S. M. DAVISON.

SOUND RECEIVING DEVICE.

APPLICATION FILED JUNE 5, 1909. RENEWED MAY 25, 1910.

1,002,903. Patented Sept. 12, 1911.

Fig. 1.

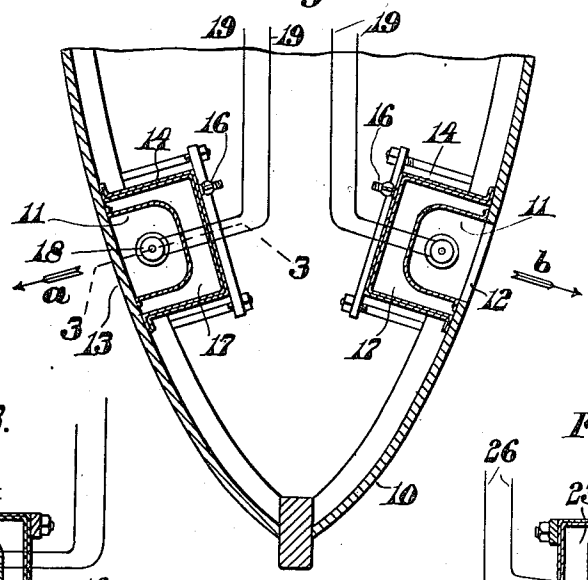


Fig. 3.

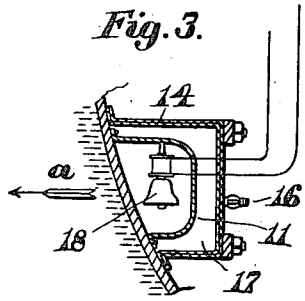


Fig. 4.

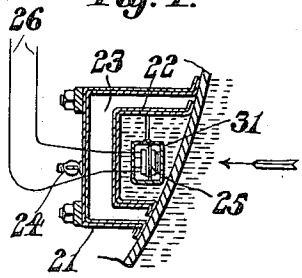


Fig. 5.

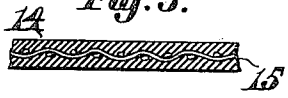
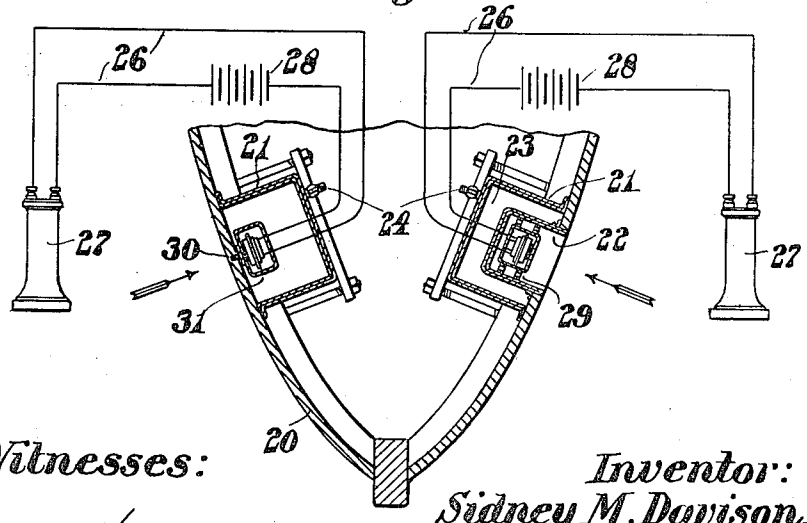


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SOUND-RECEIVING DEVICE.

1,002,903. Specification of Letters Patent. Patented Sept. 12, 1911.

Application filed June 5, 1909, Serial No. 500,786. Renewed May 25, 1910. Serial No. 563,399.

To all whom it may concern:

Be it known that I, SIDNEY M. DAVISON, a citizen of the United States of America, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Sound-Receiving Devices, of which the following is a specification.

This invention relates to the transmission of signals under water and it has for its principal object the provision of a means for intensifying the sounds produced and directing the sound vibrations produced by said signal-producing device through the skin or hull of the vessel so that they may be heard at great distances from said signal-producing device.

Another very important feature of the invention is the provision of a means for intensifying the sounds received by the sound receiver by insulating said sound receiver from all the ship's noises and other sound vibrations so that only such sound vibrations as are received from the signal-producing device are transmitted to the telephone receiver.

The invention consists primarily in securing to the skin of a vessel an inclosure in which is positioned a shell or casing free from the walls of said inclosure, these forming a chamber between the outer walls of the casing and the inner walls of the inclosure from which the air may be withdrawn to form a vacuum which absolutely prevents any sound vibrations passing to the interior of the inner chamber in which the signal-producing member or the sound-receiving device is suspended.

The invention further consists in certain novel features of construction and arrangement of parts which will be readily understood by reference to the description of the drawings and to the claims hereinafter given.

Of the drawings: Figure 1 represents a horizontal section of a portion of the bow of a vessel showing on either side thereof receptacles secured to the skin of the vessel in which the sound-producing device is located. Fig. 2 represents a similar section of another vessel showing the receptacles containing the sound-receiving device. Fig. 3 represents a vertical section, the cutting plane being on line 3—3 on Fig. 1. Fig. 4 represents a vertical section of a modified form of the sound-receiving device and the receptacle in which it is contained, and Fig. 5 represents a sectional detail considerably enlarged of a portion of the inclosure showing the metal reinforcing embedded in the material.

Similar characters designate like parts throughout the several figures of the drawings.

In the drawings, 10 represents the bow of a boat to the skin or wall of which it secured a casing 11 which may be open to the water in which the vessel floats, as indicated at 12, Fig. 1, or closed by the skin of the vessel, as indicated at 13, Fig. 1.

