

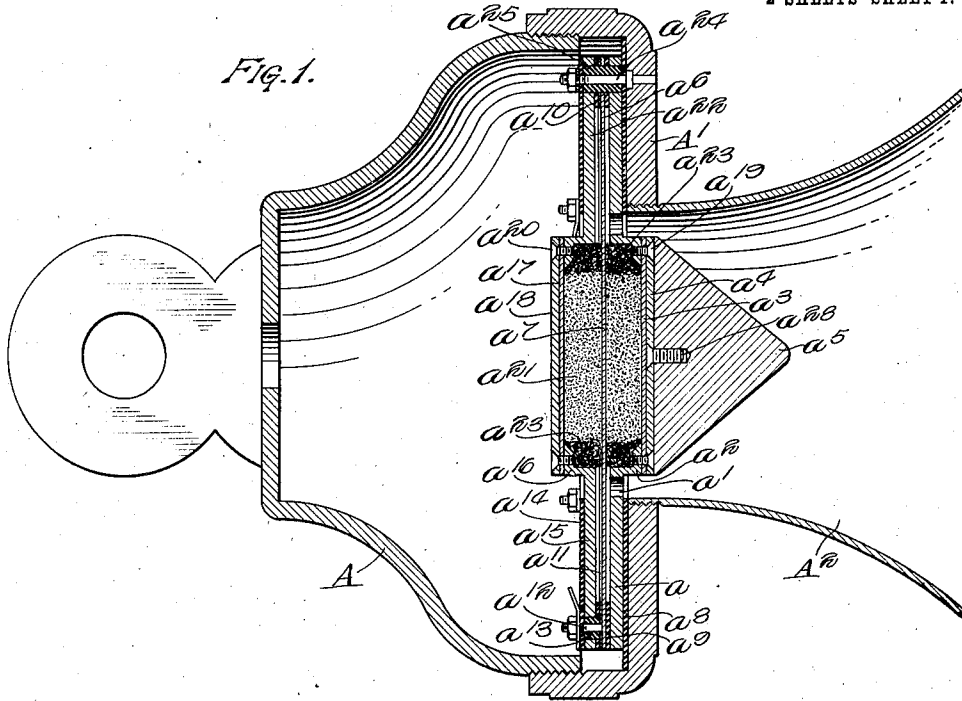
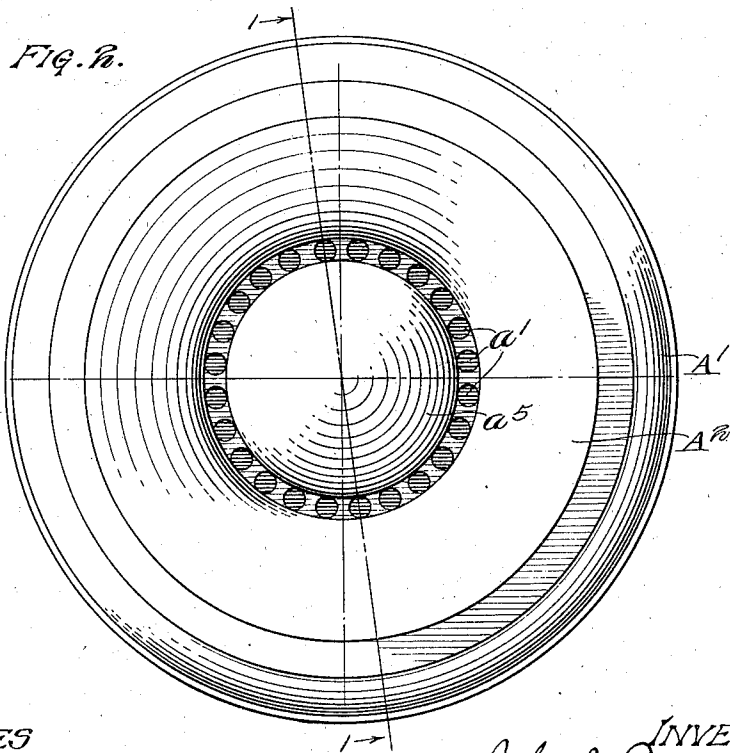
J. J. COMER.
MICROPHONE.

APPLICATION FILED NOV. 28, 1910.

1,079,931.

Patented Dec. 2, 1913.

2 SHEETS—SHEET 1.



WITNESSES
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2 SHEETS-SHEET 2.

Fig. 3.

