F. GOTTSCHALK.

TELEPHONE TRANSMITTER.

APPLICATION FILED JUNE 12, 1911.

1,018,182.

Patented Feb. 20, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

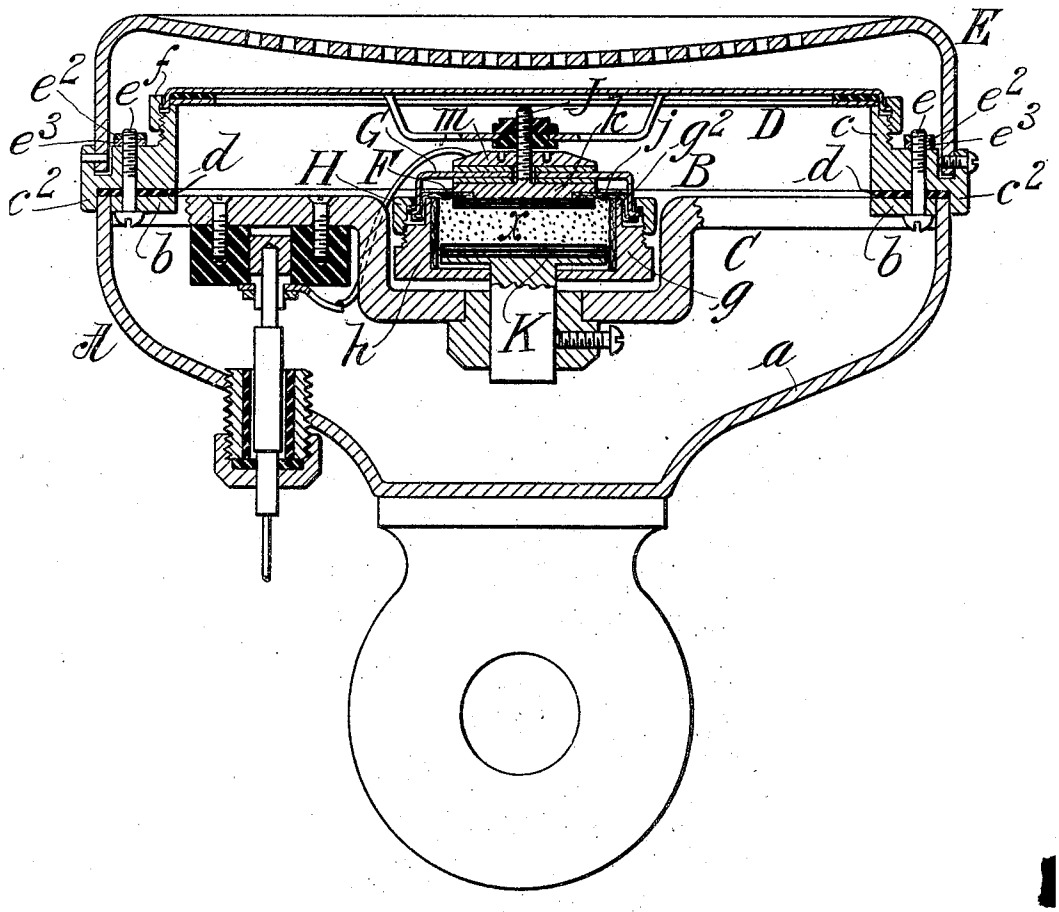
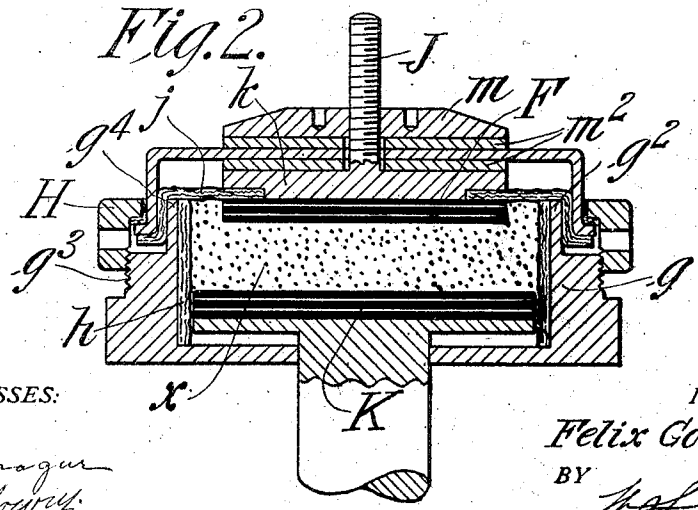


