June 4, 1929. W. HAHNEMANN 1,715,831

ARRANGEMENT FOR ELIMINATING DISTURBANCES IN RECEIVING SOUND WAVES

Filed July 21, 1921

Fig. 1.

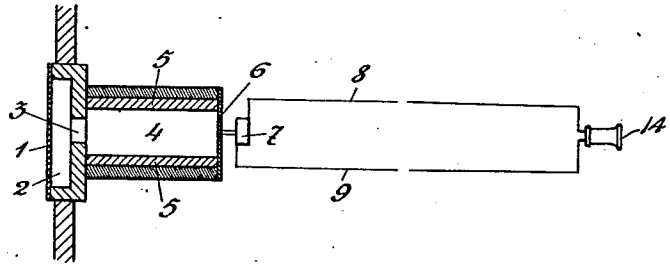


Fig. 2.

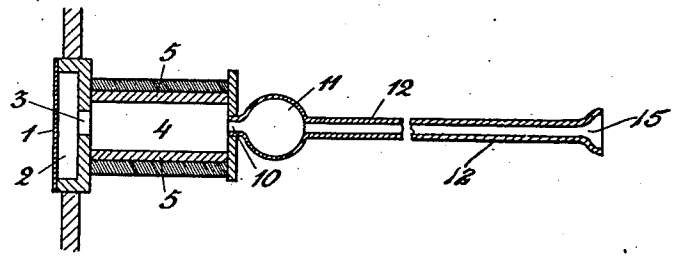
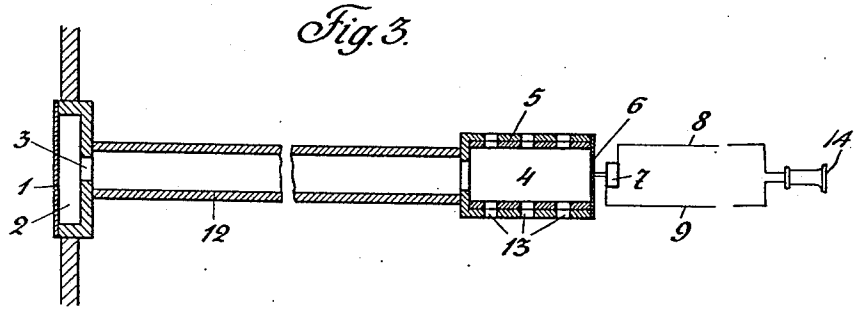


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ARRANGEMENT FOR ELIMINATING DISTURBANCES IN RECEIVING SOUND WAVES.

Application filed July 21, 1921, Serial No. 486,568, and in Germany April 3, 1920.

This invention relates in general to an arrangement for eliminating disturbances in receiving sound waves, or noises which possess the characteristics of a tone of any kind. The invention relates more particularly to an arrangement for eliminating disturbing sounds when receiving sound signals with the aid of submarine sound receivers in which the sound that is received by a radiating member (such as a diaphragm) abutting on the water is transmitted through an air chamber to the sound conductor leading to the operator's position. The said eliminating arrangement consists in interposing, in the path along which the sound travels from the radiating member to the ear of the operator, a chamber adapted to cooperate with a member tuned to the sound to be received and equipped with a sound damping means. To render a chamber of this kind more effective it is tuned in accordance with the invention to the frequency of vibration of the signals to be received. An advantageous manner of tuning the said chamber consists in properly dimensioning its length.

The invention is illustrated in the drawing in which

Fig. 1 is a diagrammatic longitudinal section of a receiving device with a disturbance-eliminating-chamber arranged to cooperate with a diaphragm attached to a microphone,

Fig. 2 is a similar representation except that the disturbance-eliminating chamber cooperates with a spherical resonator, and

Fig. 3 shows a receiving device with an eliminating chamber provided with adjustable lateral perforations for tuning purposes.

The arrangements shown in the three figures each comprise a radiating member or sound receiving diaphragm 1 that abuts on the external sound propagating medium through which the sound waves arrive. Adjoining the diaphragm 1 is a chamber 2 filled with air and preferably of extremely small size. This chamber 2 acts as an acoustic link or sound transferring means. In Figs. 1 and 2 the disturbance-eliminating chamber 4 connected to the chamber 2 is the next acoustic link in the chain of sound transferring members. In the devices illustrated the sound waves that pass through the chamber 4 are damped by a lining 5 in this chamber composed of sound absorbing material (for example, felt). Adjoining the chamber 4 in Fig. 1 is a vibratory diaphragm 6 which is tuned to the sound to be received and carries a microphone 7. The latter is connected by wires 8 and 9 to the telephone receiver 14. In the modification illustrated in Fig. 2 the chamber 4 at the rear terminates in a rigid plate. Through an opening 10 in this plate the chamber 4 is connected to a spherical resonator 11 to which is joined the sound conductor or pipe 12 that conducts the sound to the operator's position 15.

