

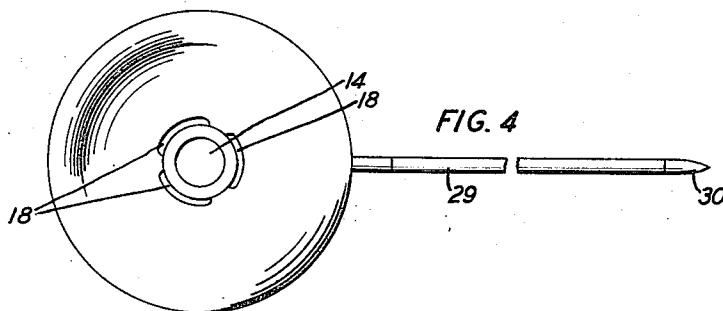
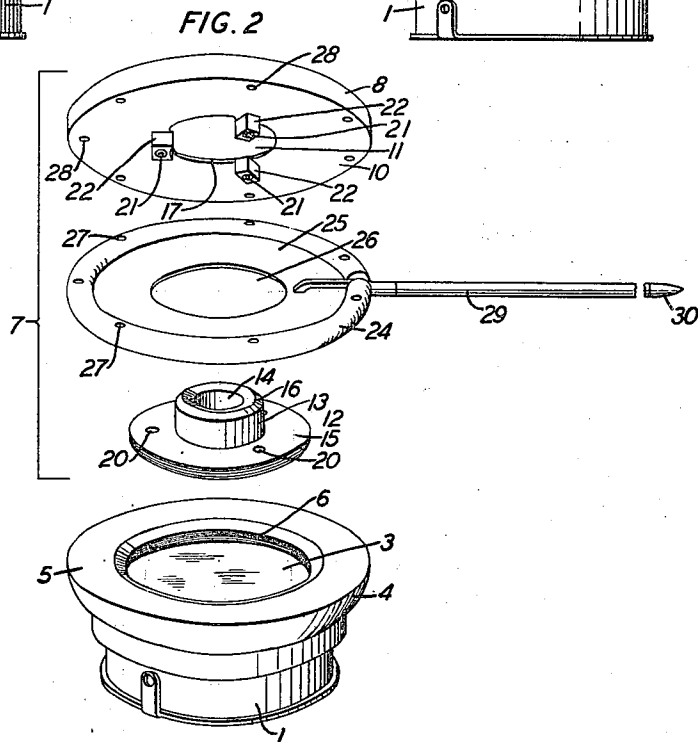
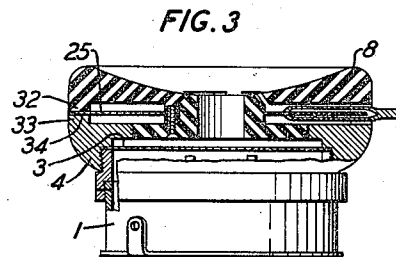
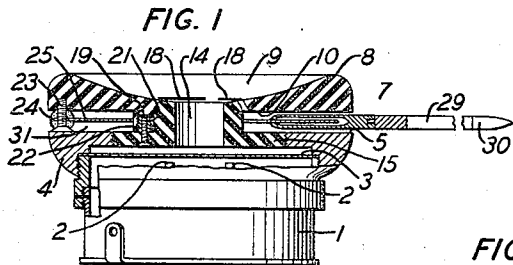
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J. C. STEINBERG

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TELEPHONE RECEIVER

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INVENTOR
J. C. STEINBERG

BY *Walter C. Kiesel*

ATTORNEY

UNITED STATES PATENT OFFICE

JOHN C. STEINBERG, OF SPARTA, NEW JERSEY, ASSIGNOR TO BELL TELEPHONE LABORATORIES, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

TELEPHONE RECEIVER

Application filed December 31, 1930. Serial No. 505,825.

This invention relates to telephone receivers and more particularly to a receiver for use in connection with apparatus for measuring noise.

5 An object of this invention is to measure noise in a simple and novel manner. Another object of this invention is to conduct noise and other vibrations to the ear of an observer and thereat to combine the vibrations, as sound waves, with sound waves produced by a telephone receiver, the path of the noise or other vibrations being through the ear-
 10 piece of the receiver.

A further object is to combine at the ear
 15 of an observer sound waves from different sources, the paths for the sound waves being distinct and separate but terminating in close proximity.

According to this invention, the noise, the
 20 intensity of which is to be measured, and certain diaphragm tones are received simultaneously in the ear of the observer from respective paths in the receiver earpiece. The path for the noise is through a chamber in
 25 the earpiece which is concentric preferably to that of the diaphragm tone sound path at the center of the earpiece, a sound translating diaphragm being positioned in the chamber and adapted to be actuated by a listening
 30 or sounding stick.

