

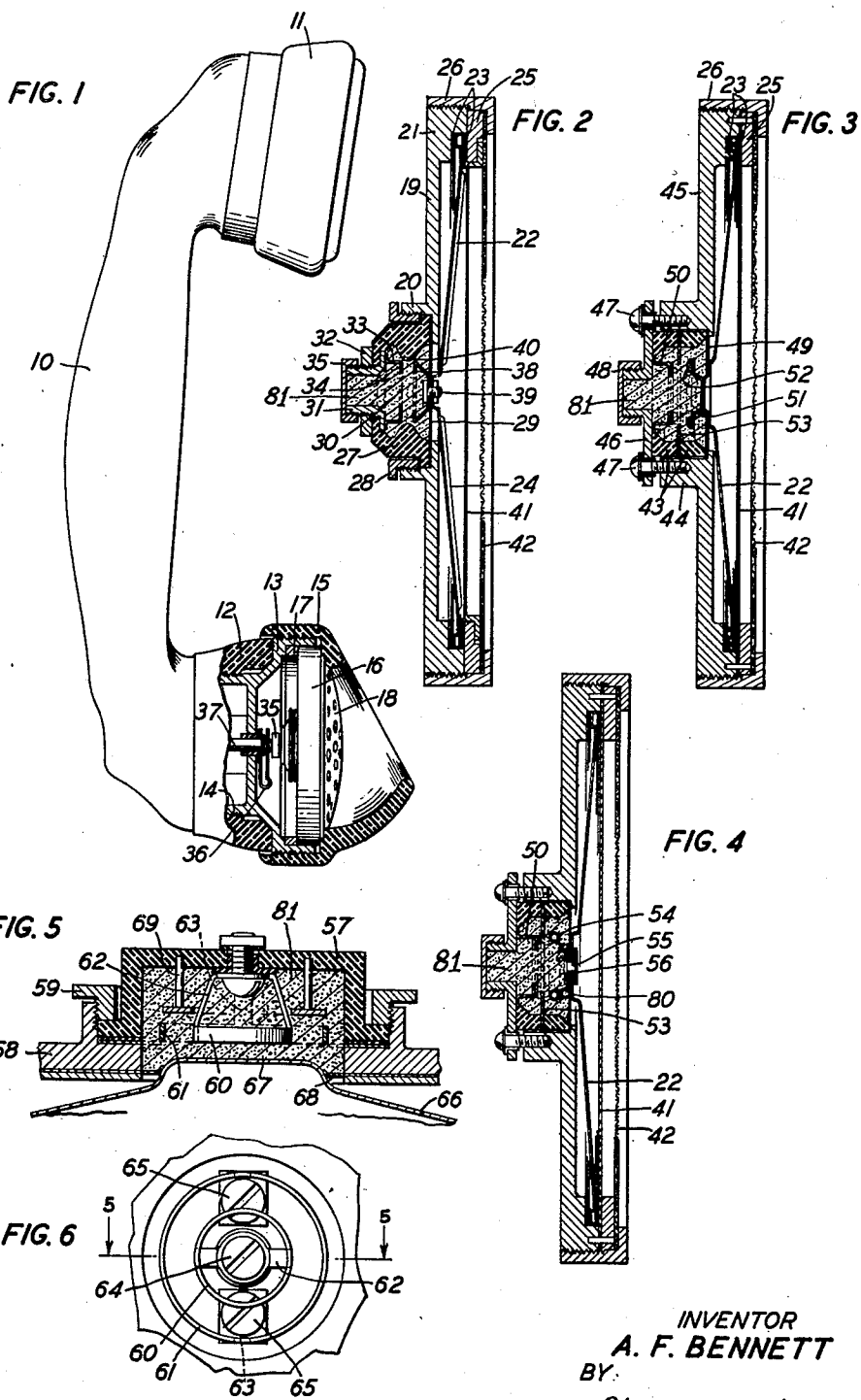
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TELEPHONE TRANSMITTER

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TELEPHONE TRANSMITTER

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This invention relates to telephone transmitters and more particularly to such transmitters for hand telephones and utilizing comminuted material as the resistance varying medium.

5 The operating characteristics of telephone transmitters embodying a plurality of electrodes and a comminuted resistance varying material, such as carbon granules, disposed between the electrodes and in contact therewith are dependent to a large extent upon the nature of the pressure variations produced in the comminuted material when the material is agitated to produce a desired resistance variation. It is desirable, therefore, that a good contact and substantially uniform pressure be maintained between the material and the electrodes. It is desirable also for efficient operation that the current flowing between the electrodes pass through a relatively restricted path and especially through a path embracing the portions of the comminuted material which are agitated to the greatest extent.