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

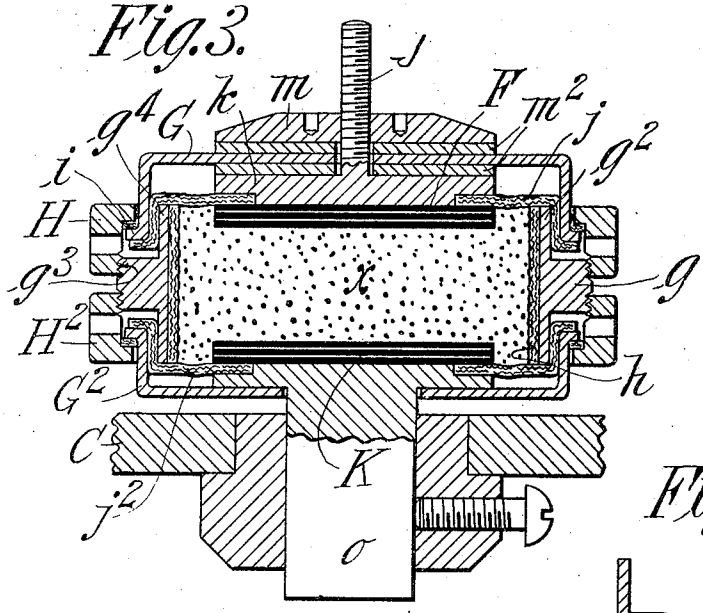


Fig. 5.

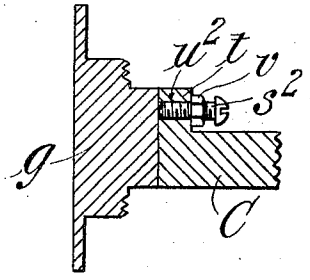
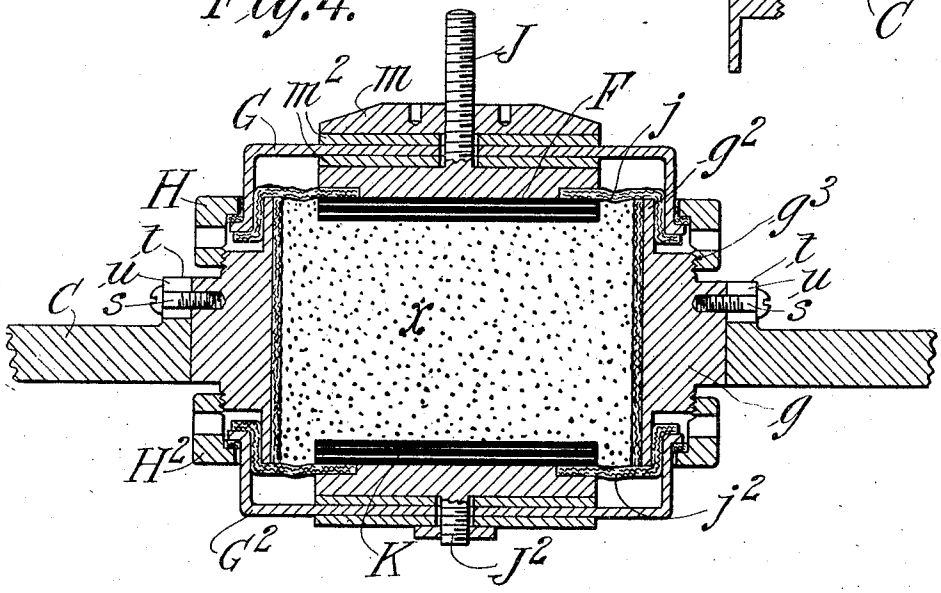


Fig. 4.



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TELEPHONE-TRANSMITTER.

