

No. 875,156.

PATENTED DEC. 31, 1907.

H. P. CLAUSEN.
TELEPHONE TRANSMITTER.

APPLICATION FILED AUG. 20, 1902. RENEWED APR. 6, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

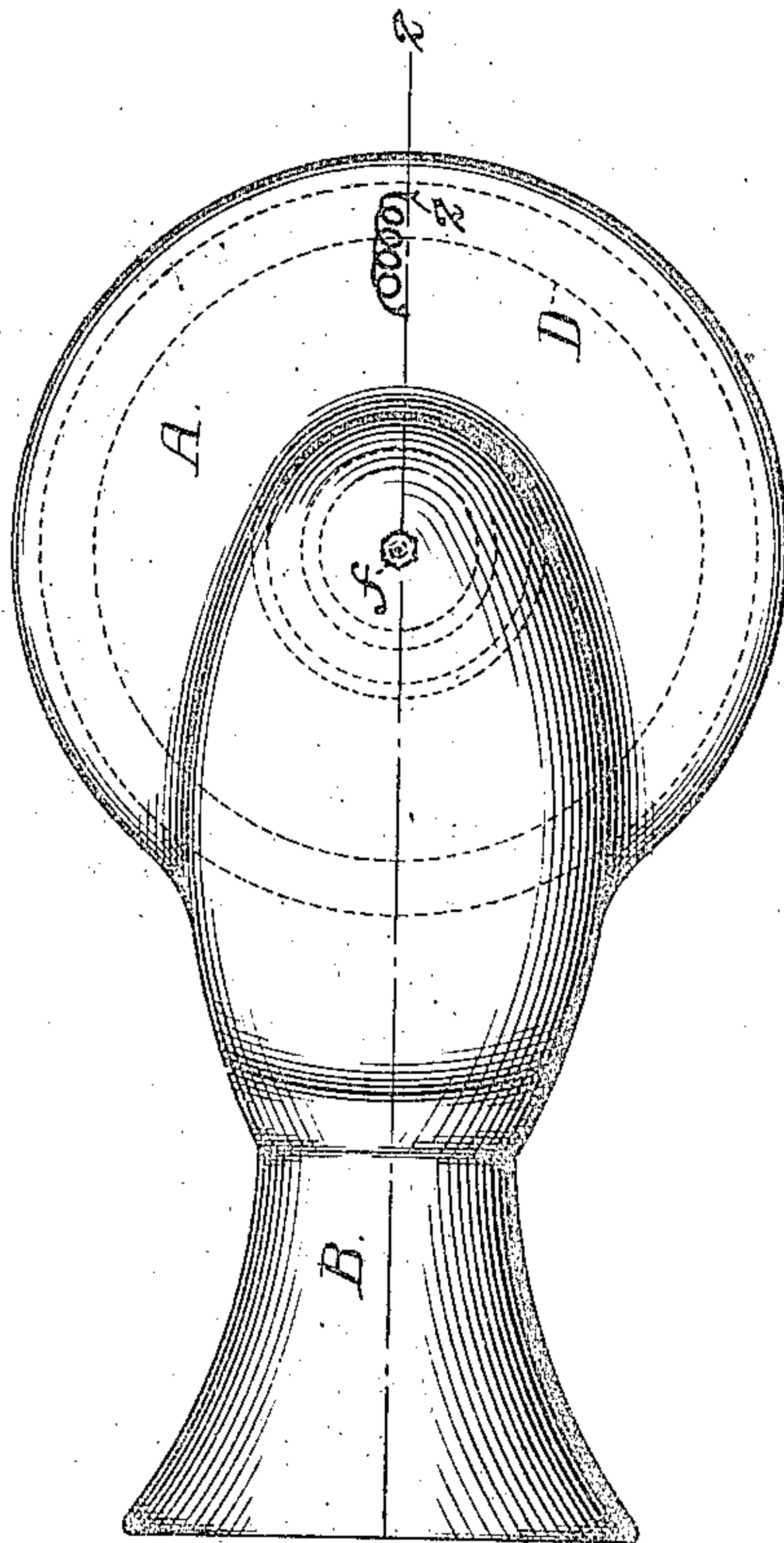
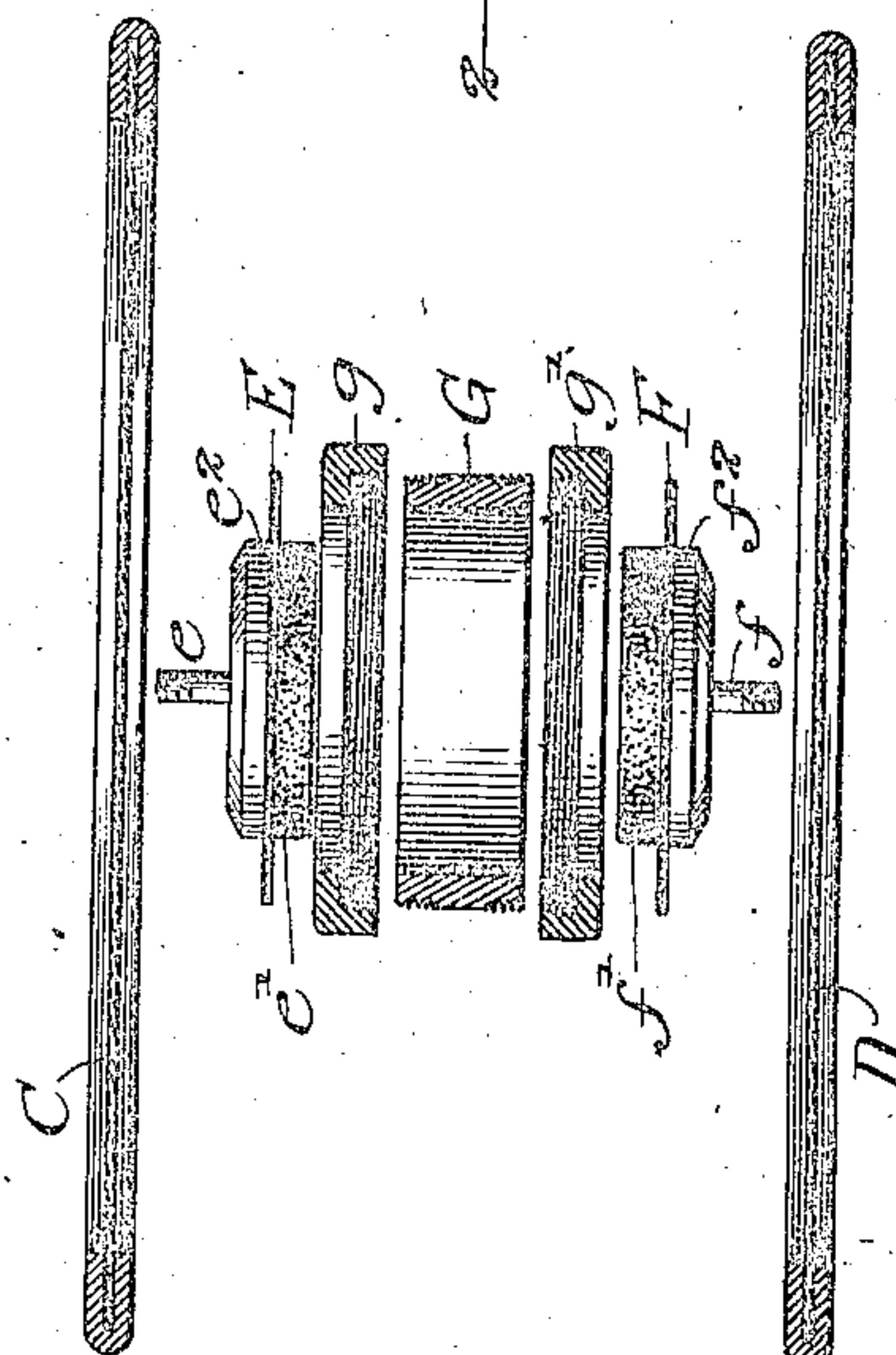


