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W. H. MARTIN ET AL

1,735,905

MICROPHONE MOUNTING

Filed Dec. 30, 1926

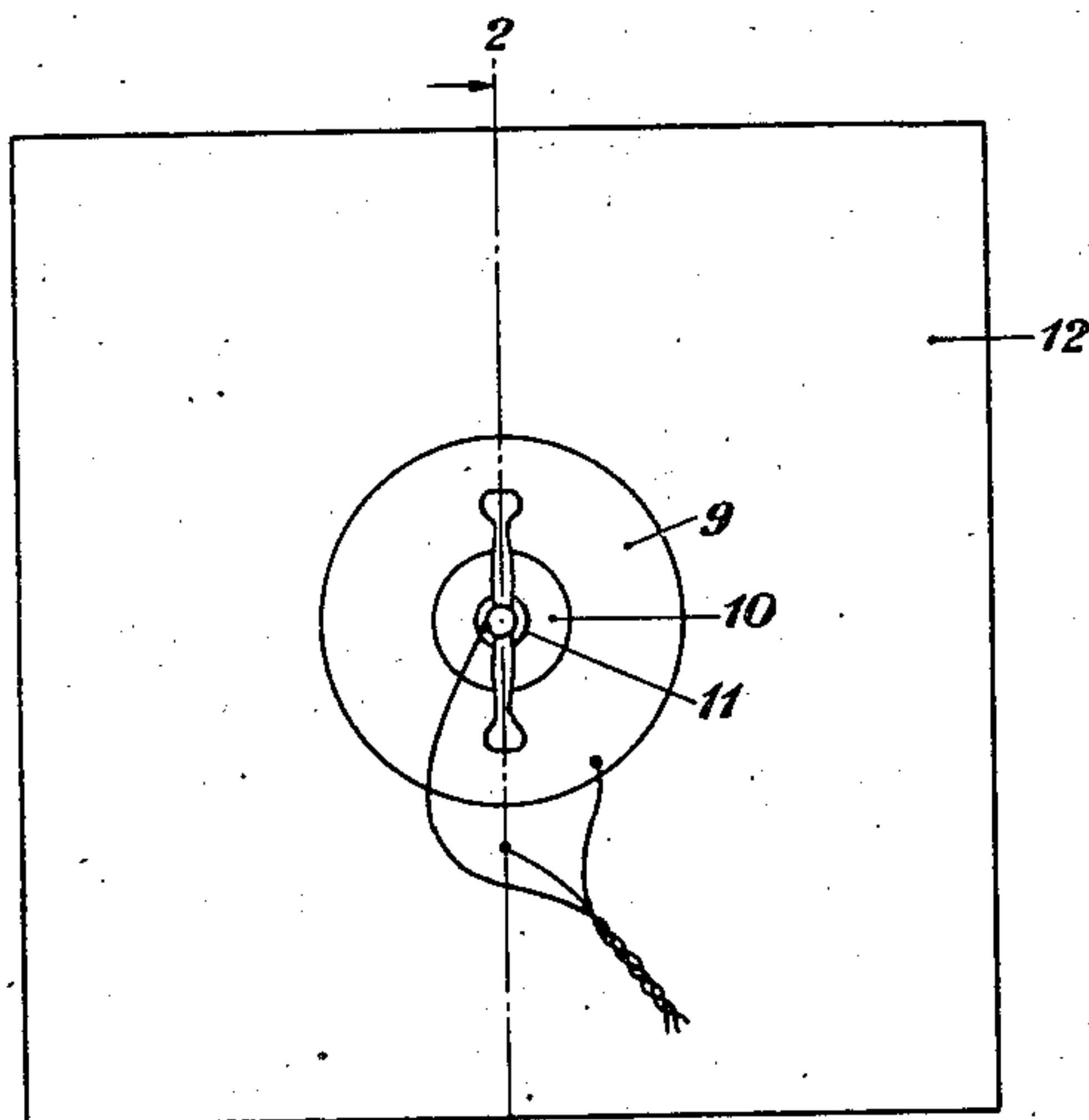


Fig. 1

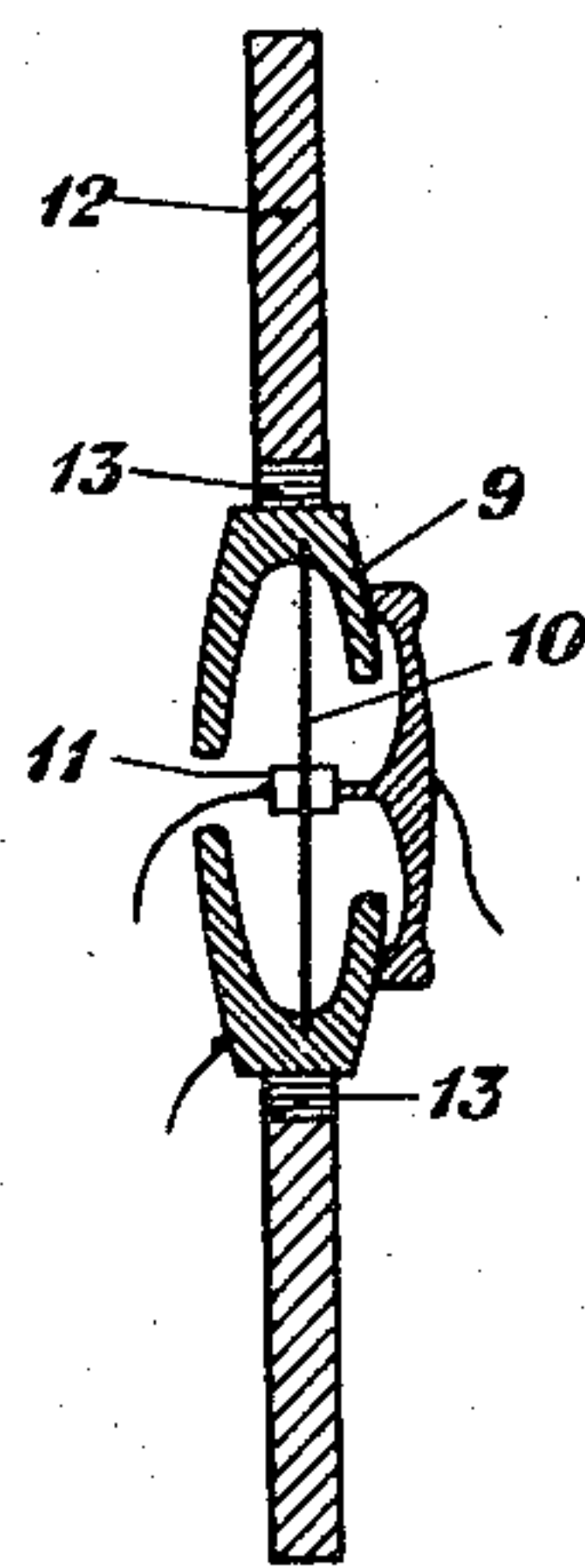


Fig. 2

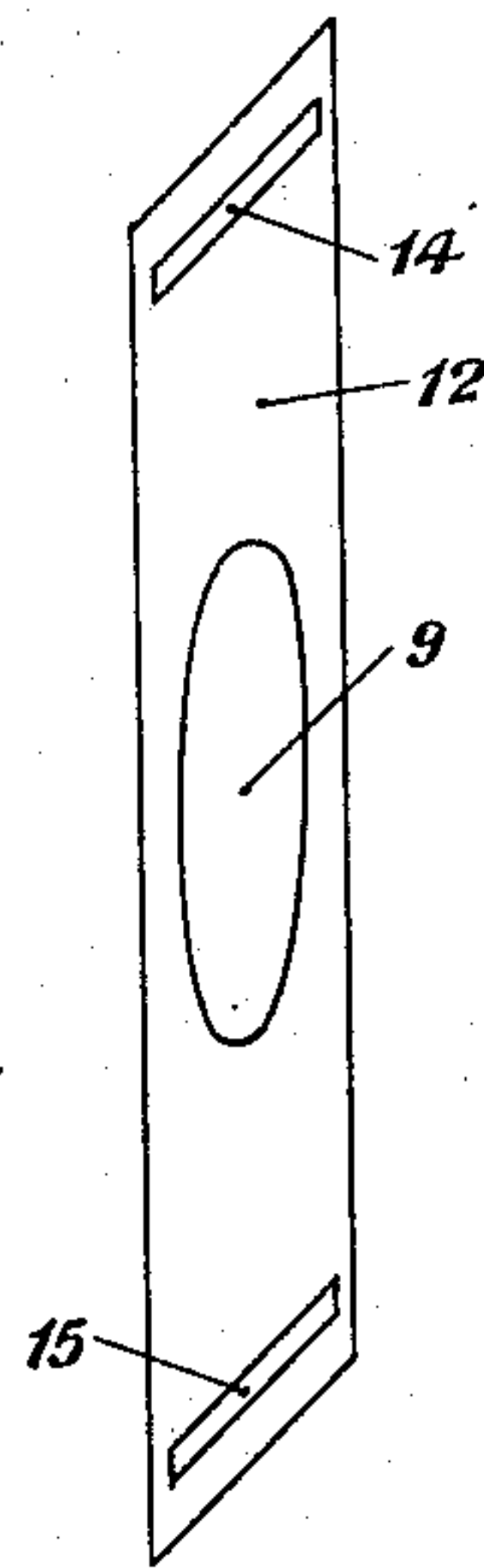


Fig. 3

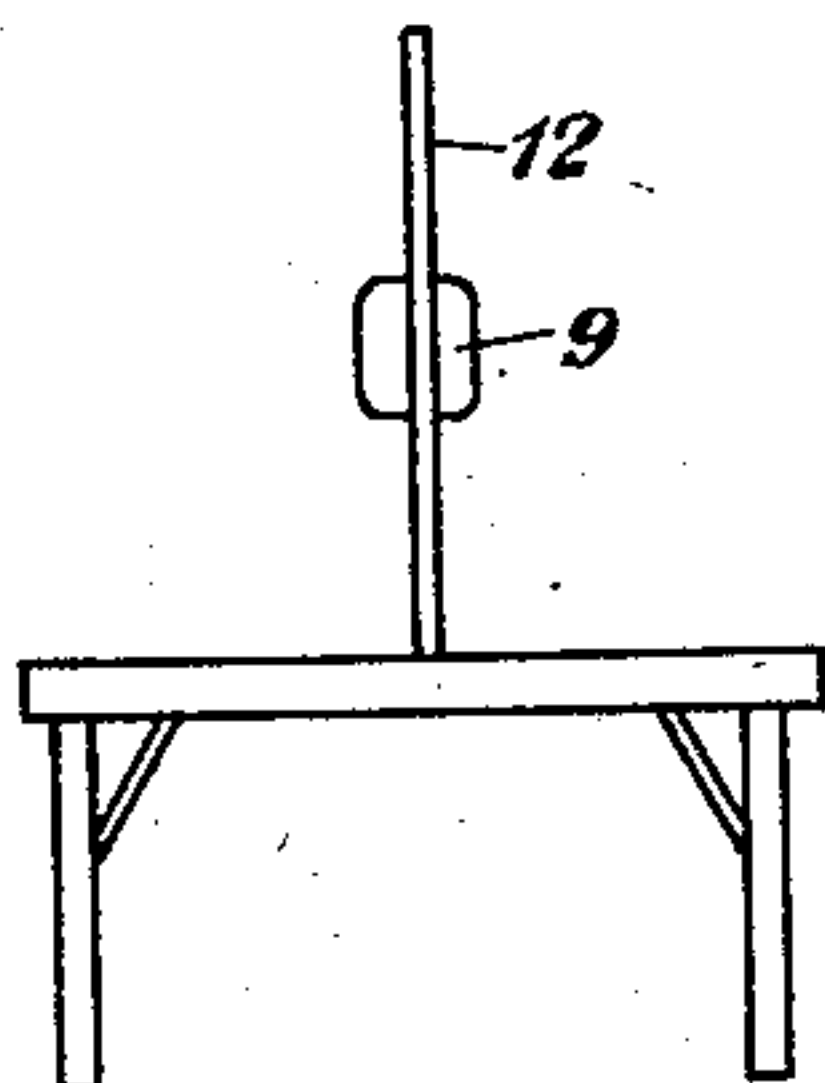


Fig. 4

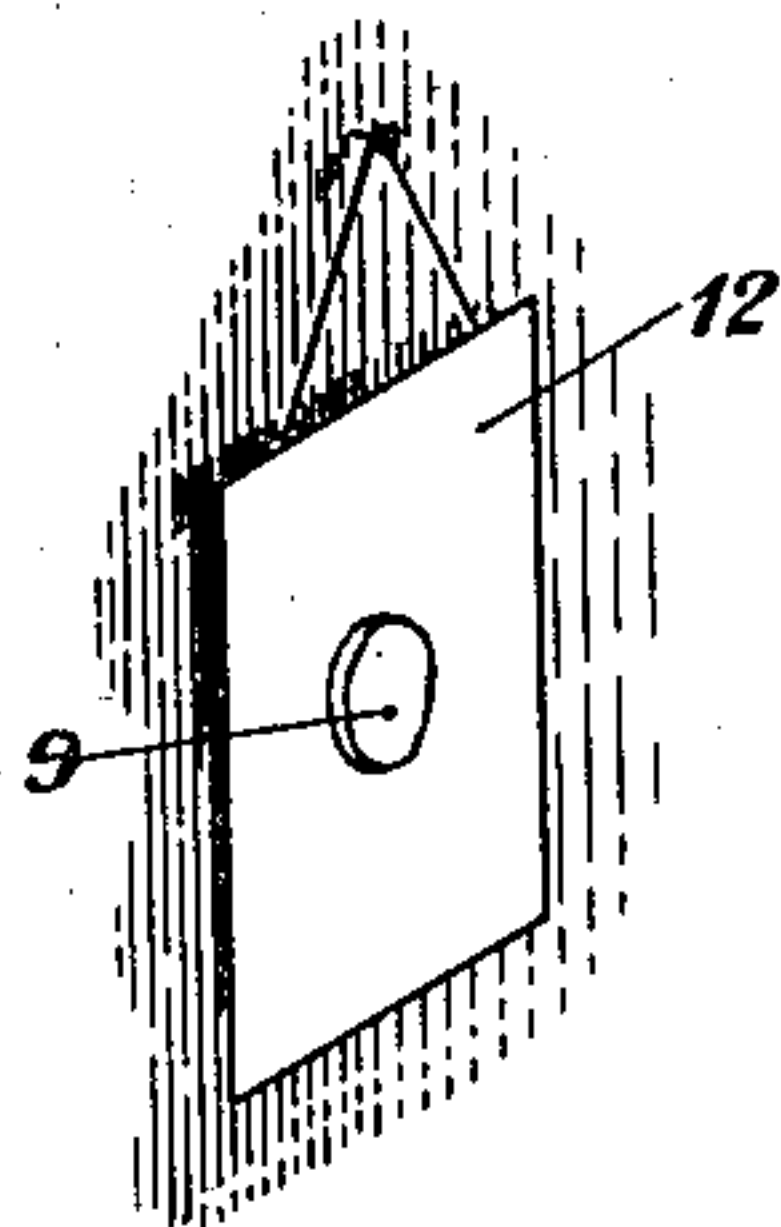


Fig. 5

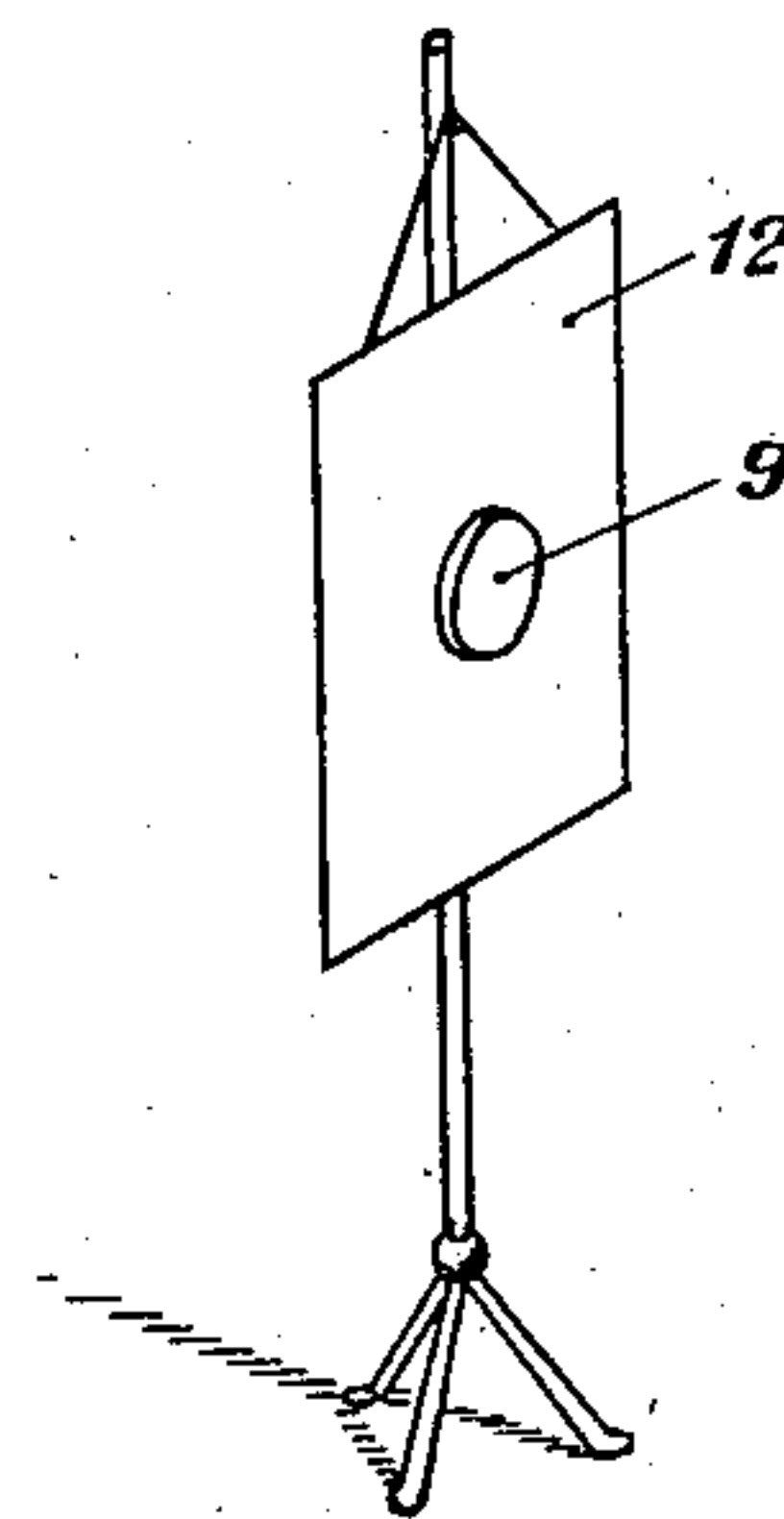


Fig. 6

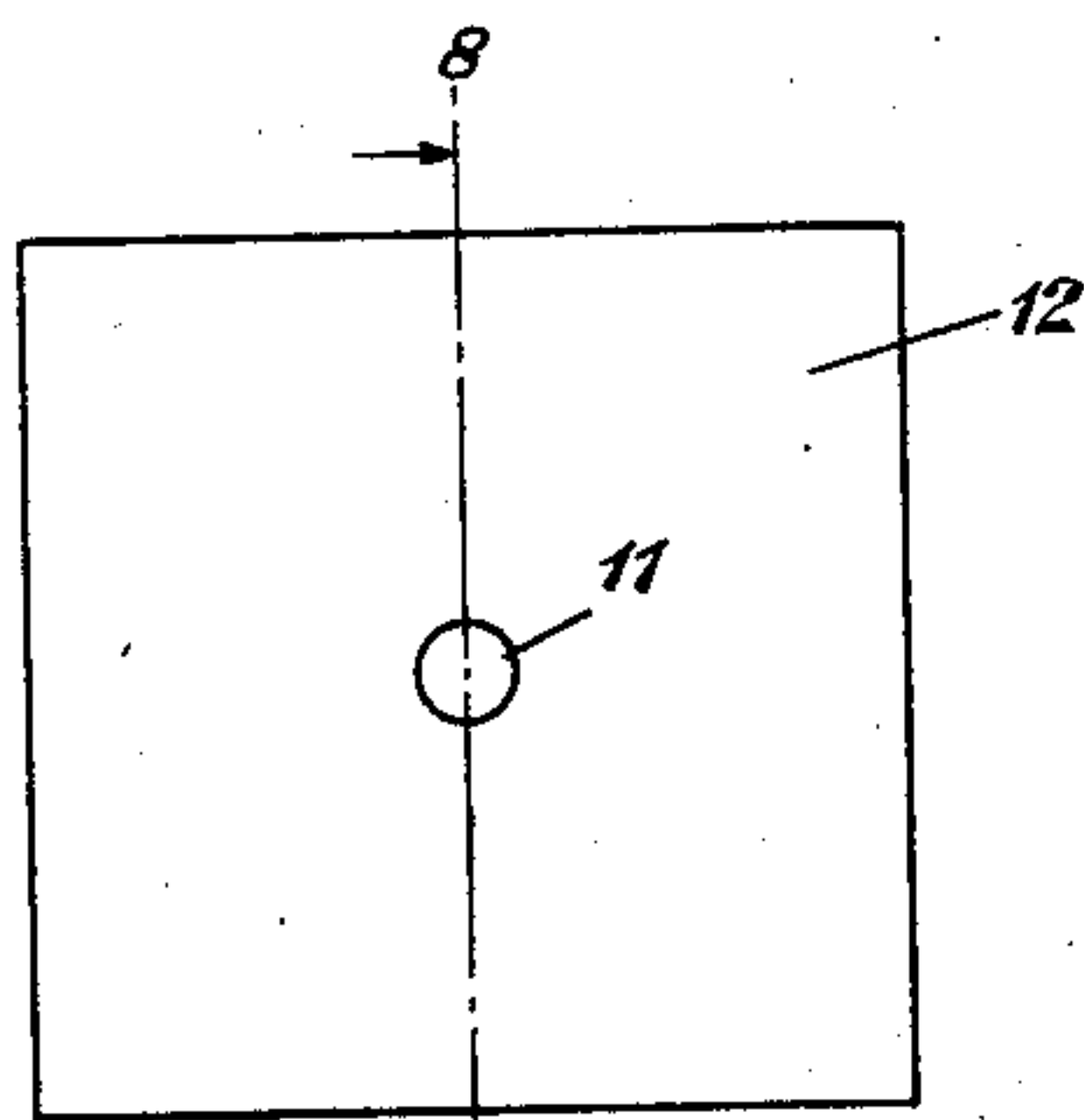


Fig. 7

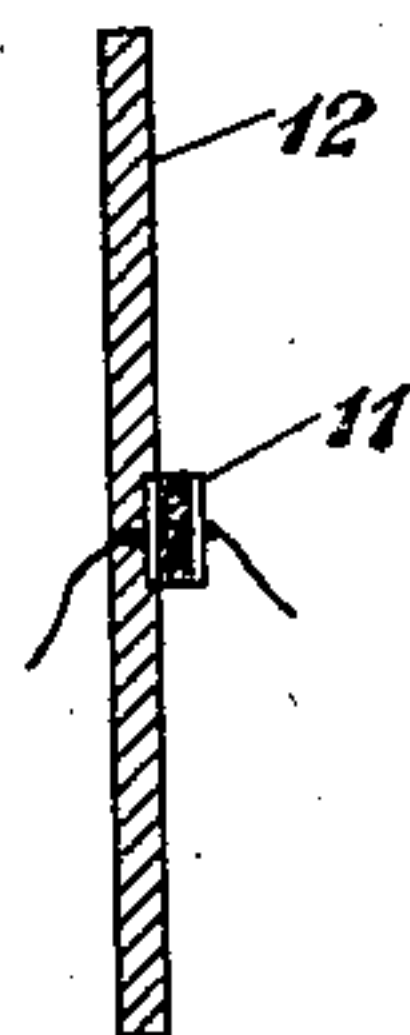


Fig. 8

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UNITED STATES PATENT OFFICE