A preferred embodiment of this invention takes the form of a telephone receiver provided with an earpiece adapted to be secured to the receiver casing and having a plane
 35 surface portion in spaced relation to the means securing it to the casing. To the outer peripheral portion of the plane surface portion is secured a ring member having a
 40 recess therein within which the periphery of a sound translating diaphragm is secured, the diaphragm being thereby supported in a sound chamber formed by the earpiece, ring and securing means. A sounding or listen-
 45 ing stick, one extremity of which is adapted to be placed against a source of noise disturbances, is attached at its other extremity to the diaphragm.

A more complete understanding of this in-
 50 vention will be obtained from the following

detailed description and by reference to the appended drawings, wherein:

Fig. 1 is a side view of one embodiment of this invention partially in section;

Fig. 2 is an exploded view of the embodi-
 55 ment of this invention shown in Fig. 1;

Fig. 3 is a side view partially in section of a modification of the embodiment of this invention shown in Fig. 1; and

Fig. 4 is a plan view of the embodiment of
 60 this invention shown in Figs. 1 and 2.

Referring now to the drawings and more particularly to Figs. 1 and 2, the telephone receiver to which this invention is applicable
 65 comprises generally a casing 1 housing a permanent magnet (not shown), a pair of pole pieces 2, 2 and a diaphragm 3 disposed in attractable relation to said pole pieces. This diaphragm is held in position on the casing 1
 70 by a clamping ring 4 having, preferably, a plane surface 5 and an interiorly threaded aperture 6. The receiver earpiece 7 comprises an earpiece portion 8 adapted to be placed
 75 adjacent the ear of an observer or user of the telephone receiver and having a concave front or upper surface 9 and a plane rear surface 10. The portion 8 has a central opening 11 irregular in contour for a purpose hereinafter to be
 80 disclosed. Extending into the opening 11 is an annular member 12 provided with a cylindrical portion 13, having a centrally disposed
 85 passage 14 and an externally threaded flange or disc portion 15 adapted to engage with the interiorly threaded aperture 6 of the clamping ring 4. The upper extremity 16 of the
 90 cylindrical portion 13 is tapered to engage with the reversely tapered portion 17 of surface 10 about the opening 11 whereby a plurality of openings 18 in spaced relation to
 95 the passage 14 are formed, the irregularity in contour of the opening 11 being such, preferably, that these openings 18 are arcuately shaped. The member 12 is attached to the
 100 earpiece portion 8 preferably by screws 19 (one only being shown) extending through the drillings 20 in the disc portion 15 and threading into tapped bushings 21 in the pro-
 105 jections 22 which maintain the member 12 in proper space relation to the earpiece portion 8. Secured by screws 23 (one only being

shown) to the peripheral portion of the rear surface 10 is an annular member 24 from which a portion has been removed and which provides a seat for the periphery of a diaphragm 25, which may be of metal or of wood and having a central opening 26. The screws 23 extend through openings 27 in said annular member and the periphery of the diaphragm 25 and thread into tapped drillings 28 in the earpiece portion 8. Attached to the diaphragm is a listening or sounding stick 29 of metal or of wood projecting through the cut away portion of the annular member 24 and whose free extremity, adapted to be placed against a source of noise vibrations, may be provided with a metal cap 30. When assembled and in engagement with the telephone receiver, the earpiece 7 cooperates with the casing 1 of said receiver to form a sound chamber 31 within which is disposed the diaphragm 25, the chamber having outlets therefrom comprising the arcuately shaped openings 18. It will be apparent that vibrations from a vibrating body may be picked up by placing the capped end of the listening or sounding stick thereagainst, conducted to the diaphragm 25 in the chamber 31 setting the diaphragm and confined air therein into vibration to translate the vibrations picked up which, as sound waves, pass out through the openings 18 to the ear of the observer who simultaneously listens to a tone produced by the vibration of the receiver diaphragm 3, said tone reaching the ear through a central sound path provided by the passage 14. This diaphragm tone may be obtained by connecting the telephone receiver in a circuit such as is disclosed in U. S. Patent 1,673,037, issued June 12, 1928 to D. G. Blattner, and, in accordance with the teachings of that patent, the intensity of the tone may be varied by the operator until the noise sounds picked up just mask the diaphragm tone. By varying the position of the sounding stick on the vibrating body the nature and distribution of the vibrations may be completely studied.

Referring to Fig. 3 the modification of the embodiment of this invention shown in Figs. 1 and 2 differs therefrom in that the earpiece portion 8 is formed with an annular peripheral flange portion 32 and the clamping ring 4 is provided with a flange portion 33 providing an annular seat 34 for the diaphragm 25 which is here held between the flanges of the earpiece and the clamping ring. The flange portions 32 and 33 are suitably grooved at that point where the listening or sounding stick is attached to the diaphragm 25.

The invention described herein is capable of a variety of uses, for instance, in certain mechanical systems where there are moving parts, the noise may be such as to cause considerable annoyance to either the user or the people in proximity thereto. This is particularly true in the higher class automobiles

where noiselessness of operation is a very desirable characteristic and one of the problems which automotive engineers are continually striving to solve. Engine noises, bearing noises, body noises and the like may be studied and measured utilizing this invention and the information acquired used to correct undesirable noise or vibration conditions. Not only is this invention applicable to the study of noises or of other sounds or vibrations originating in mechanical devices but it is apparent that, with slight modifications, it may be used in studying noises or vibrations of the human body, for instance, in the region of the heart and of the lungs. It is to be understood, therefore, that although this invention has been disclosed with reference to what are believed to be preferred embodiments thereof, it is to be construed as limited by the appended claims only.