Fig. 3.



Witnesses:

Louis M. F. Holmhead

Arthur F. Leland

Inventor:

Henry P. Clausen
By Chas. R. Renshaw

No. 875,156.

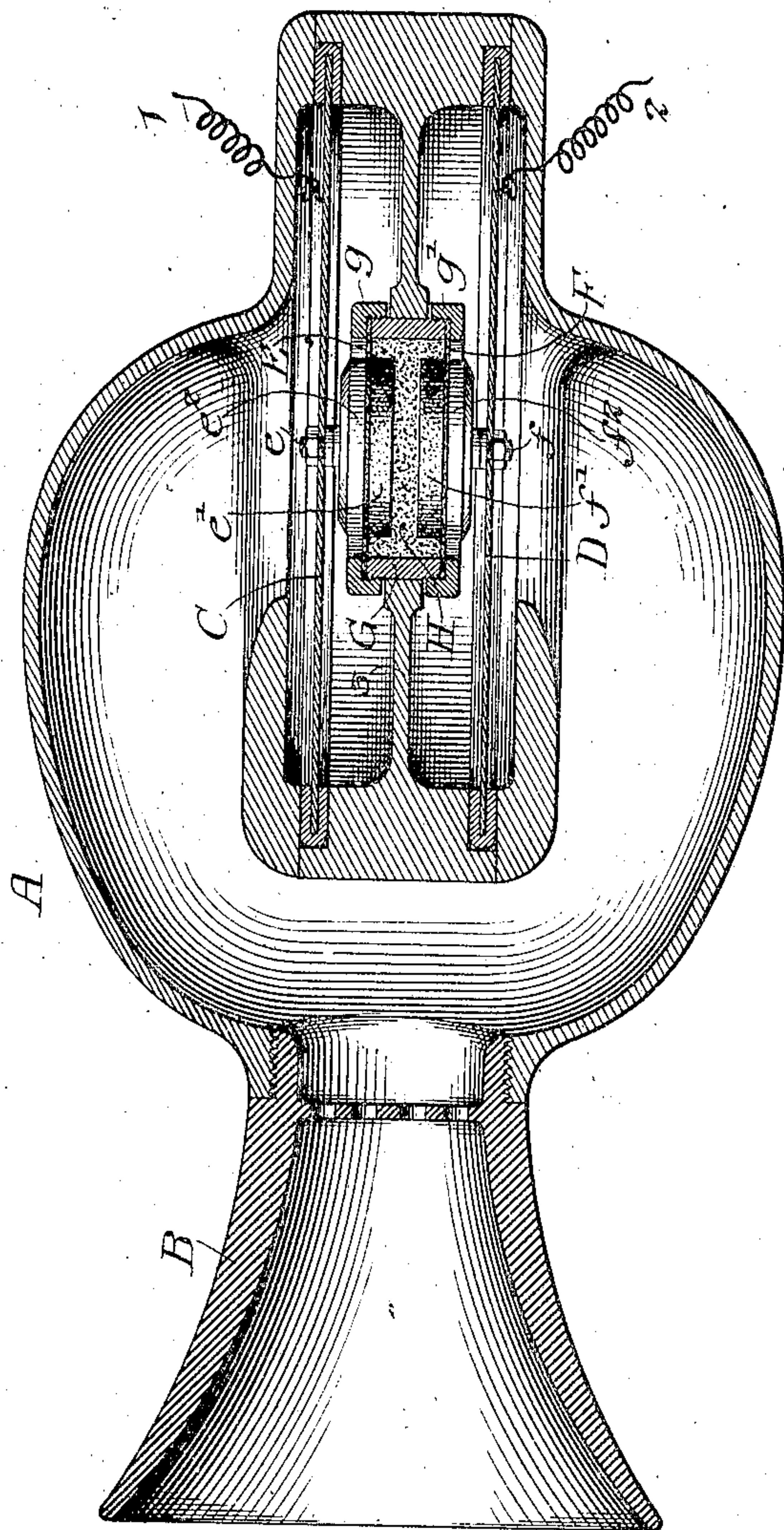
PATENTED DEC. 31, 1907.

H. P. CLAUSEN.
TELEPHONE TRANSMITTER.

APPLICATION FILED AUG. 20, 1902. RENEWED APR. 6, 1905.

2 SHEETS—SHEET 2.

Fig. 2.



Witnesses:-

Louis H. V. Whitehead

Arthur F. Leland

Inventor:-

Henry P. Clausen
By *Chas. C. Ruesch*
att.

UNITED STATES PATENT OFFICE.

HENRY P. CLAUSEN, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN ELECTRIC TELEPHONE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION.

TELEPHONE-TRANSMITTER.

No. 875,156.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed August 20, 1902, Serial No. 120,283. Renewed April 6, 1905. Serial No. 254,110.

To all whom it may concern:

Be it known that I, HENRY P. CLAUSEN, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Telephone-Transmitters, of which the following is a specification.

