

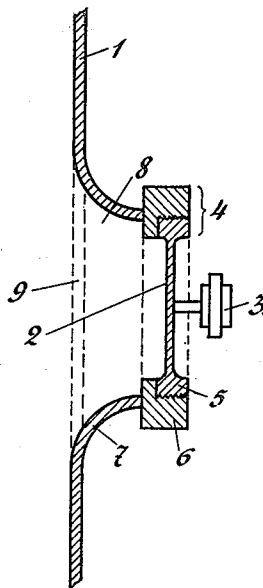
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RECEIVING DEVICE FOR SUBMARINE SOUND SIGNALING.

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by Knight Bros attorneys

UNITED STATES PATENT OFFICE

WALTER HAHNEMANN, OF KITZEBERG, NEAR KIEL, AND WILHELM RUDOLPH, OF KIEL, GERMANY, ASSIGNORS TO SIGNAL GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG, OF KIEL, GERMANY, A FIRM.

RECEIVING DEVICE FOR SUBMARINE SOUND SIGNALING.

Application filed January 31, 1922. Serial No. 533,059.

To all whom it may concern:

Be it known that we, WALTER HAHNEMANN and WILHELM RUDOLPH, citizens of the German Republic, and residing at Kitzberg, near Kiel, and at Kiel, Province of Schleswig-Holstein, and State of Prussia, have invented certain new and useful Improvements in Receiving Devices for Submarine Sound Signaling, of which the following is a specification.

A problem that has often to be solved in installing submarine sound signaling apparatus is that of inserting a tuned vibratory diaphragm in an opening in a wall abutting on water, as for example in the wall of a ship or of a water tank within the ship, etc. It has been found that if such diaphragms are merely attached to the walls in any ordinary way the diaphragm and the wall will have a detrimental influence upon each other. The parts of the wall in the neighbourhood of the diaphragm operate to change the tuning and damping of the diaphragm, and all disturbing effects that arise in the wall then also occur in the diaphragm. When the diaphragm in question is one of considerable area and thickness the interference due to the parts of the wall that lie in its vicinity can be put up with. But the smaller the diaphragm the greater the reactive interference. Submarine sound wave receivers have, as a rule, comparatively small diaphragms and therefore the said difficulties will arise more often in receivers than in large senders with big diaphragms.

The object of this invention is to provide an improved means for protecting a sound diaphragm against interference caused by the parts of the wall in its neighbourhood reacting upon it. This is accomplished by arranging intervening masses of considerable size between the diaphragm and the wall in which it is inserted. The simplest way to do this is to surround the diaphragm with a ring of considerable mass, such as a metal ring. The ring may be integral with or attached to the diaphragm, or it may be attached to the wall that carries the diaphragm. In the latter case the diaphragm is attached to the ring when the receiving device is installed. Of course, both methods could be combined by arranging a portion of the mass at the

edge of the aperture into which the diaphragm is to be inserted and by also providing the diaphragm itself with a thick peripheral edge.

The theoretical explanation of the effect of the above-described arrangement is that the large mass located at the boundary between the supporting wall and the diaphragm due to its inertia is only caused to vibrate very little if at all by the vibrations of both. Hence, very little energy passes from the wall to the diaphragm and vice versa, or in other words the diaphragm and the wall in which it is supported are extremely loosely coupled acoustically.

If the diaphragm is not to be mounted so as to lie flush with, or in the plane of, the ship's wall, but instead is to be mounted some distance back from the exterior surface of the wall, so that a recess or chamber is provided in front of the diaphragm, the effect obtained by the present invention can be enhanced by shaping the receding portions of the wall so that they taper inwardly and form an upstanding edge bounding the aperture. The effect obtained hereby can be still further improved by making the receding portions of the wall convex. The recess or chamber located before the diaphragm and filled with water may be closed or it may be open to the external water.

An embodiment of the invention is illustrated in the accompanying drawing which represents a section through a wall fitted with a sound diaphragm. 1 is the wall of a floating body, 2 the vibratory sound receiving member or diaphragm and 3 a microphone. The composite mass or inertia member 4 consists of an inner portion 5 integral with the diaphragm and an external portion 6 welded or otherwise secured to the wall of the floating vessel. The two annular portions 5, 6 are screwed together to attach the diaphragm and form a unitary mass. The wall 1 extends inwards towards the interior of the floating vessel and forms a tapering shell 7 with convex outer surfaces. The recess or chamber 8 thus formed in front of the diaphragm may or may not be closed and tightly sealed against the external water by a plate 9, as desired.

An alternative arrangement to sealing the recess or chamber 8 by a plate 9 consists

in attaching a tapering hollow body like 7 to the interior surface of the unperforated wall, instead of perforating the wall.

The present invention renders it possible to produce a standard type of sound receiver in a factory and to give all receivers the same tuning. Changes of the acoustical properties of the receiving apparatus, which occurred hitherto when the apparatus was installed and were due to stresses in the neighbouring portions of the supporting wall or reaction of these portions on the apparatus, are obviated.

We claim:

1. In submarine sound signaling plants, a body provided with an aperture, a vibratory member located within said aperture, and a mass interposed between said member and said body; said mass having greater inertia than that of the local portions of the said body in which undesired vibrations may occur and greater inertia than that of the said vibratory member, in order to acoustically insulate said member from said body.

2. In submarine sound signaling plants, a body provided with an aperture, a vibratory member located within said aperture, and a boundary portion between said member and said body; said boundary portion having greater inertia than that of the local portions of the said body in which undesired vibrations may occur and greater inertia than that of the said vibratory member, in order to acoustically insulate said member from said body.

3. In submarine sound signaling plants, a body provided with an aperture, a vibratory member located within said aperture, and a ring interposed between said member and said body; said ring having greater inertia than that of the local portions of said body in which undesired vibrations may occur and greater inertia than that of the said vibratory member, in order to acoustically insulate said member from said body.

4. In submarine sound signaling plants, a body provided with an aperture, a vibratory member located within said aperture, and a metallic mass interposed between said member and said body; said metallic mass having greater inertia than that of the local portions of said body in which undesired vibrations may occur and greater inertia than that of the said vibratory member, in order to acoustically insulate said member from said body. 50 55

5. In submarine sound signaling plants, a body provided with a wall having an aperture therein and tapering inward to form an upstanding edge bounding said aperture, 60 a vibratory member mounted within said aperture, and a mass interposed between said member and said wall; said mass having greater inertia than that of the local portions of said wall in which undesired vibrations may occur and greater inertia than 65 that of the said vibratory member, in order to acoustically insulate said member from said wall.

6. In submarine sound signaling plants, a 70 body provided with a wall having an aperture therein and tapering inward toward said aperture in such manner as to present a convex outer surface, a vibratory member mounted within said aperture, and a mass 75 interposed between said member and said wall; said mass having greater inertia than that of the local portions of said wall in which undesired vibrations may occur and greater inertia than that of the said vibra- 80 tory member, in order to acoustically insulate said member from said wall.

In testimony whereof we affix our signatures in presence of two witnesses.

WALTER HAHNEMANN.
WILHELM RUDOLPH.

Witnesses:

A. MARSTEN,
EMIL LUTZ.