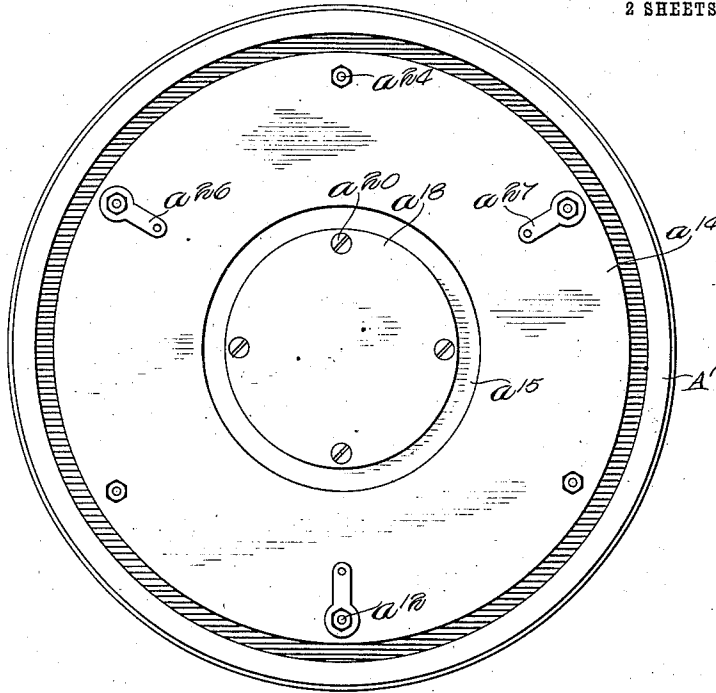
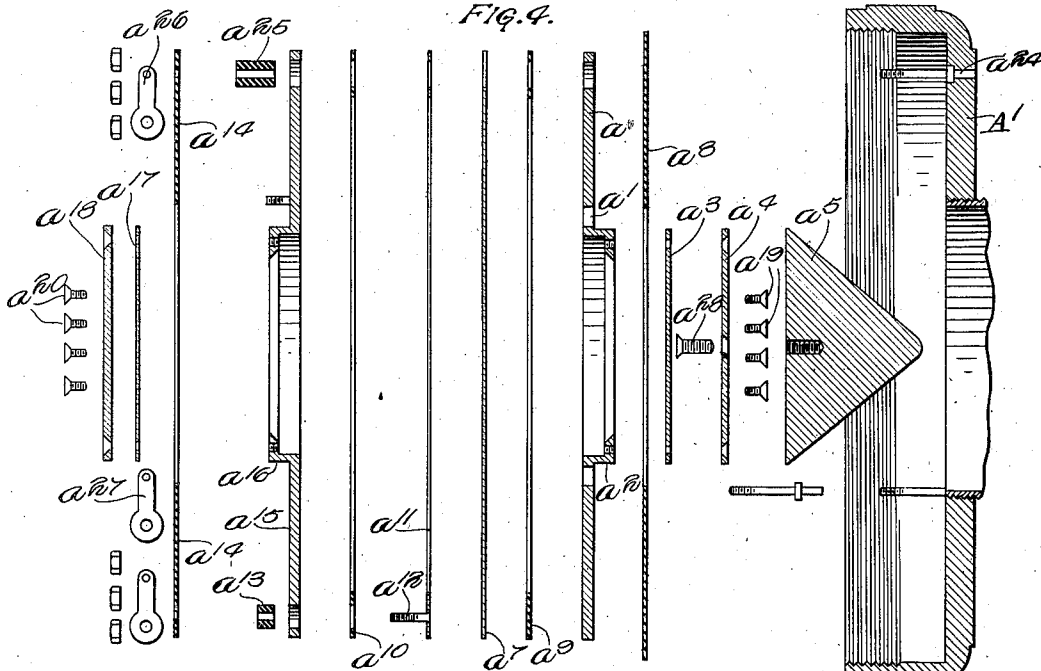


Fig. 4.



WITNESSES

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MICROPHONE.

1,079,931.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN J. COMER, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Microphones, of which the following is a specification.

My invention relates to microphones of the so-called differential type. In a microphone of this character, whether involved in a transmitter or repeater, the construction embodies, of course, an arrangement whereby the resistance at opposite sides of one or more electrodes is caused to alternately rise and fall, so that when the resistance goes up on one side it goes down on the other, and vice versa, resulting in the transmission of electrical impulses over a line circuit leading therefrom. There are, of course, many different ways of connecting up a differential microphone in circuit with other instruments, and I do not limit myself to any particular circuit arrangement.