What is claimed is:

1. A telephone receiver comprising a casing, an earpiece having sound wave passageways therein, and a plurality of sound translating diaphragms, one of said diaphragms being located within said earpiece and another exterior to said earpiece, the sound waves translated by said diaphragms having passage through the passageways in said earpiece.
2. A telephone receiver comprising a casing, an earpiece, a plurality of diaphragms, said earpiece having a sound passageway leading from each diaphragm, electromagnetic means for actuating one of said diaphragms, and mechanical means for actuating another of said diaphragms.
3. A telephone receiver comprising a casing, an earpiece, means for securing said casing and said earpiece together, and a plurality of sound translating diaphragms, one of which is located in said earpiece and another of which is located between said securing means and the casing.
4. A telephone receiver comprising a casing, an earpiece, a plurality of diaphragms, one of said diaphragms being located in said earpiece and another associated with said casing, mechanical means for actuating said one diaphragm, and electromagnetic means for actuating another of said diaphragms.
5. A telephone receiver comprising a casing, an earpiece having a plurality of sound wave passageways therein, a plurality of diaphragms, one of said diaphragms being positioned in said earpiece, means for vibrating said one diaphragm, a second of said diaphragms being positioned between said earpiece and casing, and means in said casing to actuate said second diaphragm, the sound waves translated by each of said diaphragms passing through separate paths.
6. A telephone receiver comprising a casing, an earpiece having a plurality of sound

5 wave passageways whose outlets are in proximity, a plurality of diaphragms, the sound waves translated by any one of said diaphragms passing through one only of said sound passageways; and means for actuating each of said diaphragms, one diaphragm being positioned in said earpiece and another diaphragm supported by said casing.

10 7. A telephone receiver comprising a casing, an earpiece having a plurality of sound wave passageways, the outlets of which are in proximity, two diaphragms, one of said diaphragms being positioned in said earpiece, mechanical means to actuate said one diaphragm, the other diaphragm being supported by said casing, and means for electrically actuating said diaphragm.

20 8. A telephone receiver having a casing, a diaphragm, a clamping ring for holding said diaphragm in place on said casing, means for actuating said diaphragm, an earpiece having a central sound path leading from said diaphragm, a second diaphragm, said second diaphragm being located in said earpiece, means for actuating said second diaphragm, said earpiece having a sound wave passageway therein leading from said second diaphragm and having its outlet in proximity to the outlet of said central sound path.

30 9. In combination, a telephone receiver comprising a casing, a diaphragm, an earpiece having a sound path at its center, means for securing said earpiece to said casing, said earpiece and said means providing an annular chamber concentric with said sound path, said chamber being provided with an outlet in proximity to the outlet of said sound path, and means for conducting sound vibrations into said chamber, said means comprising a listening stick and a second diaphragm, said listening stick at one extremity to be placed against a vibrating body, the sound vibrations in which are to be examined, and attached at its other extremity to said second diaphragm which is positioned in said chamber.

40 10. In a telephone receiver, a casing, a diaphragm, means for actuating said diaphragm, an earpiece having a sound path leading from said diaphragm, means to secure said earpiece to said casing, said earpiece and said means forming a sound chamber having an outlet in proximity to the outlet of said sound path, a second diaphragm positioned in said sound chamber, and means to actuate said second diaphragm.

50 11. In a telephone receiver, a casing, a diaphragm, means for actuating said diaphragm, an earpiece having a sound path leading from said diaphragm, means to secure said earpiece to said casing, said earpiece and said means forming a sound chamber having an outlet in proximity to the outlet of said sound path, a second diaphragm positioned in said sound chamber, and means to actuate said second diaphragm, said means comprising a vibration

conducting member to be placed in contact with a vibrating body.

12. In a telephone receiver, a casing, a diaphragm, electrical means for actuating said diaphragm, an earpiece having a sound path leading from said diaphragm, means for securing said earpiece to said casing, said means and said earpiece forming a sound chamber, said chamber having an outlet opening therefrom adjacent the outlet of said sound path, a diaphragm in said sound chamber, and mechanical means to actuate said last mentioned diaphragm.

13. In a telephone receiver, a casing, a diaphragm, an earpiece having a central sound path leading from said diaphragm, means for securing said earpiece to said casing, said earpiece having a flat surface in spaced relation to said means, an annular member secured to said surface at its peripheral portion, and with said earpiece and said first means forming a sound chamber having an outlet in proximity to the outlet from said central sound path, a second diaphragm, said second diaphragm supported in said chamber by said annular member, and a listening stick attached at one extremity to said second diaphragm.

In witness whereof, I hereunto subscribe my name this 23rd day of December, 1930.

JOHN C. STEINBERG.