

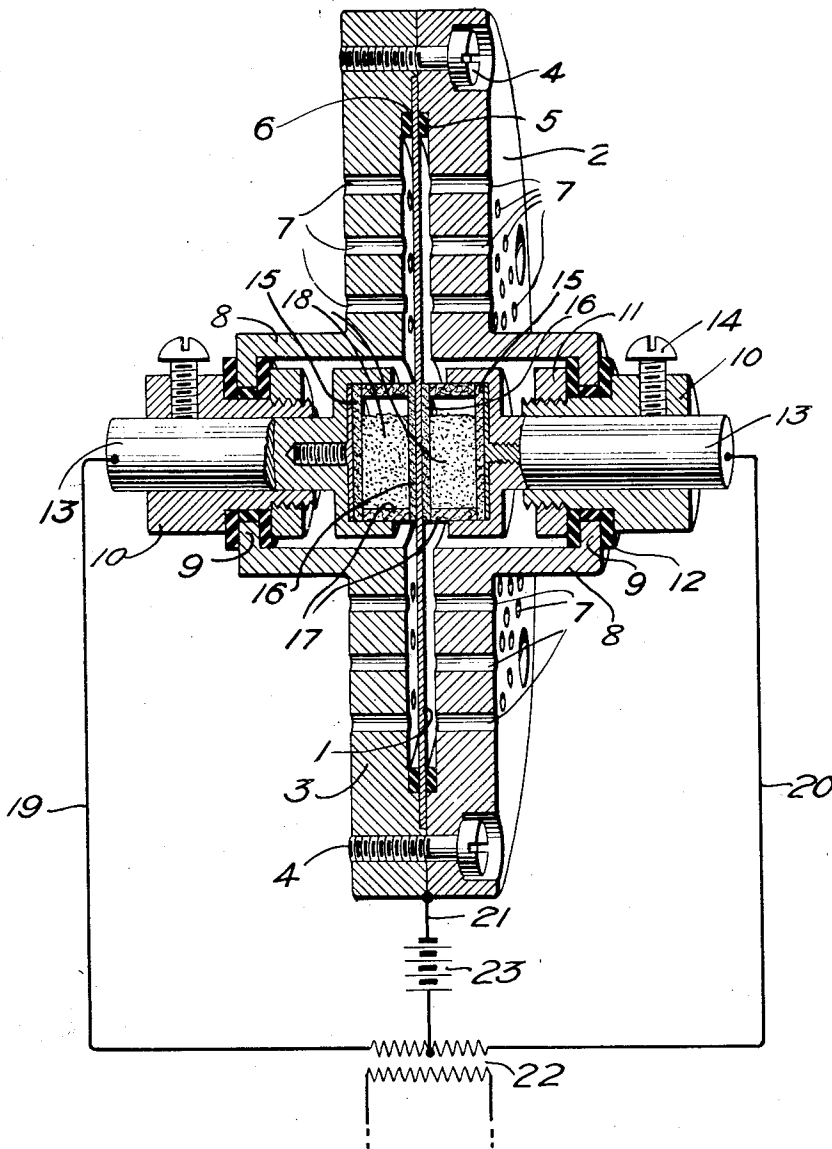
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J. G. ROBERTS

TELEPHONE TRANSMITTER

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UNITED STATES PATENT OFFICE.

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TELEPHONE TRANSMITTER.

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To all whom it may concern:

Be it known that I, JOHN G. ROBERTS, a citizen of the United States, residing at Dobbs Ferry, in the county of Westchester, State of New York; have invented certain new and useful Improvements in Telephone Transmitters, of which the following is a full, clear, concise, and exact description.

This invention relates to telephone transmitters and its object is to provide a transmitter which shall be relatively unresponsive to objectionable noises in the vicinity thereof in comparison with its sensitiveness to sounds which it is desired to transmit.

Transmitters belonging to this class are especially adapted for use in situations where excessive noise in the vicinity makes it difficult to use a telephone. A notable example of such a condition is found on aeroplanes where the noise of the motor exhaust renders the ordinary transmitter unsatisfactory for purposes of communication.

It has been suggested that the effect of this extraneous noise may be partially nullified by exposing both sides of the transmitter diaphragm to the sound waves. The transmitter of this invention embodies this principle in an improved construction whereby the main diaphragm is protected equally on both sides from objectionable sound vibrations by a baffle which screens the diaphragm from noise frequencies, but which is designed to permit the comparatively unobstructed passage therethrough of vocal or similar sounds. This baffle is furthermore formed in such a way as to produce with the diaphragm a chamber which is resonant at a frequency of about 1300 vibrations per second.

In the preferred form one of the baffles is used on each side of the transmitter diaphragm and two similar microphone buttons are mounted on the two sides of the diaphragm respectively. There is thus produced a balanced structure which will be comparatively unresponsive to sounds striking both sides of the diaphragm simultaneously, but which will respond to high frequency sounds localized on one side of the diaphragm.

From the following detailed description of the invention other objects and advantages will become apparent.

One form of the invention, constructed in accordance with the general principles and embodying the features set forth above, is shown in vertical cross-section in the accompanying drawing.

Referring to the drawing, 1 is a diaphragm preferably circular in outline and made of an elastic substance, such as thin metal, hard rubber, or like substances which are ordinarily employed in the construction of diaphragms.

Supporting the diaphragm are two face members 2 and 3, which are clamped together by means of screws 4. Two ring washers 5 and 6 of oiled linen are inserted between the diaphragm and the face members 2 and 3, respectively, to assist in maintaining the proper spacing therebetween to form a thin resonating chamber on each side of the diaphragm and to damp the vibrations at the edge of the diaphragm.