The object of my invention, generally stated, is, therefore, to provide a differential microphone of simple and efficient character, adapted more particularly for use in telephone transmitters.

A special object is to provide an improved construction and arrangement whereby the movable electrode of the differential microphone may consist of a carbon diaphragm.

Another object is to provide an improved construction and arrangement whereby the voice vibrations do not impinge directly upon the center of the diaphragm of the transmitter, but to the contrary are deflected into a restricted space which extends around the marginal portion of the diaphragm, and whereby the latter is vibrated by the alternate compression and rarefaction of the air in said restricted chamber, caused by the agitation of the air by the voice vibrations.

It is also an object to provide certain details, and features of improvement and combinations tending to increase the general efficiency of a differential microphone of this particular character.

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

In the accompanying drawings—Figure 1 is a longitudinal section of a differential microphone transmitter embodying the principles of my invention, the said section being taken on line 1—1 in Fig. 2. Fig. 2 is a front elevation or face view of the said transmitter. Fig. 3 is a rear view of the said transmitter, with the casing thereof removed to show the microphone. Fig. 4 is a sectional view showing the different parts of said transmitter in separated condition.

As thus illustrated, my invention comprises a casing A which constitutes the back of the transmitter, and a cap or front plate A', which latter has a central aperture for the usual mouth-piece A². The inner disk or plate a is provided with a circular row of holes or apertures a', and with a central and forwardly extending flange or ring a², the opening of which is closed by the front carbon electrode a³ and the metal plate a⁴. A cone a⁵ extends forward into the mouth-piece, and is of sufficient area at its base to fully cover the plate a⁴, thus serving to deflect the voice vibrations outwardly and through the openings a', through which latter they pass into the thin or restricted space a⁶ that exists between the carbon diaphragm a⁷ and the back of the plate a. Cardboard or fiber insulation a⁸ is provided between the plate a and the plate A', and a ring of similar insulation a⁹ is interposed between the marginal portions of the said plate a and the diaphragm a⁷, in the manner shown. A similar ring of insulation a¹⁰ is applied to the other side of the diaphragm, but not directly thereto, the metal ring a¹¹ being applied directly to the diaphragm with the insulation outside thereof. This ring a¹¹ has a terminal screw a¹², which screw extends through the insulating ring a¹⁰, through the fiber bushing a¹³, and then through the cardboard or fiber disk a¹⁴ on the back of the plate a¹⁵, which latter is similar in all respects to the plate a, in the manner shown. The plate or disk a¹⁵ has a central opening surrounded by a flange or ring-like formation a¹⁶, the opening of the latter being closed by the carbon back electrode a¹⁷ and the metal plate a¹⁸. The screws a¹⁹ and a²⁰ are employed, it will be seen, for securing the two carbon electrodes to opposite sides of the box or closure thus

provided and in which is contained the granular carbon a^{21} , the said body of carbon being divided into two portions by the carbon diaphragm. There is a space a^{22} between the diaphragm and the ring or plate a^{15} , which gives the diaphragm freedom of vibration in a manner that will be readily understood. Fluffy asbestos or other similar packing a^{23} is provided in the microphone box, and employed in ring form to surround the two bodies of granular carbon to prevent leakage of the latter into the spaces a^6 and a^{22} when the diaphragm is vibrated. The superimposed rings of metal and carbon and insulation are secured tightly together by bolts a^{24} that extend through them near the outer edges thereof, and which bolts are surrounded by fiber insulation or bushing a^{25} , whereby said bolts are thoroughly insulated from the structure. The terminal a^{26} is connected with the plate a^{15} , and the terminal a^{27} is connected with the plate a , in any suitable manner, whereby the transmitter is provided with three terminals, one for each electrode, and one for the diaphragm, which latter is also in the nature of an electrode.

The screw a^{28} extends through the plate a^4 and into the cone-shaped deflector a^5 , in the manner shown. In this way the voice vibrations are deflected outwardly, and caused to pass through the openings a' with the result that the air in the thin or restricted space a^9 is alternately compressed and exhausted or rarefied, resulting in a vibration of the diaphragm. When the diaphragm vibrates, it causes an alternate rise and fall of the resistance at opposite sides thereof, as the resistance through the granular carbon goes up at one side at the same time that the resistance goes down at the other side, and vice versa, thus causing a differential variation in the resistance of the transmitter for the purpose of generating impulses in the circuit leading therefrom.