When the casing 11 is closed, as shown in Fig. 1 at 13, its interior may be filled with air, water, or any other medium adapted to transmit sound vibrations although the use of a liquid is preferable. Surrounding the casing 11 but separated therefrom is an inclosure 14 which likewise is secured to the skin or wall of the vessel 10 in any desired manner. This inclosure is made up of pure gum rubber or some similar non-conductor of sound vibrations and has embedded therein metal reinforcing members 15 which stiffens the same and causes the inclosure to retain its shape. One wall of the member 14 is provided with a valve 16 through which the air in the chamber 17 between the casing 11 and inclosure 14 may be withdrawn to produce a vacuum therein.

It is obvious that any ship's noises which might strike the walls of the inclosure 14 will be deadened by the non-conductiveness of the material of which this inclosure is made and that any sounds which may by chance pass through the walls of the inclosure 14 will be absolutely prevented from passing through the vacuum chamber 17 to the casing 11, while at the same time the sound vibrations caused by the ringing of the bell 18 therein will be prevented from

passing into the interior of the vessel and thus annoying the passengers.

Within the casing 11 is suspended the bell 18 or some other sound-producing member which is operated electrically in any well-known manner through the wires 19, or said bell may be operated mechanically or otherwise if desired. It is obvious therefore that when a sound is produced by the bell 18 the vibrations therefrom will pass through the medium contained within the casing 11 whether it be air or water or some other gas or fluid, and these sound vibrations thus produced will be directly transmitted to the water in which the vessel floats, through the opening 12 in one case, or through the skin of the vessel, closing the outer end of the casing 11, as indicated at 13. The sound vibrations thus produced by either of the vessels or other audible signals or producers of sound vibrations will be transmitted in the direction of the arrows "*a*" and "*b*" on Fig. 1.

In Fig. 2, 20 represents the bow of another vessel to the skin of which is secured by any well-known means an inclosure 21 similar to that of the inclosure 14 and within this inclosure 21 is a shell or casing 22 also secured to the skin of the vessel but separated from the interior walls of the inclosure 21, thereby leaving a chamber 23 between the casing and inclosure from which the air may be withdrawn through the valve 24, thus leaving a vacuum within said chamber 23 and insulating thereby the casing 22 from all sound vibrations which might contact with the inclosure 21. Within the casing 22 is positioned one or more microphones 25 adapted to receive and intensify all sound vibrations passing thereto, said sound vibrations being transmitted therefrom through the wires 26 to suitable telephone receivers 27 forming a circuit with said microphone 25 in which circuit is included a suitable source of electric energy, such as the battery 28. The microphone 25 may be suspended in the casing 22 as indicated in Fig. 4; supported in position by means of the perforated ring 29 of rubber or other non-conductor of sound, as shown at the right of Fig. 2; or said microphone may be secured directly to the skin of the vessel as indicated at 30 at the left of Fig. 2, all without affecting the principles of the present invention. In like manner the casing 22 may communicate directly with the water in which the vessel floats, as shown at the right of Fig. 2 of the drawings, or be separated therefrom by the skin of the vessel, as shown in Fig. 4 of the drawings, in which latter case the casing will be filled with water in which the microphone is submerged.

In all cases it is preferred that the microphone should be inclosed in a metal casing 31 to prevent the microphone from being affected by dampness when submerged in the water or from being affected by the air pressure when said microphone is secured directly to the skin of the vessel, as indicated at the left of Fig. 2 of the drawings.

It is quite obvious that by such a construction as is herein shown the transmission of the sound vibrations from the interior of the vessel to the chamber in which the sound-producing member is located or to the chamber in which the sound-receiving member is positioned is wholly prevented. By thus inclosing the sound-producing devices the distance that sound may be sent is greatly increased and by inclosing the sound-receiving devices the distance that the sound may be clearly heard is greatly increased, owing to the absence of all other interfering noises which are wholly excluded by the present system.

While it has been found to be of great advantage to make the casing and inclosure of pure commercial gum rubber or some other non-conductor of sound capable of holding water and reinforced by wire metal that is neither in contact with the liquid in the casing nor with the skin of the vessel, it is quite obvious that some other form of casing could be used and made of other material provided the casing or shell was secured to the skin of the vessel so that it would contain water but be insulated from said skin or hull of the vessel.

It is believed that the operation and many advantages of the invention will be fully apparent from the foregoing.

Having thus described my invention, I claim:

1. In an apparatus for signaling under water, the combination of an inclosure secured to the skin of a vessel and from which the air is adapted to be withdrawn; an inclosed casing within said inclosure and free from the walls thereof, and a microphone in said casing.

2. In an apparatus for signaling under water, the combination of an inclosure secured to the skin of a vessel from which the air is adapted to be withdrawn; a casing contained within said inclosure and free from its walls adapted to contain a fluid; and a sound-receiving device within said casing submerged in said fluid.

3. In an apparatus for signaling under water, the combination of an inclosure secured to the skin of a vessel and composed of a non-conductor of sound vibrations; a fluid-containing casing contained within said inclosure free from its walls; and a sound-receiving device suspended in the fluid contained in said casing.

4. In an apparatus for signaling under

water, the combination of an inclosure secured to the skin of a vessel and composed of a non-conductor of sound vibrations reinforced by metal members embedded therein; a fluid-containing casing contained within said inclosure free from its walls; and a sound-receiving device suspended in the fluid contained in said casing.

Signed by me at 4 Post Office Sq., Boston, Mass., this 21st day of April, 1909.

SIDNEY M. DAVISON.

Witnesses:
WALTER E. LOMBARD,
NATHAN C. LOMBARD.