The face members 2 and 3 are of substantial thickness and weight so as not to vibrate to any marked extent. A large number of apertures 7 are provided through each face member to the resonating chambers. The diameter of these holes is preferably less than their length as this is the form which has been found by experiment to operate most successfully in preventing the admission of violent noises of an objectionable character.

Integral with each face member 2 and 3 is a projecting hub 8 having an annular flange 9 perpendicular thereto. Supported on each of the flanges 9 is a shouldered bushing 10 threaded at one end to receive a nut 11 for securing it in place. The bushings 10 are insulated from the face members 2 and 3 by bushings 12 of insulating material. Microphone supports 13 are longitudinally slidable in bushings 10 and may be fastened where desired by means of set screws 14. The microphone supports 13 are provided with cup-shaped ends at the bottom of which are screwed the microphone fixed electrodes 15. The movable electrodes

16 are separated from the fixed electrodes by felt rings 17 which serve to form chambers for the variable resistance element 18 which is preferably granular carbon.

5 The movable electrodes 16 are held firmly against the diaphragm 1 by a proper adjustment of the shanks of the supports 13.

By the structure above described there is provided a thin resonant chamber between 10 each side of the diaphragm 1 and the face members 2 and 3, communication to the chambers from the outer air being afforded by the apertures 7. In practice it has been found that violent sound vibrations or 15 those having great amplitude are excluded from the diaphragm when the resonant chambers have a depth of .015 inches or less and the apertures 7 have a diameter of .05 inches or less and a length of .125 inches or 20 more. Chambers of this size then resonate at frequencies of approximately 1300 vibrations per second and the apertures also assist in excluding the objectionable vibrations by virtue of their proportions. Sounds 25 directed at one face member only will affect the diaphragm if they are within the voice range frequencies and not of a violent character such as the perforations of the face members exclude.

30 The reason for fixing the resonance of the chambers at approximately 1300 vibrations per second is that it has been found that the power of the vowel sounds produced by the human voice is at a maximum 35 when their fundamental pitch has approximately this vibratory rate. At this rate also the carbon microphones respond at their highest efficiency. The uniformity of resonance in the vibratory system thus establishes a condition most favorable to the 40 transmission of vocal sounds.

The face members 2 and 3 perform the combined functions of a means for supporting the diaphragm, a bridge upon which the 45 microphone elements are mounted, and a means cooperating with the diaphragm to provide damping therefor. It is desirable that the members 2 and 3 be rigid and light and preferably made of aluminum. When 50 the diaphragm is constructed of conductive material, electrical connection to the movable electrodes 16 may be made by means of a suitable binding post (not shown) mounted on either one of the face 55 members 2, 3. Connection with the rear electrodes may be made through the supporting members 13.

The transmitter is preferably associated with the well known "push-pull" circuit arrangement. The connections for such a 60 circuit are illustrated diagrammatically in the drawing. The rear electrodes 15 are each provided with individual conductors 19 and 20, and the front electrodes 16 have 65 a common lead 21. The circuit for one

microphone includes one-half of the primary winding of an induction coil 22. The other half of the primary winding of the coil 22 is included in the circuit of the other 70 microphone. Current is supplied to both microphones from a suitable source 23. With the vibration of the diaphragm 1, the resistance of one microphone fluctuates in reverse order to the resistance of the other. 75 From the location of the source 23 in the circuit it will be seen that the current flows in opposite directions through the two halves of the primary winding. Therefore, the fluctuations of current in the two halves of the primary winding produce additive in- 80 ductive effects in the secondary winding of the coil 22.

What is claimed is:

1. In a telephone transmitter, a diaphragm, a chamber of similar sound characteristics on each side thereof, said chambers being resonant to substantially the same vibrations at voice frequencies and each provided with apertures therethrough to selectively admit such vibrations and exclude 90 vibrations of other frequencies, and a pair of microphone elements arranged symmetrically with respect to the diaphragm and adapted to be actuated thereby.

2. In a telephone transmitter, a diaphragm, and a face member on each side of the diaphragm and slightly separated therefrom, the face members being provided with apertures of greater length than width. 95

3. In a telephone transmitter, a diaphragm adapted to be actuated from either side, means forming a thin chamber therewith on each side thereof, each chamber being resonant to voice vibrations and provided with equal access to space external the 100 transmitter.

4. In a telephone transmitter, a diaphragm, and equal resonating means for each side of the diaphragm resonant to voice frequencies. 105

5. In a telephone transmitter, a diaphragm adapted to be actuated and equally responsive from either side, equal resonating means for each side of the diaphragm, and a similar microphone mounted on each side of the diaphragm to provide a symmetrical load on each diaphragm. 110

6. In a telephone transmitter, a diaphragm equally responsive from either side, a pair of microphones arranged symmetrically with respect to the diaphragm and adapted to be actuated thereby, and a single means for supporting the microphones, and the diaphragm and for providing a resonating chamber on each side of the diaphragm, said resonating chambers being of the same proportions. 115

7. In a telephone transmitter, a diaphragm, and means on each side of the diaphragm permitting substantially equal 120 125 130

access thereto for sounds within a certain range of vibratory frequency and intensity and for excluding other sounds.

8. In a telephone transmitter, a diaphragm, equal resonating means for each side of the diaphragm resonant to frequencies within the voice range, and a micro-

phone adapted to be actuated by the diaphragm.

In witness whereof, I hereunto subscribe 10 my name this 28th day of October A. D., 1921.

JOHN G. ROBERTS.