July 31, 1923. 1,463,507

W. HAHNEMANN

DEVICE FOR INCREASING THE SOUND ENERGY WITH SUBMARINE SOUND TRANSMITTERS

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Fig. 1.

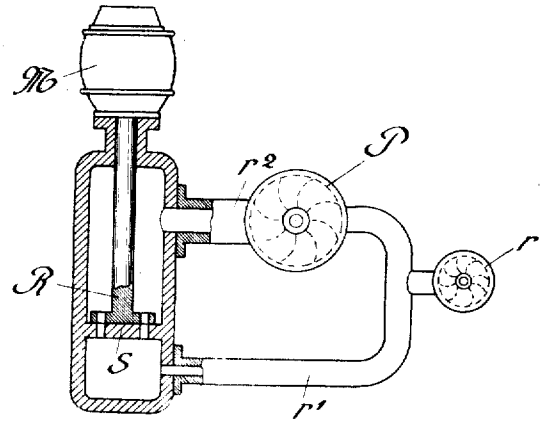
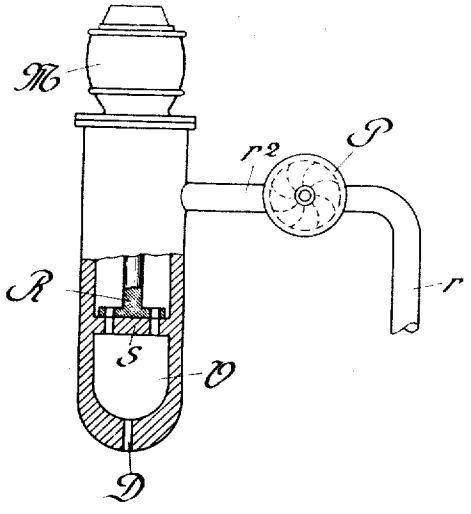


Fig. 2



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Fig. 3.

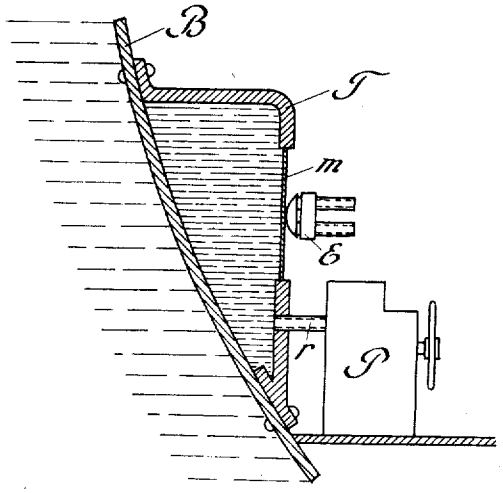
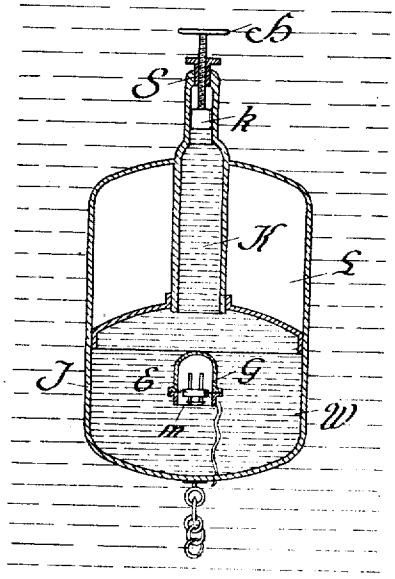


Fig. 4.



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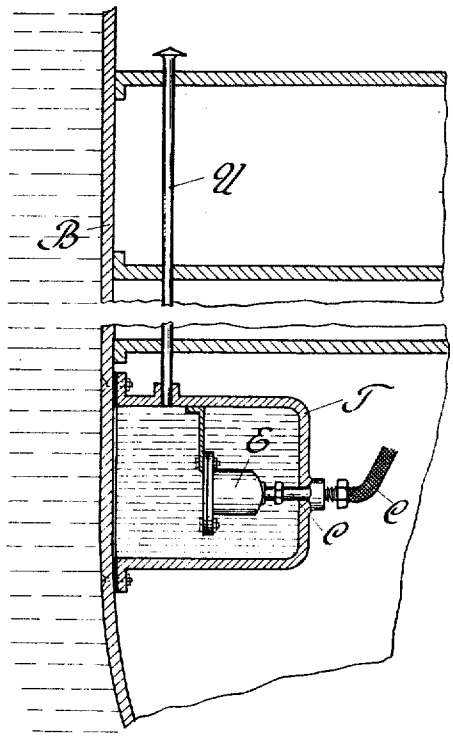
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Fig. 5



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UNITED STATES PATENT OFFICE.

WALTER HAHNEMANN, OF KITZEBERG, NEAR KIEL, PRUSSIA, GERMANY, ASSIGNOR TO THE FIRM SIGNAL GESELLSCHAFT M. B. H., OF KIEL, WERK RAVENSBERG, GERMANY.

DEVICE FOR INCREASING THE SOUND ENERGY WITH SUBMARINE SOUND TRANSMITTERS.

Application filed August 25, 1921. Serial No. 495,233.