In Fig. 3 the sound pipe 12 is located between the external receiver 1, 2, 3 and the damping chamber 4. In this latter the disturbing vibrations are eliminated not only by a damping lining 5 but also by holes 13 which, particularly in cases of low tones, are very effective. The perforations 13 may be divided into groups of various sizes and a slide valve may be provided by which the perforations may be changed according to the frequency of vibrations of the disturbing sounds.

The field of application for such means for filtering or sifting out disturbing vibrations is, of course, exceedingly large. They are specially important in cases where tones, or noises resembling tones, are received from water; because in such cases, particularly on account of the ear not being accustomed to distinguish between different sounds propagated through water, the elimination of disturbances is especially important. It will be obvious that a plurality of such devices may be used in one and the same sound conductor or chain of acoustic links. By dimensioning the sound eliminating chamber in a special way the elimination of certain frequencies of vibration or certain groups of such frequencies can be made to be more pronounced.

The term "vibratory body", as used in the claims, is intended to cover not only a body such as a diaphragm but also a body of gas; while the term "tuned" is intended to mean that the tuned body operates in its natural frequency.

I claim:—

1. A sound receiving arrangement, comprising a sound receiving member abutting on the sound propagating medium, an operator's observing device, and sound filtering means interposed in the sound path between the sound receiving member and the observing device, the sound filtering means comprising a

chamber having auxiliary means for dissipating undesired vibrations and a tuned vibratory body cooperating with said chamber.

2. A sound receiving arrangement, comprising a sound receiving member abutting on the sound propagating medium, an operator's observing device, and sound filtering means interposed in the sound path between said sound receiving member and the observing device, the sound filtering means comprising a chamber having auxiliary means for dissipating undesired vibrations and a tuned diaphragm cooperating with said chamber.

3. A sound receiving arrangement, comprising a sound receiving member abutting on the sound propagating medium, an operator's observing device, and sound filtering means interposed in the sound path between the sound receiving member and the observing device, the sound filtering means comprising a chamber having auxiliary means for dissipating undesired vibrations and a tuned diaphragm cooperating with said chamber, and a microphone cooperating with said tuned diaphragm.

4. A sound receiving arrangement, comprising a sound receiving member abutting on the sound propagating medium, an operator's observing device, and sound filtering means interposed in the sound path between the sound receiving member and the observing device, the sound filtering means comprising a chamber having a sound absorbing wall for dissipating undesired vibrations and a tuned vibratory body cooperating with said chamber.

5. A sound receiving arrangement, comprising a sound receiving member abutting on the sound propagating medium, an operator's observing device, and sound filtering means interposed in the sound path between the sound receiving member and the observing device, the sound filtering means comprising a tuned chamber having auxiliary means for dissipating undesired vibrations.

6. A sound receiving arrangement, comprising a sound receiving member abutting on the sound propagating medium, an operator's observing device, and sound filtering means interposed in the sound path between the sound receiving member and the observing device, the sound filtering means comprising a tuned chamber having a sound absorbing wall and provided with perforations.

7. A sound receiving arrangement, comprising a sound receiving member abutting on the sound propagating medium, an operator's observing device, and sound filtering means interposed in the sound path between the sound receiving member and the observing device, the sound filtering means comprising a tuned chamber having a sound absorbing wall and provided with perforations and means for varying the extent of said perforations.

8. A sound receiving arrangement, comprising a sound receiving member abutting on the sound propagating medium, an operator's observing device, and sound filtering means interposed in the sound path between said sound receiving member and said observing device, the sound filtering means comprising a tuned chamber having auxiliary means for dissipating undesired vibrations and a tuned vibratory body cooperating with said chamber.

9. A sound receiving arrangement, comprising a sound receiving member abutting on the sound propagating medium, an extremely small and flat gas chamber adjoining the said receiving member, an operator's observing device, and sound filtering means interposed in the sound path between said gas chamber and said observing device and comprising a tuned body including means for dissipating undesired vibrations.

10. A sound filtering device, comprising a tuned body including means for dissipating undesired vibrations.

11. A sound filtering device, comprising a tuned resonating chamber provided with apertures for dissipating undesired vibrations.

12. A sound filtering device, comprising a tuned resonating chamber provided with a sound absorbing wall and with apertures for dissipating undesired vibrations.

13. A sound filtering device, comprising a chamber having means for dissipating undesired vibrations, and a tuned diaphragm in sound transferring relation with said chamber.

14. A sound filtering device, comprising a tuned resonating chamber having auxiliary means for dissipating undesired vibrations, and a tuned diaphragm in sound transferring relation with said chamber.

In testimony whereof I affix my signature.

WALTER HAHNEMANN.