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MICROPHONE MOUNTING

Application filed December 30, 1926. Serial No. 158,086.

This invention relates to the mounting of sound transmitters, and, more particularly, telephone transmitters or microphones used for transmitting programs for radio broad-

5 casting. The object of the invention is the improvement of the fidelity and efficiency of conversion from sound energy to electrical energy.

10 While our invention results in an improvement at practically all frequencies involved in the transmission of speech and music, the greatest improvement is obtained at the lower frequencies, as will appear more clearly hereinafter.

15 The invention will be clearly understood when the following description and discussion are read with reference to the accompanying drawing. Figure 1 of the drawing shows a front view of the transmitter and the structure on which it is mounted; Fig. 2 shows a sectional view taken on the line 2—2 of Fig. 1, and Fig. 3 shows a rear view in perspective; while Figs. 4, 5 and 6 indicate three desirable positions of the mounting structure. Figs. 7 and 8 show a modification of the device, and will be discussed hereinafter. Like numerals of reference in the several figures of the drawing designate corresponding parts.

20 The transmitter 9 is roughly shown as a carbon transmitter with a diaphragm 10 and carbon cup or button 11. The transmitter is mounted in the center of a baffle-board 12. This board has a comparatively extensive and plane or substantially plane surface, which is approximately flush with the diaphragm 10.

25 If a series of sound waves impinges perpendicularly on an infinite plane surface, the root mean square