

May 31, 1938.

C. A. VOLF

2,118,993

TRANSMITTER

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Fig. 1.

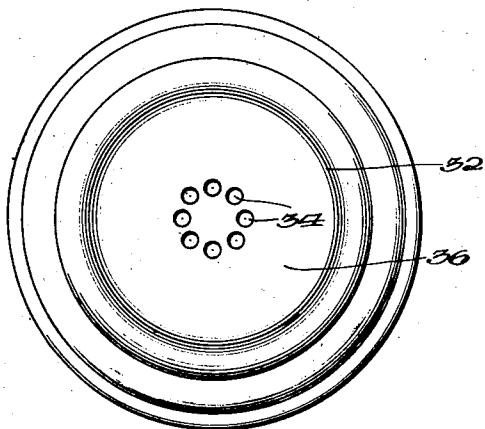


Fig. 2.

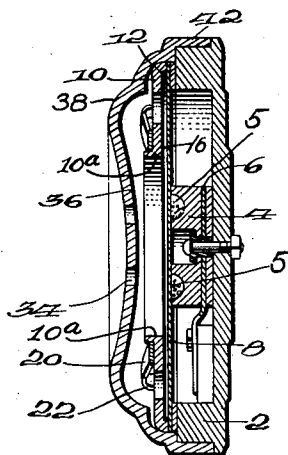


Fig. 3.

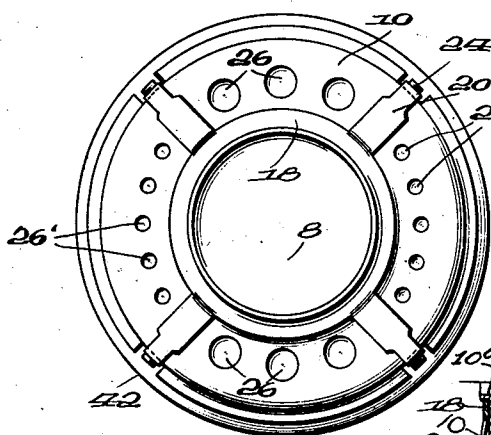


Fig. 4.

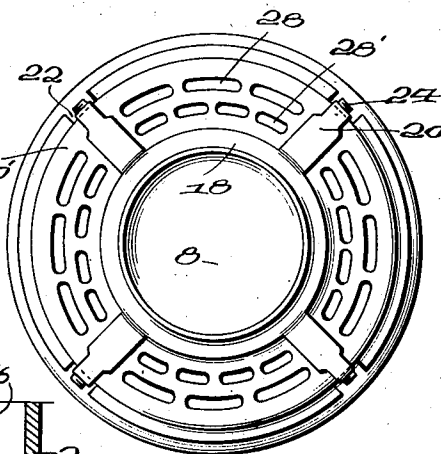


Fig. 5.

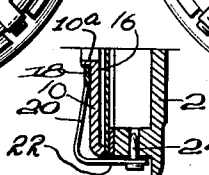


Fig. 6.

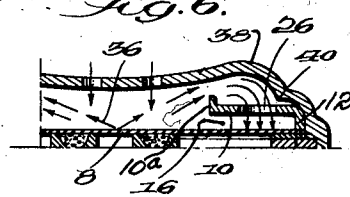
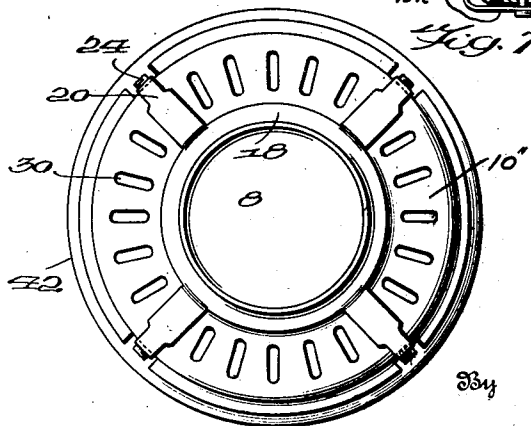


Fig. 7.



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UNITED STATES PATENT OFFICE

2,118,993

TRANSMITTER

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Application May 26, 1936, Serial No. 81,941

4 Claims. (Cl. 179—122)

This invention is a transmitter, particularly of the type used for aiding the sense of hearing although the invention is not limited to this particular use.

5 The present preferred embodiment of the invention is in a transmitter of the type using a carbon button and carbon diaphragm. The invention, however, is not limited to these precise materials. In one of the types of such transmitters now on the market there is a clamping ring for the diaphragm, this ring bearing against the outer periphery of the carbon diaphragm. This type of transmitter, while an improvement over those that have gone before, is still subject to the sea shell roar, "cooking" and "hissing" and still leaves much to be desired in the way of accuracy, sensitivity and frequency range.