During the use of hand telephones of the usual design, that is, embodying a handle, a receiver adjacent one end of the handle, and a carbon granule transmitter adjacent the other end of the handle, the transmitter assumes a large variety of positions and, due to gravitational action, the carbon granules likewise assume a large variety of positions with respect to the electrodes. As a result, the contact between the electrodes and the material and also the resistance of the transmitter varies over a wide range with a consequent non-uniformity in the transmission characteristics and efficiency of the transmitter.

A general object of this invention is to improve the efficiency and operating characteristics of telephone transmitters of the type utilizing a comminuted resistance varying material.

40 More specifically, one object of this invention is to insure a good and substantially uniform contact between the carbon granules and the electrodes in a telephone transmitter or similar device, throughout a wide range of angular positions which the transmitter may assume during operation.

Another object of this invention is to confine the current flow between the electrodes of a telephone transmitter, or similar device, to a restricted path embracing the portions of the carbon granules agitated to the greatest degree during the operation of the transmitter.

In one embodiment illustrative of this invention, a telephone transmitter comprises a chamber containing a comminuted resistance varying material, such as carbon granules, and a pair of closely spaced coaxial annular electrodes disposed within the chamber and completely immersed in the comminuted material. One of the electrodes is stationary and the other of the electrodes may

be connected to a diaphragm and be vibratile therewith. In another embodiment both of the electrodes may be stationary and the diaphragm may be disposed with a portion thereof in contact with the carbon granules so that the pressure between the granules disposed intermediate the electrodes and hence the resistance between the electrodes, is varied in accordance with the vibrations of the diaphragm.

In order to insure a high efficiency and uniform operating characteristics, means are provided for confining the current flow between the electrodes to a path consisting primarily of the portions of the carbon granules agitated to the greatest extent by the vibratile electrode or the diaphragm. In one form, an annular disc of insulating material is coaxially disposed with respect to the electrodes and extends from the walls of the carbon chamber inwardly and partially between the juxtaposed surfaces of the electrodes. The disc divides the carbon chamber into two portions having communication only through the aperture in the disc so that a large percentage of the granules in the two portions are electrically segregated and the current between the electrodes passes through those granules within the confines of the inner edge of the disc.

In another embodiment, the inner wall of the carbon chamber may be provided with an inwardly projecting portion terminating adjacent the electrodes or extending partly between the juxtaposed surfaces of the electrodes.

The invention and the various features thereof will be understood more clearly and fully from the following detailed description with reference to the accompanying drawing in which:

Fig. 1 is a side view partly in cross-section of a hand telephone embodying a transmitter of the type comprehended by this invention;

Fig. 2 is an enlarged cross-sectional view of a telephone transmitter constructed in accordance with this invention, in which the inner walls of the granule chamber are formed to confine the current flow between the electrodes;

Fig. 3 shows another transmitter constructed in accordance with this invention, in which a disc member is provided to confine the current flow between the electrodes;

Fig. 4 shows a modified form of the transmitter illustrated in Fig. 3;

Fig. 5 is a partial view partly in cross-section of another embodiment of this invention in which the two electrodes are disposed one within the other; and

Fig. 6 is a front view of the embodiment shown in Fig. 5 with the diaphragm removed.

Referring now to the drawing, the hand telephone shown in Fig. 1 comprises a handle 10, a receiver 11 at one end of the handle, and a transmitter 12 at the opposite end of the handle. The

transmitter 12 comprises a dished metallic support 13 threaded into the handle as at 14 and has threaded thereto a mouthpiece 15. A transmitter unit designated generally as 16 is locked in the dished support 13 between a spacer ring or gasket 17 and an inner shoulder on the mouth piece 15, together with a perforated protective plate 18.

The transmitter unit in one form shown in Fig. 2 comprises an annular frame or support 19 which may be of metal, having a cylindrical interiorly threaded portion 20 and an exteriorly threaded rim portion 21. A dished diaphragm 22, which may be of a lightweight material such as duralumin, is seated at its periphery in an annular recess in the rim portion 21, flexible annuli 23 being disposed on opposite sides of the periphery of the diaphragm so that the diaphragm may vibrate substantially as a whole analogous to a piston. The diaphragm may be provided with a plurality of radially extending stiffening ribs or flutes 24. An annular disc member 25 overlies the periphery of the diaphragm and is secured to the rim of the frame by a clamping ring 26 threaded on the frame, and thereby holds the diaphragm 22 and the annuli 23 in position.

