

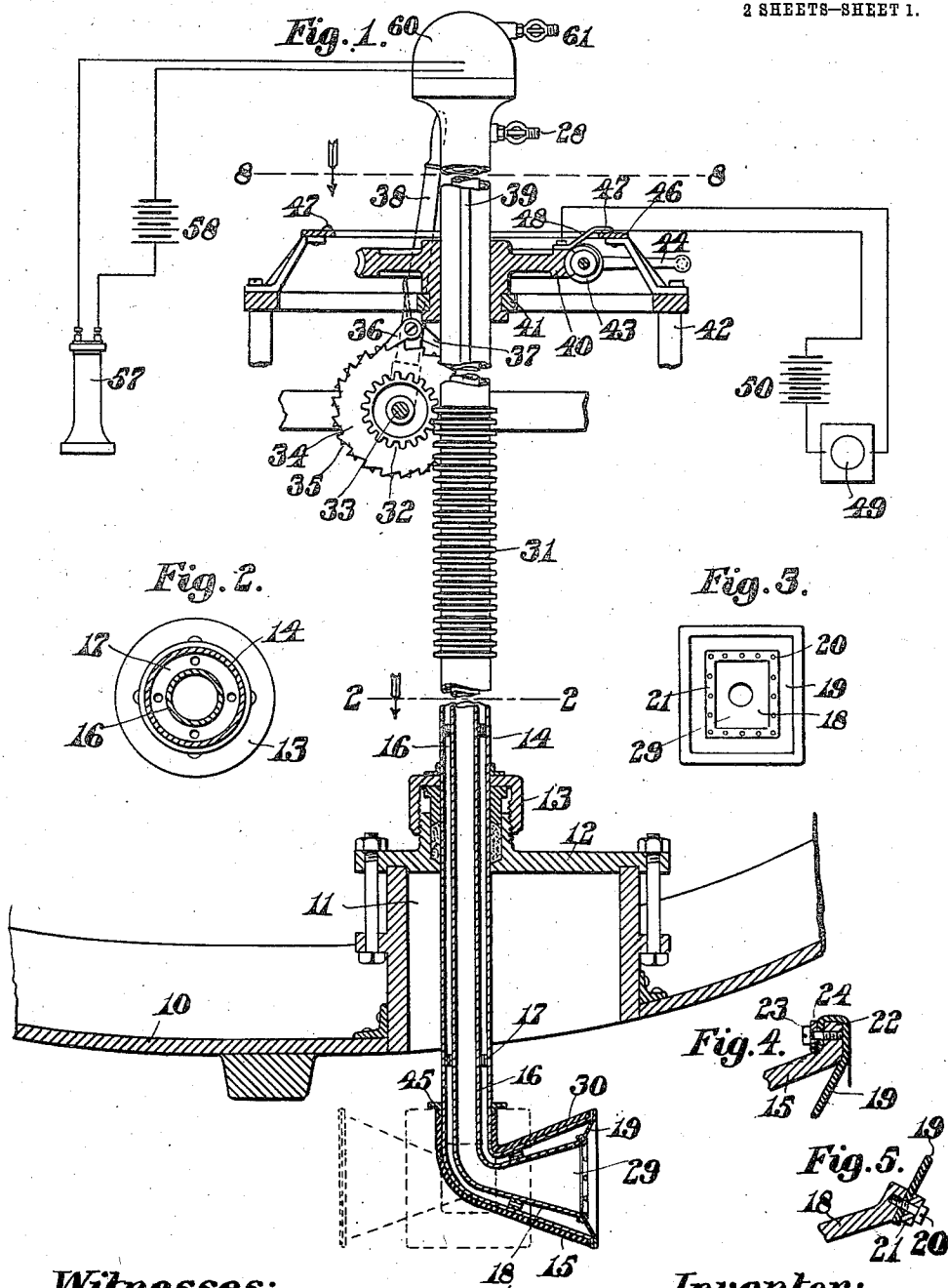
S. M. DAVISON.
SOUND RECEIVING DEVICE.

APPLICATION FILED APR. 22, 1909. RENEWED MAY 25, 1910.

1,002,567.

Patented Sept. 5, 1911.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 6.

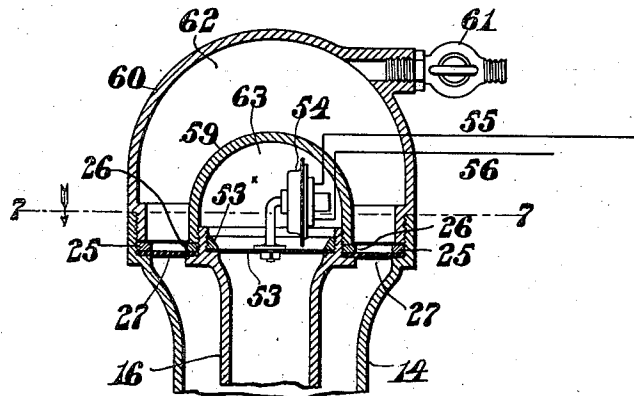


Fig. 7.