In such transmitters of the prior art, a clamping ring, except at its periphery, is spaced a slight distance away from the diaphragm. This creates an air pocket, and it is believed that sound vibrations set up in this air pocket play a controlling part in creating the undesirable "cooking" and "hissing" sounds met with in some transmitters. According to the present invention, the clamping ring is provided with a plurality of apertures therethrough, which relieve any air pressures that might be built up between the clamping ring and the diaphragm. Any air pressure that might be built up in this annular air pocket is instantly relieved. Whether or not this theory is correct, actual tests of the invention produce much improved results, and the "cooking", "hissing" and other extraneous noises are substantially eliminated.

10 The apertures in the clamping ring also have an important effect in connection with the cap. The inside of the cap is flared outwardly, away from the diaphragm, forming a resonance chamber just over or alongside the clamping ring. Sound waves reflected from the center of the diaphragm pass into the resonance chamber and are reflected toward the holes in the clamping ring, where they meet sound waves, coming through these holes, from the outer portion of the vibrating diaphragm and blend and coalesce with them, forming a combinational tone.

15 The accuracy and sensitivity of the present transmitter are such that the user can discriminate between sounds coming from different distances. If more than one conversation is going on in the same room while a deaf person is trying to concentrate on a particular conversation, such sounds coming from a great distance, although they may be audible, do not take prefer-

ence over a direct conversation because of space differences. This result is believed to be new over similar pick up devices of the prior art.

One of the important new results attained by the present transmitter is the elimination of the undesirable extra loudness of the vowel sounds. In transmitters of the prior art, the vowel sounds, which are sounds of the "building up" and "breaking down" type, came through much too strongly, as compared with other sounds, which do not come through strongly enough. With the transmitter of the present invention, such "peaks" of sound are eliminated, and a wide range of sounds is transmitted without the formation of such "peaks".

20 The construction of the front cap or cover forms also an important feature of the present invention. This cap is concave and provided with one or more holes at substantially its center. The inside of the cap is convex, and flares away from the diaphragm. Incoming sounds are thus concentrated onto the center of the diaphragm and are then reflected radially and outwardly, underneath the flared part of the cover, probably being amplified in the chamber formed by such flared portion of the cap, thence are reflected downwardly or laterally through the apertures in the clamping ring, onto the diaphragm. These waves, as has been mentioned, also meet, blend and coalesce with waves that are set up by the vibrating outer part of the diaphragm, each set of waves strengthening the other.

25 While the applicant has explained what he believes to be the theory of operation of his invention, the invention is not to be invalidated in any sense in case such theories are shown to be erroneous, in whole or in part. The invention has been fully tested by deaf persons, in direct comparison with modern transmitters and has been proved to be more efficient, to eliminate vowel "peaks", to eliminate "cooking", "hissing", etc., to be quite sensitive and to be able to pick up and amplify a wide range of sounds, both vocal and musical, with accuracy and without distortion.

30 The invention will be further described in connection with the accompanying drawing illustrating the present preferred embodiment of the invention.

In the drawing:

Fig. 1 is a front view of a transmitter of this invention;

Fig. 2 is a vertical cross section;

Fig. 3 is a front view of the transmitter, with the cap removed;

Figs. 4 and 5 are similar views showing modified forms of the clamping ring; and

Fig. 6 is an enlarged section of part of Fig. 2.

Referring now to the drawing, in which similar reference characters indicate similar parts, 2 indicates the housing provided with the usual carbon button or electrode 4 having the usual recesses partially filled with carbon granules. The button 4 is seated on the connector plate 6. The usual carbon diaphragm 8 bears against the button 4 in the usual way, and is held in place by an annular clamping ring 10 having a large central opening, defined by the edge 10a, adjacent the central part of the diaphragm, as shown in Figure 2. The clamping ring is provided with an annular, laterally extending rim 12, which bears against the diaphragm 8. The electrical connections to the diaphragm and carbon button form no part of the present invention and are not shown in detail.

The clamping ring 10 is held in position by the adjustable clamp 18 which bears against the inner part of the clamping ring, which clamp is provided with resilient, radially extending arms 20, the ends 22 of which are bent around the outer edge of the clamping ring. The ends 22 of these arms are secured to the body portion 2 by pins 24 passing into suitable recesses in the body 2, it being necessary to push such arms to the right in Fig. 7 for the insertion of the pins, and the reactive effect of the resilient arms 20 is sufficient to hold the member 18 and clamping ring in place.

Coming now to one of the most important features of the present invention, the clamping ring, as shown in Fig. 3, for example, is provided with holes 26 and 26', preferably of different sizes, although they could all be of the same size if desired. The size and placement of the holes in the clamping ring may be varied widely; the combined area, however, of all the holes 26 and 26' is preferably approximately equal to the size of the opening formed by the diaphragm clamping ring 10.

As shown in the modification, Fig. 4, the clamping ring 10 is provided with slots 28 and 28', the size and distribution of which can be varied considerably, to change the pitch values.

As shown in Fig. 5, the clamping ring 10'' is provided with radial slots 30.