pressure against this surface will be twice as large as the corresponding pressure in free air, due to the summation of the oncoming and reflected sound waves. If the plane surface is not infinite, but is still large compared with the sound wave length, it acts in the same way, except near the edges, and the pressure on it is double that of the sound wave in free air. If the plane surface is very small in comparison with the wave length of the sound its pres-

ence has very little or no effect on the pressure which the sound waves exert.

On a surface the size of the ordinary carbon microphone, this double pressure effect is obtained only for the higher frequencies usually transmitted. For example, the pitch of sounds whose wave length is comparable to the diameter of an ordinary microphone diaphragm are in the region of three or four octaves above middle C in the musical scale, whereas good music may include tones whose fundamental is well below 100 cycles, which fall in the second or third octave below middle C; and if the effect of these tones upon the microphone is but half that of the higher tones or overtones—relative of their original volumes—the result will obviously be a badly distorted copy of the original. Thus, in the transmission of music or anything involving a wide range of frequencies, it becomes very important to have the reflecting surface sufficiently large so that the increased pressure on the microphone due to its effect shall be in like proportion for all frequencies concerned. Since the wave length of a tone whose frequency is 100 will be in the neighborhood of 11 feet, it will be seen that it will involve a radical departure from ordinary practice with respect to the reflecting surface employed.