A hollow member or shell 27 of insulating material is secured within the cylindrical portion 20 by a threaded clamping ring 28. The hollow member 27, the members 31 and 35, together with a thin, flexible sheet 29 of insulating material, such as silk, clamped between the base of the hollow member and the frame 19, define a chamber 30 which is substantially filled with a comminuted resistance varying material 31, such as carbon granules. A flanged tubular metallic sleeve 31 is clamped to the hollow member or shell 27 by a clamping ring 32 and has secured thereto an electrode 33 having a flat, annular flange 34 disposed coaxially with the diaphragm 22. The outer end of the sleeve 31 may be closed by a threaded metallic cap 35 which serves as a terminal for the electrode 33 and may be engaged by a spring conductor 36 electrically associated with an external electrical circuit by a conductor 37.

Another electrode having a flat annular flanged portion 38 parallel with the flanged portion 34 of the electrode 33 and coaxial therewith is secured to the center or apex of the diaphragm 22, as by a bolt and nut 39. The flanged portions 34 and 38 are closely spaced and provide a restricted annular path of low resistance between the electrodes of the transmitter. In order to confine the current flow between the electrodes to this path, the inner wall of the hollow member or shell 27 may be provided with an inwardly extending or bulged portion 40. This construction insures a flow of the greater portion of the current between the electrodes through a path including the annular portions 34 and 38 of the electrodes and the comminuted material immediately thereadjacent. Since the comminuted material between and immediately adjacent the flanges 34 and 38 is subjected to the greatest agitation in accordance with the vibrations of the diaphragm 22 and the electrode connected thereto, a high modulation and good transmission characteristics are obtained.

In order to protect the diaphragm against corrosion by moisture a thin, moisture-proof screen 41, such as of oiled silk or cellulose acetate, may be provided adjacent the front surface of the diaphragm. Inasmuch as the diaphragm is preferably of a lightweight material, such as duralumin, it is susceptible to temperature changes

and may become distorted during use due to the heat from the breath of a person speaking into the transmitter. To prevent this possible distortion of the diaphragm, and thereby to maintain the characteristics of the transmitter constant, a screen 42 of a material having a low heat conductivity, such as rose or wood metal may be provided to dissipate the heat from the breath of one speaking into the transmitter.

In another embodiment of this invention illustrated in Fig. 3 a hollow insulating member or shell 43 is secured within a tubular projection 44 of a frame or support 45 by a clamping plate 46 which is secured to the projection 44 by screws 47. The outer end of the tubular portion of the plate 46 is closed by a threaded cap 48. The end of the shell 43 toward the substantially conical shaped diaphragm 22 is closed by the flattened central portion of the diaphragm and a thin, flexible annular sheet 49 of insulating material.

A pair of electrodes 50 and 51, similar to the electrodes 33 and 38 of the embodiment shown in Fig. 2, are positioned within the shell or hollow member 43, the electrode 50 being rigidly secured to the clamping plate 46 and the electrode 51 being connected to the central or apex portion of the diaphragm 22. In order to insure good contact between the comminuted material and the electrode 51, the surface thereof in juxtaposition to the electrode 50 is rounded as indicated at 52. The juxtaposed surface of the electrode 50 likewise may be rounded or may be hollowed. In order to confine the current flow to a path embracing the comminuted material subjected to the greatest agitation by vibrations of the diaphragm, that is, the material between and in the immediate vicinity of the juxtaposed surfaces of the electrodes 50 and 51, an annular shield 53 of insulating material is provided and extends from the inner wall of the shell 43, partly between the electrodes 50 and 51.

In a modified embodiment of this invention, illustrated in Fig. 4, the vibratile electrode comprises a hollow toroid 54 secured to brackets, such as 50, which are in turn secured to the central or apex portion of the diaphragm 22 by an eyelet 55. The outer end of the eyelet is sealed by an imperforate disc 56.

In still another embodiment of this invention illustrated in Figs. 5 and 6, a cup-shaped member 50 is secured to a frame 58 by a clamping ring 59. A pair of annular electrodes 60 and 61 are supported by brackets 62 and 63, respectively, which are secured to the cup-shaped member 57 by bolts 64 and 65, respectively, which serve as external terminals for the electrodes. The electrodes 60 and 61 are concentrically arranged and thereby provide juxtaposed coaxial cylindrical surfaces between which current may flow through the intermediate comminuted resistance varying material.

A dished diaphragm 66 having a flat portion central 67 disposed in proximity to the electrodes 60 and 61 and substantially coextensive with the electrode 61 is supported on the frame 58, the opening between the flat portion 67 and the frame being closed by a flexible annulus 68, which may be of silk or other similar material.

In order to increase the modulation, an annular insulating baffle 69 may be provided adjacent the inner edges of the electrodes 60 and 61, the baffle being suitably secured to the casing 57.

The chamber formed by the cup-shaped member 57, the flat portion 67 of the diaphragm and the annulus 68 is filled with a comminuted

resistance varying material such as carbon granules. Vibrations of the diaphragm 66 are communicated to the comminuted material and the resistance between the electrodes 60 and 61 is thereby varied.