1,018,182. Specification of Letters Patent. Patented Feb. 20, 1912.

Application filed June 12, 1911. Serial No. 632,565.

To all whom it may concern:

Be it known that I, FELIX GOTTSCHALK, a citizen of the United States of America, and resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Telephone-Transmitters, of which the following is a full, clear, and exact description.

This invention in telephone transmitters comprises improvements pertaining to the resistance cup and to the sectionally formed transmitter casing.

As concerns the resistance cup, an object is to provide a construction thereof by means of which the delicate mica diaphragm or diaphragms may be dispensed with, whereby the liability of breakage is very greatly lessened or avoided.

Another object is to provide a construction of resistance cup so that in the assemblage or disassemblage of the parts the contained granular carbon may not be sifted or spilled.

Another object is to embody in the resistance cup a metallic vibratory diaphragm having connection with the electrode or electrodes therein whereby the activity and sensitiveness of this important part of the instrument is increased.

Another object is to so construct the resistance cup and to mount the same in the instrument that the entire contents of the carbon chamber are free to be vibrated under the electrical impulses through the instrument, and so that the resistance cup may be easily placed and always maintained in perfect adjustment in the transmitter, thereby greatly reducing the possibility of the packing of the granulated carbon.

Another object is to provide an improved construction of transmitter casing as regards the means for the engagement and detachable confinement of the separable sections thereof and for the combination therewith and retention therein of an appliance for rendering the casing air tight and waterproof at the junction of the separable parts.

Other objects are generally for a cheapening of the instrument and for advantages as will hereinafter appear.

And for the attainment of the aforenamed objects, the invention consists in combinations and arrangements of parts and constructions of certain of the parts all substantially as hereinafter described and set forth in the claims.

In the drawings:—Figure 1 is a sectional view, on an enlarged scale, centrally through the improved transmitter. Fig. 2 is a central sectional view through the resistance cup of the form shown in Fig. 1, but on a still more enlarged scale. Fig. 3 is a view similar to Fig. 2 but showing a provision of duplicated diaphragms in the resistance cup. Fig. 4 is a view similar to Fig. 3, but further showing a new means of supporting and adjusting the resistance cup. Fig. 5 is a partial section showing a modification.

In these drawings, by reason of the enlarged scale on which they are made, the thicknesses of materials and the degree of their separations are very much magnified and exaggerated.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A represents the casing or inclosing shell of the transmitter, consisting of a circular back section *a* having an internal flange *b* at its mouth portion, which flange extends at right angles to its axis, and the front casing section *c* which is adapted to match with said flange and which has an annular flange c^2 parallel with said axis. A ring *d* of compressible packing material is interposed between the matching portions of the two casing sections, and has means for tightly holding the two casing sections together, which provisions are as follows: Instead of employing screws horizontally, which in time may work loose, and make a "noisy" transmitter, I employ screw-threaded studs *e* as permanent and rigid members of the flange *b* of the casing applied in parallelism with each other and with the axis of the instrument. These studs *e* have heads which are soldered to the flange ring *b*, or such studs may be made an integral part of such ring, and their forwardly protruding portions are extended through suitably positioned holes therefor in the front casing section *c*; and the nuts e^2 in conjunction with which washers e^3 are employed to perfect the confinement of the parts.

In practice the flange *b* is first made as a ring separate from the rear casing section *a*, and the screw studs *e e* are soldered or otherwise affixed thereto and made to all intents

and purposes as integral parts thereof; and then said ring is soldered in the mouth of the casing section *a* so that this also to all intents and purposes becomes an integral part of such casing section; and the said flange c^2 of the front casing section covers and conceals the seam between the two sections and the interposed packing ring *d*. In the construction described, the internal flange *b* of the rear casing section *a* affords a comparatively broad and flat plane surface for a compressible ring *d*, having the form of an annulus, to be borne against by the flat rear face of the forward casing section *c*,—the studs *e e* with the nuts therefor perfecting the closure of a water tight joint between the casing sections, and which joint is concealed by the flange c^2. This is deemed a material improvement over transmitters in which the casing sections are telescopically engaged together and in which is difficult, if not impossible, to employ a packing ring under a degree of compression such as is here possible.