To all whom it may concern:

Be it known that I, WALTER HAHNEMANN, engineer, citizen of the German Republic, and residing at Kitzeberg, near Kiel, county of Schleswig-Holstein, State of Prussia, have invented certain new and useful Improvements in Devices for Increasing the Sound Energy with Submarine Sound Transmitters, of which the following is a specification.

In the production of sound waves in water the pressure magnitudes fluctuate in the positive and negative senses about a constant value which is determined by the depth of water in which the transmitter is located.

From this fact it can be readily understood that in the positive sense an upper limit for the pressure magnitudes to be produced does not exist, but that in the negative sense the pressure magnitudes cannot attain a greater absolute value than that corresponding to the constant water pressure. In practice it is not possible in the negative sense to obtain a magnitude of pressure as great as the ordinary constant pressure, and even with slight drops below this latter pressure, objections of various kinds become noticeable as, for example, the formation of air and vapour.

The invention provides a means whereby pressure amplitudes as high as desired in the positive and negative senses may be obtained.

It consists in the feature that the liquid located immediately adjacent the point where the sound is produced, is maintained in a condition of artificial excess pressure.

The constructional carrying out of the invention is possible in various ways. It necessitates completely or almost completely closed chambers in the vicinity of the source of sound, which chambers receive the artificial pressure. The excess pressure is produced by any suitable known pressure developing or maintaining device, such as, for example, a tube containing a column of liquid, or a pump. With hydraulic submarine sound senders the service pump itself can also undertake the production of the excess pressure. In the case of transmitters which work with a flowing operating medium either the well-known method of a closed cycle can be used and the whole system kept under pressure, or the operating medium can be permitted to escape into the free water through a throttle device.

In Figs. 1–5 constructional examples of the invention are represented in a diagrammatic manner, showing:

Fig. 1, a siren operated by a liquid under pressure, with a closed circuit in which the complete cycle of the system is placed under pressure by means of an auxiliary pump.

Fig. 2, a similar siren in which the operating medium flows away through a front chamber with a throttled outlet.

Fig. 3, an electromagnetic diaphragm transmitter located within the ship on a special water tank with stout walls in which the filling of water is placed under pressure by means of a hydraulic press.

Fig. 4, an electromagnetic diaphragm transmitter located in a closed buoy, the transmitter being mounted in a chamber filled with water under pressure.

Fig. 5, a water tank arranged within the ship, in which a sound transmitter is arranged and in which the water filling is placed under pressure by means of an ascending tube.

In Fig. 1, R indicates the rotor, S the stator, M the siren motor, P the supply pump, r_1 the suction conduit, r_2 the pressure conduit, p the pressure pump.

In Fig. 2 the reference letters are the same. The operating liquid is held here under excess pressure in the front chamber V by means of the throttle opening D. A special pressure pump is superfluous in this case because the pressure of the supply pump P is utilized.

In Fig. 3, T is a water tank constructed with extremely stout walls mounted on the ship's wall B, a diaphragm m being mounted in its wall. On the diaphragm there is located an electromagnetic exciter E. An hydraulic press P is in communication with the interior of the tank through the pipe R.

In Fig. 4, m is also a diaphragm which is set into oscillation by an electromagnetic exciter E. The transmitting device is enclosed in a special strong casing G. The whole is mounted in the interior of a buoy j, the lower part W of which is constructed as a water

container while its upper part L serves as a buoyancy vessel. A chamber K connected with the container W terminates in a piston chamber in which a piston *k* can be pressed down by means of the hand-wheel H. An adjustable stuffing-box *s* serves for fixing the piston after the desired pressure has been adjusted.

In Fig. 5, B again indicates the outer wall of a ship, T the container in the ship, E a sound transmitter mounted in the container with cables C, and U indicates the ascending tube containing a column of liquid. The tube extends up above the deck of the ship and on being filled produces an excess pressure in the container T which pressure is unaffected by pitching and rolling of the ship.

I claim:—

1. In combination with an arrangement for producing sound under water, means for maintaining an artificial special static excess pressure in the liquid space nearest to the point where the sound is produced, whereby the sound energy is increased.

2. In combination with an arrangement for producing sound under water, a chamber enclosing the point where the sound is produced, liquid in the said chamber, and means for maintaining an artificial special static excess pressure in the said liquid.

3. In combination with an arrangement for producing sound under water, a chamber enclosing the point where the sound is produced, liquid in the said chamber, and a column of liquid associated therewith adapted to maintain an artificial special static excess pressure therein, whereby the sound energy is increased.

4. In a submarine sound signaling plant, in combination, a sound producer, and means for developing a constant pressure greater than normal in the sound propagating liquid immediately adjacent the point of sound production.

5. In a submarine sound signaling plant, in combination, a sound producer, and means for maintaining during sound production a constant pressure greater than normal in the sound propagating liquid immediately adjacent the point of sound production.

6. In a submarine sound signaling plant, in combination, a sound producer, and means for maintaining in the sound propagating liquid immediately adjacent the point of sound production during sound production a constant pressure sufficiently great to substantially prevent the formation of bubbles or evaporation in the liquid at that point.

7. In combination with an arrangement for producing sound under water, a chamber within a ship enclosing the point where the sound is produced, liquid in the said chamber, and means for maintaining an artificial special excess pressure in the liquid space nearest to the said point, whereby the sound energy is increased.

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

WALTER HAHNEMANN.

Witnesses:
WILHELM FISCHBECK,
KARL HANS BUSSE.