My invention relates to telephone transmitters constructed on the microphone principle and involving, preferably, a quantity of granulated carbon or other comminuted material interposed between the electrodes which are caused to move relatively toward and away from each other, when the diaphragm of the transmitter is vibrated by the sound waves.

Generally stated, it is the object of my invention to provide a simple, compact, comparatively inexpensive and highly efficient transmitter of the foregoing character, which will correctly and clearly transmit speech.

A special object is to provide a construction and arrangement for obtaining a highly effective and beneficial action of a pair of main diaphragms arranged in conjunction with a pair of supplemental diaphragms.

It is also an object of my invention to provide certain details and features of improvement tending to increase the general efficiency and serviceability of a telephone transmitter of this character.

To the foregoing and other useful ends my invention consists in matters and things hereinafter set forth and claimed.

In the accompanying drawings Figure 1 is a side elevation of a transmitter embodying the principles of my invention. Fig. 2 is an enlarged section on line 2—2 of Fig. 1. Fig. 3 is a view showing the two diaphragms and the different parts of the microphone separated.

As illustrated, my improved microphone transmitter comprises a suitable body A, a mouth-piece B, and a pair of oppositely arranged diaphragms C and D.

It will be observed, that the construction of the casing is such that the atmospheric vibrations passing through the mouth-piece are conducted to a point where they will impinge on the central portions of the said main or acoustic diaphragms C and D. A pair of supplemental diaphragms E and F, preferably of mica or some other springy

or resilient material, are arranged between the main diaphragms, and are preferably connected with the latter by means of bolts or screws *e, f*. The carbon blocks, or electrodes *e¹* and *f¹*, are mounted on the said supplemental diaphragms and are inclosed within the chamber provided by the latter and the separating ring G.

The two supplemental diaphragms can be clamped on the said ring by means of threaded and flanged clamping rings *g, g¹*. The construction may be such that the two supplemental diaphragms are held between the carbon electrodes and the metal blocks *e², f²*. Granular carbon H, or other like comminuted material, can be inclosed between the two carbon electrodes, as illustrated. With this arrangement the talking or transmitter circuit can include the main and supplemental diaphragms and carbon electrodes in series. For example, the conductor 1 can be secured to the main diaphragm C, and the other conductor 2 can be secured to the main diaphragm D. In this way the circuit not only includes the diaphragms and electrodes in series, but also the granular carbon, and the latter when subject to the vibrations of the diaphragms varies the resistance of the circuit in the well known manner. When the voice vibrations impinge upon the two main diaphragms the latter first move inward so as to cause the two carbon electrodes to move toward each other and the reaction then causes the electrodes to separate. This movement of electrodes is of course attended by a vibratory movement of the two supplemental diaphragms.

It will be readily understood that any other springy or resilient material can be employed for the supplemental diaphragms. The ring G, can, if desired, be supported and held against movement by a web or wall 3.

Thus it will be seen that I provide a pair of positively movable electrodes, each electrode being vibrated positively by a main diaphragm. In this way I secure a greater extent of movement between the two electrodes and consequently a greater variation in the resistance of the transmitter circuit. As a result the transmitter is very sensitive and capable of more accurately transmitting speech.

The ring G is removable from the ring or

annulus H to which the main diaphragms are secured at their edges. In this way, the diaphragms and electrodes are all organized into a self-contained microphone which is removable as a unit from the rear end of the transmitter casing. Any suitable means can be employed for securing the said unitary microphone in place in the casing. With this construction, both the main and auxiliary or supplemental diaphragms are held against movement at their edges or marginal portions.

What I claim as my invention is:

1. A telephone transmitter comprising a pair of main diaphragms, a mouth-piece and a casing adapted to direct sound waves against both of said main diaphragms a pair of supplemental diaphragms arranged between said main diaphragms, each diaphragm supported independently of the others, electrode surfaces carried by said supplemental diaphragms, said electrode surfaces thereby being movable toward and away from each other, and granular carbon interposed between said electrode surfaces, said main diaphragms being firmly held and rigidly separated at their edges.

2. A telephone transmitter comprising a pair of main diaphragms, a mouth-piece and a casing adapted to direct sound waves against both of said main diaphragms a pair of supplemental mica diaphragms, each diaphragm supported independently of the others, carbon blocks carried by said mica supplemental diaphragms, said carbon blocks thereby being movable toward and away from each other, means for connecting the supplemental diaphragms with the said main diaphragms, and granular carbon interposed between said carbon blocks said main diaphragms being firmly held and rigidly separated at their edges.