B represents the resistance cup supported by the bridge C; and D represents the diaphragm of the drum head type held and confined in taut condition across the annular front casing section *c* by the threaded ring *f*.

E represents a guard for the drumhead diaphragm, and its confining means.

The resistance cup comprises a cylindrical body or shell *g* having its mouth portion externally of step shape whereby the narrow annular rib g^2 is produced and made with screw threads g^3 back of, or beyond the step.

F represents the front electrode near the mouth of the casing and forward of the granular carbon *x*, and with which electrode the transmitter diaphragm coacts in substantially the usual way, but in the present instance through the medium of parts having somewhat specifically different form and arrangement from the ordinary.

h represents the usual insulating lining for the resistance cup.

G represents a comparatively small and thin metallic diaphragm covering the front electrode, closing the mouth of the casing and having an angularly turned or step shaped marginal portion *i* which is disposed relatively to the rib comprised in the step shaped formation of the casing so as to be confined in taut condition by the internally flanged ring nut H which is engaged with the aforementioned screw threads g^3 of the casing.

J represents a screw stud forwardly projecting from and as an appurtenance of the front electrode and with which the diaphragm has its operative engagement. This screw stud J is made with an enlarged base or back *k* which is marginally reduced or rabbeted at its rear side, and which also has its rear side secured to the front electrode. A circular sheet *j* of flexible insulating material, such as sheet asbestos, and which is suitably centrally apertured, has the portion thereof marginally of such apertures secured within the said rabbeted portion of the stud back and extends from the latter to engagement with the mouth portion of the shell inside of the small sheet metal vibratory diaphragm G. The outer edge portion of this flexible insulating sheet material is carried over the rib g^4 forming the riser of the step externally of the mouth of the casing *g* and is engaged and confined as well, and in the same manner, as the metallic diaphragm by the aforementioned internally flanged ring nut H. This annulus of flexible insulating sheet material serves the double duty of insulating the small diaphragm G from the resistance cup body or casing and forming a means for preventing the shifting or scattering of the granular carbon out from the front of the cup, keeping it always in confinement within the cup. The washer shaped nut *m* screw engaging on the screw stud outside of the small vibratory diaphragm G confines the central portion of the latter in its relation to the stud back, and in practice thin washers m^2, m^2 are interposed respectively between the nut *m* and diaphragm and the diaphragm and stud back. The stud back constitutes a spacing member interposed in contact with and between the diaphragm and the electrode for the assurance of entirely free vibratory action of the metal diaphragm.

In Fig. 3 the parts and formations described in conjunction with Figs. 1 and 2 are shown as duplicated at the rear of the resistance cup and in relation to the back electrode K, viz: The body or casing of the cup is made rearwardly open, is of the external step formation, receives the ring nut H^2 which holds the duplicated small thin metallic vibratory diaphragm G^2 in its place as well also as the sheet of flexible insulating material J^2 which closes the rear open end of the casing having connection with the rear electrode by the interposition and confinement of its inner marginal portion between the back electrode *k* and the back electrode post *o* which is reduced or rabbeted in a similar manner to that shown for the stud back *k*.

In Fig. 4 the combinations and arrangements of the parts at the back of the resistance cup are almost identically the same as those at the front thereof, those at the back being so nearly counterparts of the other that the resistance cup might be reversed end for end, and here the means for the support and adjustment of the cup within the instrument are as follows: The bridge C is made with an aperture therethrough of a

diameter equal to the maximum diameter of the resistance cup, and it has flange like portions t marginally of the aperture which are parallel with the axis. The intermediate portion of the casing of the resistance cup is encircled by the apertured and flanged bridge and is bodily adjustable therein; and headed confining screws have the shanks thereof passed through slots u in the flange like portions of the bridge, the lengths of which slots are parallel with the axis of the cup,—the threaded end portions of the screws engaging in screw shaped holes therefor in the casing, while the heads are set up firmly against the outer faces of the flange portions. In the construction of the resistance cup as represented in Fig. 4, a maximum of vibration is permitted for both the front and rear electrodes which in a sense are held in suspension within the cup by the opposed small metallic vibratory diaphragms G and G^2, which latter form closures for the opposite ends of the shell while the studs J and J^2 extending through said closures form the requisite metallic connection-making appurtenances of the electrodes at the opposite ends of the cup.