30 If the microphone is mounted in a comparatively large baffle-board, the pressure on the transmitter diaphragm will be doubled not only for the high frequencies but also for frequencies as low as are desired, the size of the baffle-board being the only limitation. Even though the diameter of the board is shorter than the wave length corresponding to the lowest frequency it is desired to handle—and yet comparatively very long (with respect to the ordinary microphone diaphragm), there is attained an approximation to equalization in the double pressure effect.

35 By mounting the transmitter in the comparatively large baffle-board, so that only the face of the transmitter is exposed to the sound waves, we cause the pressure on the transmitter diaphragm to be built up to approximately the double value—down to consider-

ably lower frequencies, the only limitation (as shown above) being the size of the baffle-board.

The baffle-board furthermore is so hung or mounted, and is so constructed that it is comparatively free to vibrate in response to the impinging sound waves. In the case of a carbon transmitter, the vibration of the board serves to agitate the carbon, that is, it reinforces the action of the diaphragm and increases the electrical output of the transmitter. The baffle-board structure may be hung or mounted in any one of a number of ways. Three suitable positions are indicated in Figs. 4, 5 and 6 of the drawings. In Fig. 4, the board is mounted on a table; in Fig. 5, it is shown hung from the wall, and in Fig. 6, it is shown mounted on a floor stand.

The applicants' improved mounting gives an increased over-all efficiency resulting in an improvement in the ratio of desired signal to noise. In particular, as explained above, the low frequency efficiency is increased with a considerable improvement in naturalness of reproduction. Part of this improvement is traceable to the double pressure due to the large surface furnished by the baffle-board mounting. The remainder of the improvement is due to the vibration of the board, which gives an increased agitation of the carbon with the consequent increased alternating current output from the transmitter.

The transmitter is preferably mounted in the board with the plurality of paper washers 13—or their equivalent—inserted between the transmitter and the board, as shown in Fig. 2 of the drawing.

The baffle-board may be adapted so that its natural resonance will be suitable to the reinforcement of certain frequencies. This may be accomplished by the proper choice of material or by the adjustment of the mass—by the addition of strips of metal, for instance, as shown in Fig. 3 of the drawing, the strips 14 and 15 being fixed on the rear surface of the board in suitable positions. Likewise, the damping of the baffle-board may be produced to any suitable degree by means which are in themselves well known in the art.

By the adaptations discussed above, there may also be produced compensation for defects in the microphone or for defects in other parts of the system in which the transmitter is employed.

The applicants' invention is carried a step further by the arrangement shown in Fig. 7 of the drawing, in elevation, and in Fig. 8, in section—the view being taken on the line 8—8 of Fig. 7. Here the baffle-board serves not only to give the true pressure but also as the sole diaphragm of the transmitter. The carbon cup or button 11 is mounted at the center of the baffle-board and diaphragm 12, the carbon being agitated by the compara-

tively free vibration of the board-diaphragm.

It is to be understood that the scope of our invention is determined not by the above detailed description, which merely serves the purpose of illustration, but by the appended claims.

What is claimed is:

1. A mechanism for equalizing the electrical transmission of sound waves over a wide range of frequencies, comprising an element for varying the electrical current in response to variations of the pressure of impinging sound waves, and a large plane surface associated with said element for reflecting substantially equally in the neighborhood thereof all frequencies of sound waves to be transmitted, whereby the effective pressure for the lower tones is increased in substantially the same proportion as for the higher tones.

2. A mechanism for equalizing the electrical transmission of sound waves over a wide range of frequencies, comprising a structure having a surface of such size that it will reflect the longer and shorter sound waves substantially equally well, and a transmitter element responsive to the pressure of sound waves so located in said surface as to receive the increased pressure effects due to such reflection at all frequencies of sound waves to be transmitted.

3. A mechanism for equalizing the electrical transmission of sound waves over a wide range of frequencies, comprising a baffle-board for reflecting sound waves the dimensions of whose surface approximate the wave length of the lower tones of the musical scale, and a transmitter element located near the center of said baffle-board.

In testimony whereof we have signed our names to this specification this 28th day of December, 1926.

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