The transmitter is completed by a cap, indicated generally at 32, provided with a plurality of holes 34 at or near the center thereof, the inner part 36 of the cap being concave, as shown more particularly in Fig. 2. The center part 36 flares outwardly and away from the diaphragm to about the point 38 and then curves inwardly so that the inner surface, as shown at 40, is substantially flush with or coextensive with the outer edges of the holes 26. There is thus formed a resonance chamber over or adjacent the clamping ring and this resonance chamber serves to direct sound waves in a distinct path through apertures 26 onto the outer part of the diaphragm, as shown by the curved arrows at the right of Fig. 6. These sound waves also blend and coalesce with sound waves that may be coming from the other side of the clamping ring. The cap is further provided with a flange 42, and is detachably secured to the housing or base member 2, in any suitable way.

Referring now to Fig. 6, the sound waves coming in through the holes 34 engage the diaphragm 8 in the usual way. Some of these waves are reflected outwardly and radially as in-

dicated by the arrows and are reflected from the inner side of the cap, just under 38, and are guided by the inside of the cap into and toward the holes 26, 28, 30, etc. in the clamping ring. The normal vibration of the diaphragm 8 sets up impulses in the outer part of the diaphragm and these impulses tend to pass in the opposite direction through the holes 26 where they meet the sound waves coming from the other direction, with which they blend and coalesce and form a combinational tone, the formation of which is believed to be one of the reasons for the efficiency and accuracy of the present invention.

Furthermore, any pocketing of the air in the annular space 16 is entirely relieved by the provision of the holes 26, 28, 30, etc. in the clamping ring and the elimination of this pocketing is believed to be at least one of the reasons for the elimination of the hissing, cooking and roar, which is achieved by the present invention.

While the preferred embodiments of the invention have been described in some detail, it should be understood that this disclosure is illustrative and not restrictive of the invention and that it may be carried out in other ways.

I claim as my invention:

1. A transmitter comprising a diaphragm, variable resistance button and clamping ring, said clamping ring being provided with a large central opening adjacent the central part of the diaphragm, and being further provided with circumferentially arranged pressure-relieving and pressure-equalizing apertures for allowing the passage of sound waves therethrough and a cap, the outside of which is concaved inwardly toward the center of the diaphragm and apertured, while the inside of said cap flares outwardly to form an air resonance chamber just over said clamping ring, said large central opening serving to direct sound waves to the central part of the diaphragm, while said air resonance chamber serves to direct sound waves in a distinct path against the outer part of the diaphragm, said two sets of sound waves blending into a combinational tone.

2. A transmitter comprising a diaphragm, variable resistance button and clamping ring, said clamping ring being provided with a large central opening adjacent the central part of the diaphragm, and being further provided with circumferentially arranged pressure-relieving and pressure-equalizing apertures for allowing the passage of sound waves therethrough and a cap, the outside of which is concaved inwardly toward the center of the diaphragm and apertured, while the inside of said cap flares outwardly to form an air resonance chamber just over said clamping ring and then curves inwardly toward the outer part of the clamping ring, said large central opening serving to direct sound waves to the central part of the diaphragm, while said air resonance chamber serves to direct sound waves in a distinct path against the outer part of the diaphragm, said two sets of sound waves blending into a combinational tone.

3. A transmitter comprising in combination with a base member, a diaphragm, a variable resistance button in engagement with the diaphragm, a clamping ring for the diaphragm, said ring being provided with a large central opening adjacent the central part of the diaphragm, and being further provided with circumferentially arranged pressure-relieving and pressure-equalizing apertures and being spaced from said diaphragm for most of its area, and a cap member concaved inwardly toward the diaphragm and

provided with a sound-admitting aperture, the inside of said cap flaring away from the central part of the diaphragm and then curving toward said apertures in the clamping ring to form a sound resonance chamber adjacent said pressure relieving and pressure equalizing apertures, said large central opening serving to direct sound waves to the central part of the diaphragm, while said air resonance chamber serves to direct sound waves in a distinct path against the outer part of the diaphragm, said two sets of sound waves blending into a combinational tone.

4. A transmitter, comprising in combination a housing, a concave cap cooperating therewith, a carbon diaphragm, a carbon button, a clamping ring for holding the diaphragm in place in the housing, against the carbon button, said clamping ring being provided with a large central opening adjacent the central part of the dia-

phragm and also with a plurality of circumferentially arranged pressure-relieving and pressure-equalizing apertures, said clamping ring bearing against the diaphragm at the outer edge thereof, while the remainder of the clamping ring is spaced slightly from the diaphragm, the inner part of the concave cap, opposite the clamping ring, being flared outwardly away from the clamping ring and then bent inwardly toward the apertures in the clamping ring to form a sound resonance chamber adjacent said pressure relieving and pressure equalizing apertures, said large central opening serving to direct sound waves to the central part of the diaphragm, while said air resonance chamber serves to direct sound waves in a distinct path against the outer part of the diaphragm, said two sets of sound waves blending into a combinational tone.

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