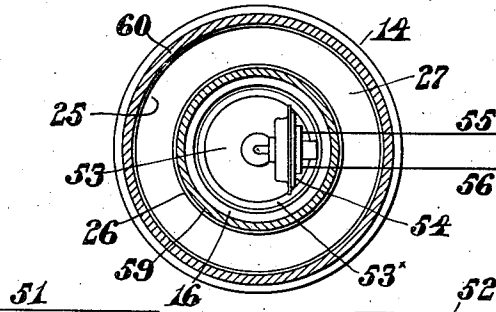
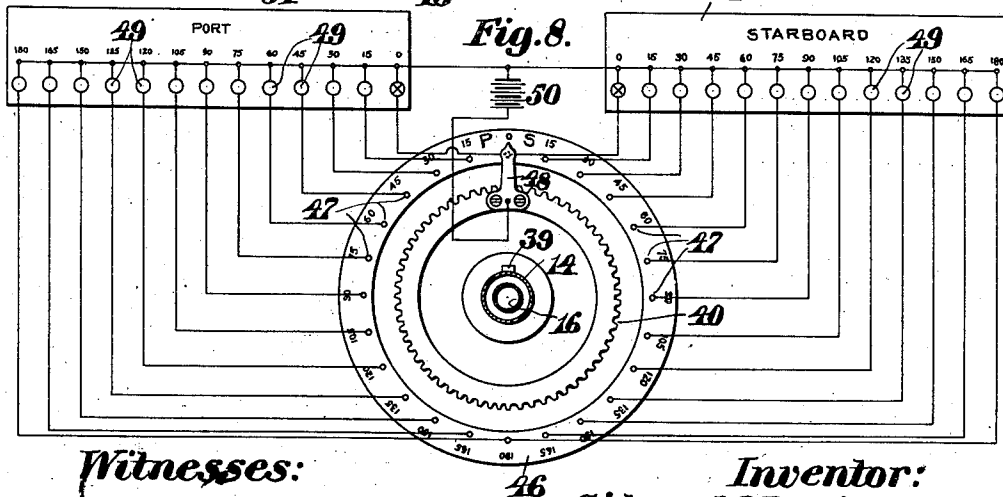


Fig. 8.



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UNITED STATES PATENT OFFICE.

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SOUND-RECEIVING DEVICE.

1,002,567.

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Patented Sept. 5, 1911.

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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 sound transmitters and receivers especially adapted to receive sound vibrations communicated thereto by a suitable medium interposed between the sound signaling apparatus and the receiver, this medium preferably being water.

It has for one of its objects the production of a device of this nature which is adapted to be moved about a vertical axis and is provided with a flaring mouth adapted to receive the sound vibrations which may be turned in any direction in order to ascertain the exact direction of the sound communicated thereto.

The invention further consists in providing a means of indicating the direction from which the sound vibrations come.

The invention still further consists in surrounding said apparatus by an inclosed vacuum chamber adapted to exclude from said device all ship noises and other sound vibrations except those which are admitted through the open flaring end of the receiver.

The invention further consists in surrounding the exterior walls of said receiver with a casing of material adapted to deaden the sound vibrations and exclude all such vibrations except those entering through the open mouth of the receiver.

The invention further consists in providing in the skin of the vessel an open chamber in which the receiver is adapted to be contained when the ship is in motion and from which it is adapted to be lowered below the keel of the vessel so that it may be used for the purpose of ascertaining the direction of any desired audible signal.

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

section through a portion of the hull of a vessel and showing partly in elevation and partly in section a sound-receiving device embodying the features of the present invention. Fig. 2 represents an enlarged horizontal section of the same, the cutting plane being on line 2—2 on Fig. 1. Fig. 3 represents an elevation of the open end of the receiver. Figs. 4 and 5 represent details showing the method of securing to the shells of said receiver the member for closing the outer end of the chamber between these two shells. Fig. 6 represents an enlarged vertical section of the upper end of the receiver. Fig. 7 represents a horizontal section of the same, the cutting plane being on line 7—7 on Fig. 6, and Fig. 8 represents a horizontal section of the same, the cutting plane being on line 8—8 on Fig. 1 and showing in diagram the various signals adapted to indicate the angle of the sound signaling device from the longitudinal axis of the vessel in which the receiving device is mounted.

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

In the drawings, 10 represents a portion of the hull of a vessel in which is constructed in any suitable manner a walled chamber 11 communicating with the water in which the vessel 10 floats. The inner wall 12 of said chamber 11 is provided with a stuffing box 13 through which extends a tubular member 14, the lower end of which is at right angles to the axis of said tubular member 14, as indicated at 15 in Fig. 1, this portion being flaring with its outer end of greater area than its inner end.