3. A telephone transmitter comprising a pair of main diaphragms, a pair of supplemental diaphragms arranged between said main diaphragms, each diaphragm supported independently of the others, a ring separating the two supplemental diaphragms, clamping rings for clamping the two supplemental diaphragms upon said separating ring, electrode surfaces carried by said supplemental diaphragms, both electrode surfaces thereby being vibratory or movable toward and away from each other, means for connecting the supplemental diaphragms with the main diaphragms, and granular carbon interposed between said electrode surfaces said main diaphragms being firmly held and rigidly separated at their edges.

4. In a telephone transmitter, the combination of a pair of main diaphragms, a pair of supplemental diaphragms between said main diaphragms, each diaphragm supported independently of the others, a support for holding the marginal portions of the supplement-

tal diaphragms against movement, granular carbon interposed between the supplemental diaphragms, oppositely arranged vibratory electrode surfaces carried by said supplemental diaphragms, and non-yielding connections between said supplemental diaphragms and said main diaphragms said main diaphragms being firmly held and rigidly separated at their edges.

5. A telephone transmitter comprising a pair of main diaphragms, a pair of springy supplemental diaphragms arranged between said main diaphragms, each diaphragm supported independently of the others, movable electrodes carried by said supplemental diaphragms and connected with said main diaphragms, granular carbon between said electrodes, and a mouth-piece and a casing adapted to direct sound waves against both of said main diaphragms said main diaphragms being firmly held and rigidly separated at their edges.

6. A telephone transmitter comprising two oppositely arranged vibratory electrodes, granular carbon between said electrodes, a plurality of diaphragms for supporting and vibrating both of said electrodes, a stationary box located between said diaphragms and inclosing said granular carbon and electrodes, and a mouth-piece and a casing for directing sound-waves against the outer surfaces of both of said diaphragms said main diaphragms being firmly held and rigidly separated at their edges.

7. A telephone transmitter comprising a pair of main diaphragms, oppositely arranged electrodes each connected with and supported by one of said main diaphragms, a box like structure inclosing said electrodes and having oppositely arranged springy walls each connected with one of said electrodes, a stationary support for said box-like structure, a mouth-piece and a casing adapted to direct sound waves against the said main diaphragms, and granular carbon between said electrodes said main diaphragms being firmly held and rigidly separated at their edges.

8. A telephone transmitter comprising a pair of main diaphragms, a pair of movable electrodes each connected with and supported by one of said main diaphragms, granular carbon between said electrodes, a box-like structure inclosing said electrodes and granular carbon, said box-like structure having a pair of oppositely arranged springy walls each mechanically connected with one of said electrodes, and a mouth piece and a casing adapted to direct sound waves against said main diaphragms said main diaphragms being firmly held and rigidly separated at their edges.

9. A telephone transmitter comprising a pair of main diaphragms, a pair of movable electrodes each connected with and supported by one of said main diaphragms, granular

carbon between said electrodes, a box like structure inclosing the said electrodes and granular carbon, said box like structure having a pair of oppositely arranged mica disks each connected with one of said electrodes, a stationary support for said box like structure, and a suitable mouth-piece and casing for directing sound waves against both of said main diaphragms said main diaphragms being firmly held and rigidly separated at their edges.

10. A telephone transmitter comprising a transmitter-case having a sound-chamber, a removable microphone provided with a carbon-chamber, two oppositely-disposed electrodes within the carbon-chamber, carbon between said electrodes, flexible covers for said carbon-chamber, two sound-diaphragms of relatively larger size than the flexible covers located on opposite sides of the carbon-chamber, said diaphragms supported independently of said covers, and means interposed between the electrodes and sound-diaphragms, whereby the vibrations of the sound-diaphragms will be communicated to the electrodes, said sound diaphragms being held at their edges.

11. In a telephone-transmitter, a microphone, comprising an annulus with an inwardly-projecting flange, a pair of flexible disk covers connected at their outer edges to said flange, a pair of sound-diaphragms secured at their center to said flexible disk covers, said diaphragms supported independently of said covers, electrodes mounted on the inner side of said flexible disk covers, and means introduced between said sound-diaphragms and electrodes, whereby the motion of the sound-diaphragms will be communicated to the electrodes, said sound diaphragms being held at their edges.

