G. A. NUSSBAUM.

MICROPHONE.

APPLICATION FILED JAN. 28, 1911.

1,012,217. Patented Dec. 19, 1911.

Fig. 1.

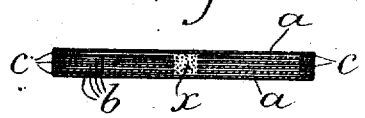


Fig. 2.

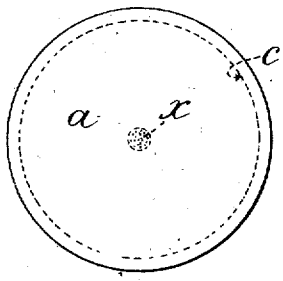


Fig. 3

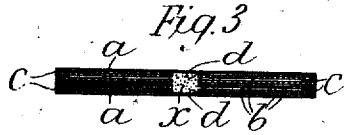


Fig. 4.

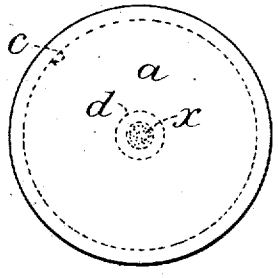


Fig. 5.

Fig. 6.

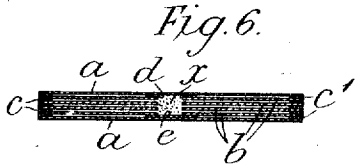


Fig. 7.

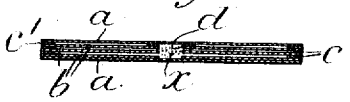
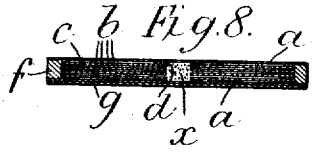


Fig. 8.



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UNITED STATES PATENT OFFICE.

GUILLAUME ARNAUD NUSSBAUM, OF LONDON, ENGLAND.

MICROPHONE.

1,012,217. Specification of Letters Patent. Patented Dec. 19, 1911.

Application filed January 28, 1911. Serial No. 605,303.

To all whom it may concern:

Be it known that I, GUILLAUME ARNAUD NUSSBAUM, a subject of the King of Great Britain, residing at London, England, have invented Improvements in Microphones, of which the following is a specification.

This invention relates to microphones for telephonic use and it has for its general object to provide a microphone of simplified construction, very suitable for long distance and common battery circuits, which shall be more reliable than those heretofore proposed and in which packing of the carbon granules is effectually prevented.

One important object of the invention is to build up the microphone of disks separated and assembled to form a granule cell so constituted that the vibrations of the entire cell and the air set in motion between the disks prevent packing of the granules.

Another object of the invention is to provide a microphone, that may be mounted "solid back fashion" or in such a manner that sound waves act on both sides thereof simultaneously, wherein the vibrations of sound waves are communicated to intermediary disks and the carbon granules, such combined vibrations causing great variations in the resistance of the microphone circuit.

With these and other objects, the invention consists in the various combinations of elements hereinafter described and claimed.

In the accompanying drawings Figure 1 is a transverse section of one form of the improved microphone. Fig. 2 is a sectional plan of the same. Figs. 3 and 4 are views similar to Figs. 1 and 2 of another form of the microphone. Figs. 5 to 8 are transverse sections of further modifications.

As shown in Figs. 1 and 2 the microphone comprises a series of thin resilient plates or diaphragms the two outer ones *a* of which, preferably carbon, are plain disks, while the intermediary ones *b* are each formed with a central hole. The intermediary plates *b* may be of carbon, or of metal, paper, cardboard, mica, fiber and the like. The several intermediary plates *b* must be separated from each other in such a manner that a very thin air gap remains between adjacent plates so thin in fact that carbon granules *x* cannot enter between them, this being conveniently effected by interposing thin peripheral washers *e* of paper, mica, fiber or the like. For the sake of clearness, these air gaps are purposely exaggerated in the drawings.

The microphone shown in Figs. 3 and 4 is similar to that of Figs. 1 and 2 with the addition however of concentric washers *d* between the outer diaphragms *a* and intermediary plates *b*. These washers *d* may be of insulating material or, when it is desired to reduce the resistance of the microphone, of carbon.

In Fig. 5 the outer diaphraghs *a* are shown separated from the plates *b* by peripheral washers e^1 and concentric carbon disks *e*, while in Fig. 6 one diaphragm *a* is separated from one plate *b* at the center, by a washer *d* and the other diaphragm *a* from its adjacent plate *b* by a disk *e*. For the purpose of still further reducing the resistance of the apparatus the peripheral washers e^1 may be of conducting material.

