielding of the plate is a function of the ratio between its thickness and that of the skin, as a thick skinned vessel requires a thicker inertia plate to give the same relative shielding that a thinner plate does on a vessel having thin skin.

It will be further understood that the above description and accompanying drawing comprehends only the general and preferred embodiment of my invention and that various minor changes in details of construction, proportion and arrangement of parts may be made within the scope of the appended claims and without sacrificing any of the advantages of my invention.

Having described my invention, I claim:

1. In a sound signal receiver, a body provided with an opening, a member of relatively high inertia extending from said opening, a resilient lining within said member, and vibratory responsive means supported by said lining.

2. In a sound signal receiver, a body

structure provided with an opening, reinforcement for said opening of high inertia relative to the body structure, a member extending from said opening of high inertia relative to the body structure, and vibratory responsive means shielded by the member and by the reinforcement of the opening.

3. In a sound signal receiver, a body structure provided with an opening, reinforcement for said opening of high inertia relative to the body structure, a member extending from said opening of high inertia relative to the body structure, a resilient lining to said member and vibratory responsive means supported by the lining and shielded by the reinforcement and the member.

4. In a sound signal receiver, a body structure provided with an opening, a member extending from said opening, a diaphragm supported by but out of direct contact with said member, and a microphone operatively connected to said diaphragm.

5. In a sound signal receiver, a body structure provided with an opening, a member extending from said opening, a diaphragm resiliently supported by but out of direct contact with said member, and a microphone connected to said diaphragm.

HARVEY C. HAYES.