A differential microphone transmitter of this character is, I find, exceedingly efficient and satisfactory in use, and especially adapted for use in loud speaking systems, or systems of similar character. It is capable of carrying a heavy current, and is calculated to insure clear enunciation and good tones, when combined with proper receiving instruments, and is capable of constant use for a long period of time without the necessity of repair or overhauling. In other words, and if properly adjusted on the start, it will give efficient and highly satisfactory results for a long time without any further attention. The voice vibrations do not impinge directly upon the center of the diaphragm, but are deflected outwardly and caused to operate on the body of air overlying the marginal portions of the diaphragm, whereby better results are obtained, so I

find, than in some cases where voice vibrations are permitted to impinge directly upon the center of the diaphragm.

With my improved construction, only the diaphragm vibrates. It carries no weights or heavy parts, and vibrates freely by itself.

What I claim as my invention is:

1. A differential microphone comprising a carbon diaphragm, a pair of plates, embracing said diaphragm, which plates have their outer edges secured together to clamp the marginal portion of the diaphragm between them, with interposed insulation to provide interior spaces between the diaphragm and the two plates, granular carbon engaging the opposite sides of the diaphragm at the center thereof, and stationary electrodes secured to said plates and engaging said granular carbon, said plates lying in close proximity to said diaphragm.

2. A differential microphone transmitter comprising a diaphragm with oppositely facing electrode surfaces at the center thereof, a pair of plates disposed at opposite sides of said diaphragm, with space between, the plates of the diaphragm being secured together at their outer edges, one of said plates being provided with a circular row of apertures, a mouth piece communicating with said apertures, said apertures communicating in turn with one of said spaces, a body of granular carbon at each side of the center of said diaphragm, engaging said electrode surfaces, stationary electrodes engaging said granular carbon, which stationary electrodes are secured to said plates, and a cone shaped deflector in the said mouth-piece, secured at the back of one of said stationary electrodes, whereby the voice vibrations entering said mouth-piece are deflected through the said apertures and into the space at the front of the diaphragm, and a springy or resilient packing encircling said granular carbon at opposite sides of said diaphragm to prevent the granular carbon from escaping into said spaces when the diaphragm is vibrated.

3. In a transmitter, a plate provided with a circular row of holes, a deflector surrounded by said circular row of holes, a mouth-piece inclosing said deflector, whereby the voice vibrations are deflected outwardly and caused to pass through said openings, a diaphragm back of said row of openings, and means covering the central portion of said diaphragm to prevent the voice vibrations from impinging on said central portion, said plate lying in close proximity to the exposed portion of said diaphragm.

4. In a transmitter, a casing, a diaphragm mounted in said casing, a carbon receptacle adjacent to the central portion of said diaphragm, a circular plate lying adjacent to the marginal portions of said diaphragm, 130

and a second circular plate on the opposite side of said diaphragm and covering the marginal portions thereof, said plates being separated from said diaphragm by a narrow
5 air space.

5. In a transmitter, a casing, a diaphragm mounted therein, a carbon receptacle covering the central portion of said diaphragm, and a pair of circular plates lying adjacent
10 to said diaphragm on opposite sides thereof and being separated therefrom by a narrow air space and substantially covering the exposed surface of said diaphragm.

6. In a transmitter, a casing, a diaphragm
15 mounted therein, a carbon receptacle covering the central portion of said diaphragm, a pair of circular plates lying adjacent to said diaphragm on opposite sides thereof and being separated therefrom by a narrow
20 air space and substantially covering the exposed surface of said diaphragm, and a series of perforations in one of said plates to

permit sound waves to reach said diaphragm.

7. In a transmitter, a casing, a diaphragm 25 mounted therein, a carbon receptacle covering the central portion of said diaphragm, a pair of circular plates lying adjacent to said diaphragm on opposite sides thereof and being separated therefrom by a narrow 30 air space and substantially covering the exposed surface of said diaphragm, a series of perforations in one of said plates to permit sound waves to reach said diaphragm, a mouth-piece secured to said casing, and 35 a deflector in said mouth-piece for deflecting said sound waves through said perforations.

Signed by me at Chicago, Illinois, this 23d day of November 1910.

JOHN J. COMER.

Witnesses:

S. LEWIS,

E. H. CLEGG.