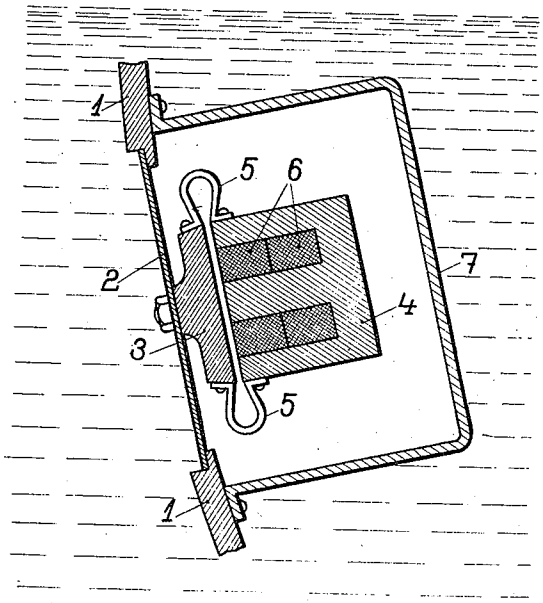
Feb. 17, 1925. 1,526,414

A. DU BOIS-REYMOND

ARRANGEMENT OF VIBRATING APPARATUS FOR SOUND SIGNALING

Filed Jan. 5, 1921



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ARRANGEMENT OF VIBRATING APPARATUS FOR SOUND SIGNALING.

Application filed January 5, 1921. Serial No. 435,296.

To all whom it may concern:

Be it known that I, ALARD DU BOIS-REYMOND, citizen of the German Republic, and residing at Plon, county of Schleswig-Holstein, State of Prussia, Germany, have invented certain new and useful Improvements in Arrangements of Vibrating Apparatus for Sound Signaling, (for which I have filed an application in Germany on October 23, 1915, Patent No. 345,791; in Austria on October 26, 1916, Patent No. 89,005; in Hungary on October 28, 1916, Patent No. 81,647; in Denmark on June 25, 1919, Patent No. 27,923; in Norway on June 30, 1919, Patent No. 32,895; in Sweden on July 9, 1919, Patent No. 46,991; in France on May 19, 1920, Patent No. 515,754; in England on June 8, 1920, Patent No. 144,664; in Italy on June 19, 1920, Patent No. 530/201; in Holland on July 26, 1919, Patent No. 9,132; in Argentina on May 20, 1921, Patent No. 20,432), of which the following is a specification.

Electromagnetically actuated vibrating apparatus which act as sound transmitters or receivers are known in which two or more parts are made to execute mutual oscillations by some agency such as alternating electric currents or sound waves, and in which one of the said parts is attached to, or consists of, a diaphragm, or a wall acting as a diaphragm, that abuts against the sound propagating medium, while the other part or parts are attached to something else and so adjusted as to be at a certain distance from the part that is fixed to the diaphragm, or from the diaphragm itself. With this arrangement it is easy to fix the said distance for certain definite conditions of operation, but in all cases in which the diaphragm becomes bent, as for example when the diaphragm is subjected to sufficient static pressure, the said distance is changed.

The changeableness of the distance between the parts becomes a matter of special importance in cases where the electromagnetic sound producer or receiver, in which masses of iron or current conductors are set in motion, is to be used at different depths under water. The diaphragm is bent inwards under the influence of the external water pressure applied to it and hence the air-gap between the armature and the magnet, or between the oscillating current-conducting parts, is changed.

The object of this invention is to prevent this change of the distance between the mutually oscillating parts. This is accomplished by attaching the parts of sound producers or receivers of this kind—which, for the proper working of the instrument, should always be the same distance apart—directly or indirectly to the diaphragm itself in such a manner that they are all displaced by the effect of the static pressure to the same extent and in the same direction. The connecting members by which the parts are joined together or which join a part to the diaphragm must then be of a kind, or if elastic of a size, that permits of an oscillating movement of the parts toward and away from each other. The invention is carried into effect either by attaching separate parts of the apparatus to different parts of the diaphragm that execute motions equal in magnitude and direction, or by first assembling the parts of the oscillating apparatus so as to form a complete oscillator, which is then advantageously fixed to a single point of the diaphragm, or to a plate or surface which is attached to, or forms a part of, the diaphragm, the plate or surface being either rigid in itself or made unbending by stiffening members.

The arrangement is then of a kind in which the elastic members that connect the mutually oscillating parts serve to hold them at a certain normal distance from each other, which distance is not varied when the diaphragm is bent by static pressure.

A way of carrying out the invention is shown in the drawing in which an electromagnetically actuated sound producer having a special armature attached to a diaphramg is diagrammatically illustrated.

1 is the skin or hull of a vessel or the like, 2 a diaphragm abutting against the water, 3 the armature of an electro-magnet, 4 the electromagnet, 5 elastic connecting members between the armature and the electromagnet which permit of oscillations in opposite phase of the armature and the electro-magnet, 6 magnetizing coils for the electro-magnet, and 7 a protective casing.

It is evident that in the described design

the distance across the gap between the active iron masses 3 and 4 of the electro-magnetic system is maintained by the elastic connecting members 5, 5 and is quite independent of the extent to which the diaphragm 2 might be bent by using the sound producer at different depths of water.

It will be obvious that the position of the parts may be reversed from that shown, so that the armature 3 is freely vibratable while the electromagnet is attached directly to the diaphragm.

I claim:

In electro-magnetic submarine sound communication apparatus, a diaphragm abutting against the water and subject to its static pressure, and an electro-magnetic system carried by said diaphragm; said electro-magnetic system comprising an electro-magnet, an armature, and elastic connecting means holding the electro-magnet and the armature a certain distance apart when they are not in oscillation and permitting them to move toward and away from each when they are in oscillation, whereby the normal distance between the electro-magnet and the armature is not varied when the diaphragm is bent by said static pressure.

In testimony whereof I affix my signature in presence of two witnesses.

ALARD DU BOIS-REYMOND.

Witnesses:
LEONID ADELMANN,
BRUNO MÜLLER.