Any of the electrical circuit systems can be employed in a telephone transmitter in which the resistance cup substantially as herein described and shown is contained.

In Fig. 5, slightly modified and in some respects better means for adjustably confining the carbon chamber at its middle portion is shown. Here the flange like portion t of the bridge is made with screw holes u^2 instead of slots, and the screws s^2 have confining engagement against the smooth periphery of the casing. As adjustment is required within 1/1000 of an inch, this may be acquired by having the screws only partially, or not tightly set against the casing; and then when the adjustment to give the greatest amplitude and clearness is found, the screw is more securely tightened and the lock nut v is tightly turned up against the flange.

I claim:—

1. In a telephone transmitter, a resistance cup comprising a casing, an electrode near the mouth portion of the casing with which the transmitter diaphragm coacts, a smaller metallic diaphragm, having the inner portion thereof engaged with the electrode, covering the same, closing the mouth of the casing, confined on the portion of the casing which surrounds its mouth, and means for insulating the smaller diaphragm from the casing which extends to connection with the electrode in separation from the smaller diaphragm, so that such insulating material causes no obstruction to the free vibratory action of the adjacent diaphragm.

2. In a telephone transmitter, a resistance cup comprising a cylindrical shell having its mouth portion externally of step shape and provided with screw threads back of the step, an electrode near the mouth of the casing and forward of the granular carbon, and with which the transmitter diaphragm coacts, and a smaller metallic diaphragm, covering the electrode, closing the mouth of the casing and having an angularly turned marginal portion disposed relatively to the step shaped part of the casing and an internally flanged ring nut screw engaged on the casing and, by the flange thereof, having a confining engagement against the angular marginal portion of the smaller diaphragm.

3. In a telephone transmitter, a resistance cup comprising a cylindrical casing, an electrode within the casing and a metallic vibratory diaphragm closing the mouth of the casing, confined on the portion of the latter which surrounds its mouth and insulated therefrom, and connected with the electrode, the material which insulates the diaphragm being in separation from the vibratory portion of the diaphragm lying between the mouth of the casing and the electrode.

4. In a telephone transmitter, a resistance cup comprising a cylindrical shell having its mouth portion externally of step shape and provided with screw threads back of the step, an electrode near the mouth of the casing, a metallic diaphragm, covering the electrode, closing the mouth of the casing and having an angularly turned marginal portion disposed closely relatively to the step shaped part of the casing, an internally flanged ring nut screw engaged on the casing and by the flange thereof having a confining engagement against the angular marginal portion of the smaller diaphragm, and a sheet of flexible insulating material centrally connected to the electrode within the metallic diaphragm, and marginally engaged and confined between the mouth portion of the casing and said ring nut.

5. In a telephone transmitter, a resistance cup comprising a metallic cylindrical casing, an electrode within the casing, a sheet of flexible heat resisting insulating material connected to the electrode extending therefrom to the mouth portion of the casing, and a vibratory metallic diaphragm covering the electrode and having the marginal portion thereof engaged with the mouth portion of the casing.

6. In a telephone transmitter, a resistance cup comprising a cylindrical shell made open at its end, an electrode within the shell, a screw-stud having an enlarged base or back marginally rabbeted at its rear side and secured to the electrode, a circular sheet of flexible insulating material centrally apertured and having the portion thereof marginally of its aperture secured within said rabbeted portion of said stud-back and extending from the latter to engagement

with the mouth portion of the shell, a thin metal diaphragm centrally apertured and disposed in encircling relation about said stud at the front of the stud-back and also engaged with the open end portion of the shell, and a nut engaging on the screw-stud and for confining the central portion of the diaphragm in its relation to the stud-back.

7. In a telephone transmitter, a resistance cup comprising a cylindrical shell made open at its end, an electrode within the shell, a screw-stud having an enlarged base or back secured to the electrode, a circular sheet of flexible insulating material centrally apertured and having the portion thereof marginally of its aperture secured between said stud-back and electrode, and extending from the latter to engagement with the mouth portion of the shell, a thin metal diaphragm centrally apertured and disposed in encircling relation about said stud at the front of the stud-back, and by such stud back held separated from said sheet of insulating material and said diaphragm, also engaged with the open end portion of the shell, and a nut engaging on the screw-stud for confining the central portion of the diaphragm in its relation to the stud-back.