12. In a telephone transmitter, a microphone, comprising an annulus having a recess on each face, a pair of sound-diaphragms located in said recesses, said annulus also provided with an inwardly-projecting flange, a pair of flexible disk covers connected at their outer edges to said flange, said diaphragms supported independently of said covers, a pair of electrodes mounted on the inner side of said flexible covers, and means introduced between said sound-diaphragms and electrodes, whereby the motion of the sound-diaphragms will be communicated to the electrodes, said sound diaphragms being held at their edges.

13. A telephone transmitter comprising a wholly self-contained microphone device, which of itself is capable of transmitting sound, and a support therefor having such construction that a sound-receiving chamber will exist between it and the microphone structure, said microphone comprising two main diaphragms held at their edges, and two auxiliary diaphragms held at their edges

and located between said main diaphragms, said main diaphragms being supported independently of the said auxiliary diaphragms.

14. In a telephone transmitter, the combination with a support provided with a sound-chamber, of a structurally independent microphone device removable from said support and capable when so removed of serving as an efficient sound-transmitting device, said microphone comprising two main diaphragms held at their edges, and two auxiliary diaphragms located between and connecting said main diaphragms, said main diaphragms being supported independently of the said auxiliary diaphragms.

15. A telephone transmitter formed of two members structurally independent, one a support having a sound-chamber, and the other an independent self-contained and functionally operative sound-transmitting microphone, said microphone comprising two main diaphragms held at their edges, two auxiliary diaphragms located between said main diaphragms, and electrodes supported by the diaphragms.

16. A telephone transmitter comprising a transmitter-case having a sound-chamber, a removable microphone provided with a carbon-chamber, two oppositely disposed electrodes, within the carbon-chamber, carbon between said electrodes, flexible covers for said carbon-chamber, two sound-diaphragms of relatively larger size than the flexible covers located on opposite sides of the carbon-chamber, means rigidly connecting the edges of the diaphragms with the edges of the said covers, and means interposed between the electrodes and sound-diaphragms, whereby the vibrations of the sound-diaphragms will be communicated to the electrodes, said diaphragms and electrodes being all removable as a unit from the rear end of the transmitter.

17. In a telephone transmitter, a microphone, comprising an annulus with an inwardly projecting flange, a pair of flexible disk covers connected at their outer edges to said flange, a pair of sound-diaphragms secured at their center to said flexible disk covers, but supported independently of said covers, electrodes mounted on the inner side of said flexible disk covers, and means introduced between said sound-diaphragms and electrodes, whereby the motion of the sound-diaphragms will be communicated to the electrodes, and said diaphragms and electrodes being all removable as a unit from the rear end of the transmitter.

18. In a telephone transmitter, a microphone, comprising an annulus having a recess on each face, a pair of sound-diaphragms clamped in said recesses, said annulus also provided with an inwardly projecting flange, a pair of flexible disk covers connected at their outer edges to said flange, a pair of

electrodes mounted on the inner side of said flexible disks, and means introduced between said sound-diaphragms and electrodes, whereby the motion of the sound-diaphragms will be communicated to the electrodes, and said diaphragms and electrodes being all removable as a unit from the rear end of the transmitter.

19. In a telephone transmitter, the combination of a support having a sound-chamber open at one end, a microphone capable of acting as a sound-transmitter independently of the support, having two oppositely disposed sound-diaphragms, two vibrating electrodes, and two auxiliary diaphragms said microphone located centrally of said sound-chamber and with its diaphragms so disposed as to leave sound-spaces between the faces of said diaphragms and the sides of the sound-chamber, means for supporting said main diaphragms independently of said auxiliary diaphragms, said diaphragms and electrodes being all removable as a unit from the rear end of the transmitter.

20. In a telephone-transmitter, the combination with a support provided with a sound-chamber, of a structurally independent microphone device removable from said support and capable when so removed of serving as an efficient sound transmitting device, comprising two main diaphragms, two auxiliary diaphragms, and two electrodes, said diaphragms and electrodes being all removable as a unit from the rear end of the transmitter.

21. A telephone transmitter formed of two members structurally independent, one a support having a sound-chamber, and the other an independent self-contained and functionally operative sound-transmitting microphone comprising two main diaphragms, two auxiliary diaphragms, and two electrodes, said diaphragms and electrodes being all removable as a unit from the rear end of the transmitter.