Although a number of embodiments of this invention have been shown and described, it will be understood that many modifications may be made therein without departing from the scope and spirit of this invention as defined in the appended claims.

What is claimed is:

1. A telephone transmitter comprising means forming a chamber, comminuted resistance varying material in said chamber, a pair of electrodes insulatedly mounted with respect to each other and having juxtaposed coaxial annular portions completely immersed in said material, said electrodes having also juxtaposed apertures allowing passage of said material through said annular portions, and means for varying the pressure in said material adjacent said electrodes.

2. A telephone transmitter comprising means defining a chamber, carbon granules within said chamber, a pair of electrodes having juxtaposed coaxial annular portions, one of said electrodes being completely immersed in said granules and having an aperture therein in juxtaposition to the other of said electrodes through which said granules pass, and means for vibrating said one electrode.

3. A telephone transmitter comprising a diaphragm, means adjacent one surface of said diaphragm forming a chamber, carbon granules substantially filling said chamber, an electrode having an annular substantially flat portion, rigidly fixed within said chamber, and another electrode carried by said diaphragm and vibratile therewith, having an annular portion provided with an opening allowing passage of said granules therethrough, said second annular portion being coaxial with and in juxtaposition to the annular portion of said first electrode and completely immersed in said granules.

4. A telephone transmitter comprising a diaphragm, means forming a chamber adjacent one surface of said diaphragm, comminuted resistance varying material within said chamber, a pair of electrodes within said chamber and completely immersed in said material, said electrodes having juxtaposed parallel flat annular portions and juxtaposed central apertures through which said material passes, one of said electrodes being stationary, and the other of said electrodes being connected to said diaphragm and vibratile therewith.

5. A telephone transmitter comprising a support, a diaphragm mounted on said support, a cup-shaped member mounted on said support and forming a chamber adjacent the central portion of said diaphragm, carbon granules within said chamber, an electrode rigidly mounted within said chamber, and another electrode connected to said diaphragm and vibratile therewith, said electrodes having juxtaposed annular portions completely immersed in said carbon granules and having also juxtaposed apertures bounded by said annular portions through which said granules pass.

6. A telephone transmitter comprising means forming a chamber, comminuted resistance varying material in said chamber, a plurality of open-ended cylindrical electrodes insulatedly mounted

with respect to each other, disposed one within the other and immersed in said material, and means for varying the pressure in said material between said electrodes.

7. A telephone transmitter comprising a cup-shaped member, carbon granules within said member, a diaphragm adjacent the open end of said member and having a portion in contact with said granules, and a plurality of annular electrodes within said chamber and insulatedly mounted with respect to each other, said electrodes being coaxial and having juxtaposed cylindrical surfaces.

8. A telephone transmitter comprising a diaphragm, a hollow member forming a chamber adjacent one surface of said diaphragm, carbon granules within said chamber, a stationary electrode within said chamber, an electrode within said chamber, connected to said diaphragm and vibratile therewith, said electrodes having juxtaposed coaxial annular portions, one of said portions being completely immersed in said granules, and an annular insulating disc extending from the inner wall of said member to between said annular portions.

9. A telephone transmitter comprising a support, a diaphragm mounted on said support, a cup-shaped member mounted on said support and forming a chamber adjacent one surface of said diaphragm, carbon granules substantially filling said chamber, a pair of electrodes within said chamber, having juxtaposed coaxial parallel annular portions completely immersed in said granules, one of said electrodes being fixed and the other of said electrodes being connected to said diaphragm and vibratile therewith, and an annular insulating disc coaxially disposed with said electrodes and extending outwardly from points adjacent the juxtaposed portions of said electrodes.

10. A telephone transmitter comprising means forming a chamber, comminuted resistance varying material within said chamber, a diaphragm, and a pair of electrodes having juxtaposed annular flanged portions in contact with said comminuted material on opposite sides relative to the longitudinal axis of said electrodes, one of said electrodes having a central aperture through which said material passes and being coupled to said diaphragm and vibratile therewith.

11. A telephone transmitter comprising means forming a chamber, comminuted resistance varying material within said chamber, a diaphragm in axial alignment with said chamber, and a pair of electrodes within said chamber, having juxtaposed annular substantially L-shaped flange portions in axial alignment with said diaphragm, opposite surfaces of each of said portions being in contact with said material, one of said electrodes being coupled to said diaphragm and vibratile therewith, said electrodes having juxtaposed central apertures through which said material may flow between said opposite surfaces.

12. A telephone transmitter comprising means forming a chamber, a plurality of electrodes within said chamber having juxtaposed portions and having also juxtaposed apertures, a diaphragm connected to one of said electrodes, and comminuted resistance varying material within said chamber and in contact with opposite surfaces of each of said portions.

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