Within the tubular member 14 and in axial line therewith is another tubular member 16 positioned within the tubular member 14 by a plurality of perforated collars 17 preferably of felt or some similar non-conductor of sound. This tubular member 16 is also provided with a flaring lower end 18 centrally located within the casing 15. Between the outer ends of the flaring members 15 and 18 is secured a perforated plate 19 of rubber or some similar non-conductor of sound, this plate 19 being secured at its inner edge to the outer end of the flaring member 18 by means of a plurality of screws

20 passing through a clamp ring 21, while the outer edge of said plate passes over the flange 22 of the flaring member 15 and is secured thereto by means of a plurality of
 5 screws 23 passing through a clamping member 24.

The upper ends of the members 14 and 16 have clamped thereto by means of the annular threaded members 25 and 26 an
 10 annular plate 27 of rubber or some similar non-conductor of sound, this annular plate 27 being interposed between the two members and preventing them from contacting with each other. The two tubular members
 15 14 and 16 with their flaring ends 15 and 18 are thus separated throughout their length by means of the separators 17 and the rubber rings or plates 19 and 27 thus leaving a chamber surrounding the inner shell 16
 20 and 18 from which the air may be drawn through an exhaust valve 28 to produce a vacuum therein. It is obvious that when a vacuum has been created within this chamber surrounding the shell 16—18 no sound
 25 such as the usual ship noises or other sound vibrations which may strike the outer shell 14 and 15 through the water in which the vessel 10 floats can pass through this vacuum chamber to the inner shell 16—18. It
 30 is obvious therefore that by means of this vacuum all noises are excluded from the interior of the shell 16 except those which pass into the same through the open end 29 thereof. In order to further deaden any sound
 35 vibrations which might pass through the water in which the vessel floats, the outer flaring end 15 is inclosed within a coating 30 of rubber or some other non-conductor of sound. The tubular member 14 is provided above the stuffing box 13 with a plurality of annular teeth 31 meshing with the
 40 teeth of a gear 32 upon a shaft 33 to which is also secured two ratchet wheels 34 and 35, the teeth of which are disposed in opposite directions and are adapted to be engaged respectively by means of the spring-pressed
 45 pawls 36 and 37 pivotally mounted upon a handle 38. It is obvious that by manipulating the handle 38 the gear 32 may be
 50 turned in either direction to raise or lower the tube 14 through the medium of the annular teeth 31. Normally when the ship is in motion the flaring end 15—18 of the receiver is located within the chamber 11 so
 55 that it will not retard the motion of the vessel or be in position to be injured by any obstruction which might be met. As soon, however, as it is desired to use the receiver in order to ascertain the direction of any
 60 audible signal at a distant point the handle 38 would be operated to lower the flaring end 15—18 of the receiver into the position shown in full lines in Fig. 1 of the drawings.

65 The tubular member 14 is provided with

a key 39 extending longitudinally thereof which is always in engagement with the worm gear 40 surrounding said tubular member 14 and prevented from vertical
 70 movement by means of the collar 41 on any suitable stationary frame 42 engaging with the annular groove within the hub of said worm gear 40, as indicated plainly in Fig. 1 of the drawings. A worm 43 engages with
 75 said worm gear 40 and is adapted to rotate the receiver about its vertical axis whenever the worm 43 is turned by means of the crank 44 secured to its shaft. It is obvious, therefore, that means is thus provided whereby
 80 by the flaring end 15—18 of the receiver may be turned in any direction about the axis of the tubular members 14 and 16 and means are also provided whereby the receiver may be raised and lowered without
 85 disturbing the devices for rotating said receiver. When the receiver is raised into the chamber 11 the flanges 45 secured to the tubular member 14 serve as a means for limiting the upward movement of said receiver by contacting with the wall 12 of the
 90 chamber 11.

The framework 42 is provided with a dial 46 which dial is provided with a plurality of electric contacts 47 with any one of which
 95 the pointer finger 48 secured to the revolvable worm gear 40 is adapted to engage to make an electric circuit and cause a visual signal to be operated, as, for instance, a lamp 49. The current for this light is supplied from any suitable source of supply, as, for instance, the battery 50. The dial 46 is
 100 positioned upon the vessel so that the zero point and the 180° point thereon correspond with the longitudinal axis of the vessel and the contact members 47 are disposed about the dial at stated intervals representing so many degrees port or starboard and in the
 105 pilot house or at any other convenient point suitable boards 51 and 52 are located each being provided with a plurality of lamps 49, one of these boards 51 being adapted for use in indicating sounds coming from the port side and the other for the purpose of
 110 indicating sound coming from the starboard side. It is obvious from an inspection of the diagram indicated in Fig. 8 that whenever the pointer 48 contacts with any one of the contacts 47 that the lamp 49 connected in
 115 circuit therewith will be lighted to indicate to the pilot or the sailing master the exact direction relative to the axis of the vessel of the signal the sounds of which are being received through the receiving device.