22. A telephone transmitter comprising a transmitter-case having a sound-chamber, a removable microphone provided with a carbon-chamber, two oppositely disposed electrodes within the carbon-chamber, carbon between said electrodes, flexible covers for said carbon-chamber, two sound-diaphragms of relatively larger size than the flexible covers located on opposite sides of the carbon-chamber, a ring for the covers, a ring or annulus for the diaphragms, and means interposed between the electrodes and sound-diaphragms, whereby the vibrations of the sound-diaphragms will be communicated to the electrodes, the said ring to which the flexible covers are secured being removable from the said ring or annulus to which the main diaphragms are secured.

23. In a telephone transmitter, a microphone, comprising an annulus with an inwardly-projecting flange a pair of flexible disk covers connected at their outer edges to said flange, a pair of sound-diaphragms secured at their center to said flexible disk covers, electrodes mounted on the inner side of said flexible disk covers, a ring for the covers, a ring or annulus for the diaphragms, and means introduced between said sound-diaphragms and electrodes, whereby the motion of the sound-diaphragms will be communicated to the electrodes, the said ring to which the flexible covers are secured being removable from the said ring or annulus to which the main diaphragms are secured.

24. In a telephone transmitter, a microphone, comprising an annulus having a recess on each face, a pair of sound-diaphragms located in said recesses, said annulus also provided with an inwardly-projecting flange, a pair of flexible disk covers connected at their outer edges to said flange, a pair of electrodes mounted on the inner side of said flexible disks, a ring for the covers, a ring annulus for the diaphragms, and means introduced between said sound-diaphragms and electrodes, whereby the motion of the sound-diaphragms will be communicated to the electrodes, the said ring to which the flexible covers are secured being removable from the said ring or annulus to which the main diaphragms are secured.

25. In a telephone transmitter, the combination with a support provided with a sound-chamber open at one end, a detachable mouth-piece, and a microphone which is wholly self-contained and which will act as a sound-transmitter when removed from said case and which is provided with a diaphragm having such relation to the body of the microphone that when the microphone is out of the case sound-waves cannot pass around behind the diaphragm, there being two concentric rings, main diaphragms secured to one ring, auxiliary diaphragms secured to the other ring, the ring to which the auxiliary diaphragms are secured being removable from the ring or annulus to which the main diaphragms are secured.

26. In a telephone transmitter, the combination of a support having a sound-chamber open at one end, a microphone capable of acting as a sound-transmitter independently of the support, and having two oppositely-disposed sound-diaphragms, said microphone located centrally of said sound-chamber and with its diaphragms so disposed as to leave sound-spaces between the faces of said diaphragms and the sides of the sound-chamber, there being two concentric rings, main diaphragms secured to one ring, auxiliary diaphragms secured to the other ring, the ring to which the auxiliary dia-

phragms are secured being removable from the ring or annulus to which the main diaphragms are secured.

27. In a telephone transmitter, the combination with a support provided with a sound-chamber open at one end, of an independent self-contained and removable microphone having two sound-faces, there being two concentric rings, main diaphragms secured to one ring, auxiliary diaphragms secured to the other ring, and the ring to which the auxiliary diaphragms are secured being removable from the ring or annulus to which the main diaphragms are secured.

28. A telephone transmitter comprising a wholly self-contained microphone device, which of itself is capable of transmitting sound, and a support therefor having such construction that a sound-receiving chamber will exist between it and the microphone structure, there being two concentric rings, main diaphragms secured to one ring, auxiliary diaphragms secured to the other ring, to which the auxiliary diaphragms are secured being removable from the ring or annulus to which the main diaphragms are secured.

29. In a telephone transmitter, the combination with a support provided with a sound-chamber, of a structurally independent

microphone device removable from said support and capable when so removed of serving as an efficient sound-transmitting device, there being two concentric rings, main diaphragms secured to one ring, auxiliary diaphragms secured to the other ring, the ring to which the auxiliary diaphragms are secured being removable from the ring or annulus to which the main diaphragms are secured.

30. A telephone transmitter formed of two members structurally independent, one a support having a sound-chamber, and the other an independent self-contained and functionally-operative sound-transmitting microphone, there being two concentric rings, main diaphragms secured to one ring, auxiliary diaphragms secured to the other ring, the ring to which the auxiliary diaphragms are secured being removable from the ring or annulus to which the main diaphragms are secured.

Signed by me at Chicago, Cook county, Illinois, this 21st day of July, 1902.

HENRY P. CLAUSEN.

Witnesses:

ARTHUR F. DURAND,
HARRY P. BAUMGARTNER.