8. In a telephone transmitter, a resistance cup comprising a cylindrical shell made open at both its ends, electrodes within, and at opposite ends of the shell screw studs having enlarged bases or backs marginally rabbeted at their inner sides and secured to the electrodes, circular sheets of flexible insulating material centrally apertured and having the portions thereof marginally of their apertures secured within said rabbeted portions of said stud backs and extending from the latter to engagement with the mouth portions of the shell, thin metal diaphragms centrally apertured and disposed in encircling relations about said studs at the outer sides of their backs, and nuts engaging on the screw studs and for confining the central portions of the diaphragm in their relations to the stud backs.

9. In a telephone transmitter, a resistance cup comprising a cylindrical shell made open at both its ends, electrodes within, and at opposite ends of, the shell, screw studs having enlarged bases or backs secured to the electrodes, circular sheets of flexible insulating material centrally apertured and having the portions thereof marginally of their apertures secured to the connected stud backs and electrodes and extending from the latter to engagement with the mouth portions of the shell, thin metal diaphragms centrally apertured and disposed in encircling relations about said studs at the outer sides of their backs, nuts engaging on the screw studs and for confining the central portions of the diaphragm in their relations to the stud backs, and ring nuts for confining the marginal portions of both the flexible insulating sheets and the thin metal diaphragms on the opposite end edges of the cylindrical resistance cup shell.

10. In a telephone transmitter, a resistance cup made open at its end, an electrode within the mouth portion of the cup, a thin metallic vibratory diaphragm outside of the electrode and extending to and having a confined relation to the open end of the shell, a flexible heat resisting insulation sheet interposed in contact within and between the diaphragm and the electrode, and connected to the open end of the cup, a second electrode in the cup, and the granular carbon between the electrodes.

11. In a telephone transmitter, an annular resistance cup shell constructed open at its opposite ends, electrodes within the opposite mouth portions of the shell, thin metallic vibratory diaphragms, outside of the electrodes, and extending to and having confined relations with the opposite end edges of the casing shell, flexible heat resisting insulating sheets interposed in contact with and between the diaphragms and the electrodes, and connected to the ends of the cup shell, and the granular carbon in the shell between the electrodes.

12. In a telephone transmitter the combination with the transmitter casing having a bridge therein provided with an aperture therethrough in the axial line of the transmitter casing, having flanges marginally of the aperture and parallel with said axis, made with slots therein, of a resistance cup of cylindrical form having the intermediate portion thereof encircled by the apertured and flanged bridge and bodily axially adjustable, and headed confining screws passed through said slots and with screw engagements into the intermediate portion of the cup.

13. In a telephone transmitter, the combination with the transmitter casing having a bridge therein provided with an aperture therethrough, in the axial line of said casing, and having flanges marginally of the aperture parallel with said axis, made with slots therein, of a resistance cup having the form of an annular shell constructed open at its opposite ends, having the intermediate portion thereof encircled by the apertured and flanged bridge and bodily adjustable therein, headed confining screws passed through said slots and with screw engagements into the intermediate portion of the cup, electrodes within the opposite mouth portions of the cup, both of which are free and independently movable relatively to the shell, granular carbon between the electrodes, closures for the opposite ends of the cup, and metallic means in connection with the electrodes and extending through and to the exterior of said closures.

14. In a telephone transmitter, the combination of a resistance cup and a bridge,—the bridge having an aperture therethrough of a diameter corresponding to that of the body of the cup, and made with a flange marginally of the aperture, and the resistance cup having the metal portion of its casing externally smooth and fitted through said aperture and screw means carried by the flange portion of the bridge and detachably engaging the smooth middle portion of the casing for confining it in its adjustment.

Signed by me at New York, N. Y., in presence of two subscribing witnesses.

FELIX GOTTSCHALK.

Witnesses:
J. J. LOCKWOOD,
W. F. ROOHAN.