The upper end of the tubular member 16 is closed by means of a metal diaphragm 53
 125 secured in position by means of the threaded annulus 53* engaging with female threads upon the end of said tubular member 16. To this diaphragm 53 is secured in
 130 any suitable manner a microphone 54 from

which wires 55 and 56 extend to a telephone 57 forming a circuit in which is located a suitable source of electric energy such as the battery 58. It is obvious therefore that any sound vibrations which are received into the open end 29 of the shell 16—18 are transmitted through this shell to the diaphragm 53 and thence to the microphone 54 where they are intensified and act in the usual manner through the electric circuit 55—56 upon the telephone receiver 57 to reproduce the sound at a distant point, such, for instance, as the pilot house. By the use of a telephone or speaking tube the sailing master or pilot may easily regulate the movement of the receiver about its vertical axis and when the open end 29 has been finally located in a position where the sounds received by the telephone 57 are the loudest, the lamp 49 lighted at this time will indicate the exact direction of said signal.

In order to shut out external ship noises from the microphone 54 a cap 59 is secured to the upper end of the member 16 and in like manner an outer cap 60 is secured to the upper end of the tubular member 14, this cap 60 being provided with an exhaust valve 61 by means of which the air may be withdrawn from the chamber 62 between said caps so that a vacuum will be created within said chamber which will prevent absolutely any transmission of sound vibrations from the outer cap to the interior chamber 63 within the cap 59 in which the microphone 54 is located.

While the apparatus as shown and described is especially designed to enable mariners to ascertain their position in foggy or thick weather by submarine signals the whole device might be equally as well utilized for other purposes and when inverted for the purpose of receiving communications in the air.

One of the great advantages of the present device is that it does away with the necessity of swinging the ship in order to accurately locate any submarine sound, as is now necessary with the submarine signal receiving apparatus, which is in general use, as by the device herein shown the ship can keep on its course without any deviation while the apparatus may be turned in any direction about its vertical axis and the signal located definitely relative to the longitudinal axis of said vessel. Obviously this is a great advantage.

One advantage of the construction shown is that the microphone is so located that access can be obtained thereto by the removal of the caps 59 and 60 without interfering with the tubular members 14—16 and the vacuum chamber between them.

In most of the submarine-receiving apparatus now in use dependence is placed en-

tirely upon the balance of two microphones on either side of the ship, this obviously being a great objection as it is almost impossible to make two microphones exactly balance and remain so for any time as a ground is liable to occur in either one of the pair.

One advantage of the construction shown and described in the present application is that by the location of the microphone at the upper end of the sound receiver with the diaphragm out of contact with the water, there is less liability of the microphone becoming inoperative owing to its becoming affected by dampness.

Having thus described my invention, I claim:

1. An apparatus adapted to ascertain the direction from which sound comes, consisting of two separated shells; a pure gum rubber separator between said shells; and means whereby the air may be withdrawn from the chamber formed between said shells.

2. A subaqueous audible signal receiving apparatus, consisting of two shells located one within the other, a vacuum chamber between said shells and sound insulating, vacuum retaining material separating and connecting said shells.

3. A subaqueous audible signal receiving apparatus, consisting of two metal shells located one within the other, a vacuum chamber between said shells, and sound insulating, vacuum retaining material separating and connecting said shells.

4. A subaqueous audible signal receiving apparatus, consisting of two shells located one within the other, an electric transmitter disposed within the inner shell, a vacuum chamber between said shells and sound insulating, vacuum retaining material separating and connecting said shells.

5. A subaqueous audible signal receiving apparatus, consisting of two metal shells located one within the other, an electric transmitter disposed within the inner shell, a vacuum chamber between said shells, and sound insulating, vacuum retaining material separating and connecting said shells.

6. A subaqueous audible signal receiving apparatus, consisting of two shells located one within the other, a vacuum chamber between said shells, and rubber separating and connecting said shells.

7. A subaqueous audible signal receiving apparatus, consisting of two metal shells located one within the other, a vacuum chamber between said shells, and rubber separating and connecting said shells.

8. A subaqueous audible signal receiving apparatus, consisting of two shells located one within the other, an electric transmitter disposed within the inner shell, a vacuum chamber between said shells, and rubber separating and connecting said shells.

9. A subaqueous audible signal receiving apparatus, consisting of two metal shells located one within the other, an electric transmitter disposed within the inner shell, a
5 vacuum chamber between said shells and rubber separating and connecting said shells.

Signed by me at 4 Post Office Sq., Boston, Mass., this 17th day of April, 1909.

SIDNEY M. DAVISON.

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