In Fig. 7 one diaphragm *a*, *i. e.* the rear one, is affixed directly to the adjacent perforated plate *b*.

In Fig. 8 the intermediary plates *b* are of smaller diameter than the diaphragms *a* which in this example are adapted to be clamped to opposite faces of an outer ring *f* of fiber or other material insulated or of an insulating character. *g* is a metal diaphragm against which one of the diaphragms *a* can be clamped.

What I claim is:—

1. A microphone comprising a series of perforated and imperforate plates of conducting material arranged coaxially with the imperforate plates outermost and material separating the several plates axially one with respect to another and maintaining air spaces between them, such plates forming collectively a vibrating granule-containing cell, substantially as described.

2. A microphone comprising a series of perforated and imperforate plates of resilient material held in spaced relationship one with respect to another with air spaces between them, the said plates forming collectively a vibrating granule containing cell the lateral wall of which is formed by the inner periphery of a perforated plate, and granules located in said cell and in contact with said perforated plate.

3. A microphone comprising a series of perforated and imperforate plates of resilient material held in spaced relationship one with respect to another with air spaces between them, the said plates forming col-

lectively a vibrating granule containing cell the lateral wall of which is formed by the inner peripheries of a plurality of perforated plates, and granules located in said cell and in contact with said perforated plates.

4. A microphone comprising a series of perforated and imperforate plates, and separating material arranged between said plates near the outer peripheries thereof to form air spaces between the plates.

5. A microphone comprising a series of perforated and imperforate plates of resilient material arranged adjacent to one another with air spaces between them and vibration transmitting means between the central portion of an outer imperforate plate and the adjacent perforated plate.

6. A microphone comprising a series of perforated and imperforate plates of resilient material arranged adjacent to one another with air spaces between them and vibration transmitting means between the central portion of each outer plate and the adjacent imperforate plate.

7. A microphone comprising a series of perforated and imperforate plates of resilient material arranged adjacent to one another with air spaces between them and a vibration transmitting ring arranged between the central portion of an outer imperforate plate and the inner edge portion of the adjacent perforated plate.

8. A microphone comprising a series of perforated and imperforate plates of resilient material arranged adjacent to one another with air spaces between them and a vibration transmitting ring arranged between each of the outer imperforate plates and the inner edge portion of the adjacent perforated plate.

9. A microphone comprising a series of perforated plates of resilient material, a pair of imperforate diaphragms between which the perforated plates are disposed, and insulating peripheral washers separating the perforated plates one from another.

10. A microphone comprising a series of perforated plates of resilient material, a pair of imperforate diaphragms between which the perforated plates are disposed, and peripheral spacing washers separating the perforated plates one from another and from the diaphragms.

11. A microphone comprising a series of perforated plates of resilient material, a pair of imperforate diaphragms between which the perforated plates are disposed, peripheral spacing washers separating the perforated plates, peripheral spacing washers separating the outermost of the perforated plates from the diaphragms, and spacing washers perforated to correspond with the perforations in the plates disposed between the outermost plates and the diaphragms in register with the perforations in the plates.

12. A microphone comprising a series of perforated plates of resilient material held in spaced relationship one with respect to another, a pair of conducting diaphragms between which the perforated plates are disposed and spacing devices of conducting material adapted to secure plate and diaphragm separation.

13. A microphone comprising a series of perforated plates of resilient material held in spaced relationship one with respect to another, a pair of conducting diaphragms of larger area between which the perforated plates are disposed and a ring surrounding the plates and separating the diaphragm.

14. A microphone comprising a series of perforated plates of resilient material, a pair of imperforate diaphragms of larger area between which the perforated plates are disposed, insulating peripheral washers separating the perforated plates one from another and a ring surrounding the plates holding the diaphragm in definite spaced relationship one with respect to the other.

15. A microphone comprising a series of perforated plates of resilient material, a pair of imperforate diaphragms of larger area between which the perforated plates are disposed, insulating peripheral washers separating the perforated plates one from another, a ring surrounding the plates holding the diaphragm in definite spaced relationship one with respect to the other and spacing devices, disposed in register with the perforations in the plates, separating the outermost plates from the diaphragms.

16. A microphone comprising a series of perforated plates of resilient material, a pair of imperforate diaphragms of larger area between which the perforated plates are disposed, insulating peripheral washers separating the perforated plates one from another, a ring surrounding the plates holding the diaphragm in definite spaced relationship one with respect to the other, spacing devices, disposed in register with the perforations in the plates, separating the outermost plates from the diaphragms, and a plate in complete surface contact with the outermost diaphragm.

Signed at London, England this 20th day of January 1911.

GUILLAUME ARNAUD NUSSBAUM.

Witnesses:
ARTHUR F. BURGESS,
J. J. BROUGHAM.