J. J. COMER.

DIFFERENTIAL MICROPHONE REPEATER.

APPLICATION FILED OCT. 24, 1910.

1,050,104. Patented Jan. 14, 1913.

2 SHEETS—SHEET 1.

FIG. 1.

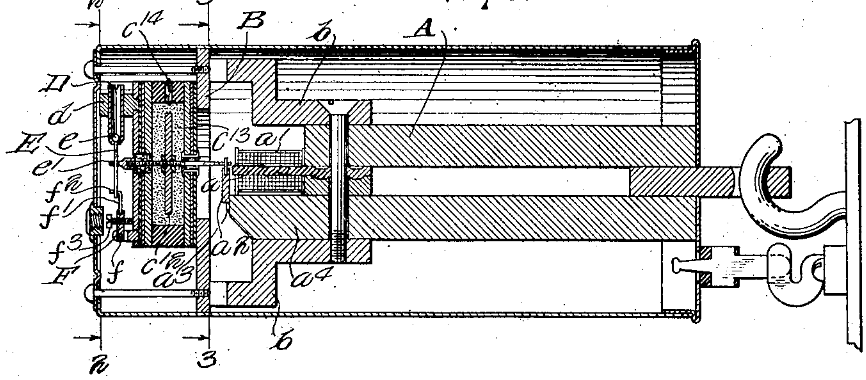


FIG. 2.

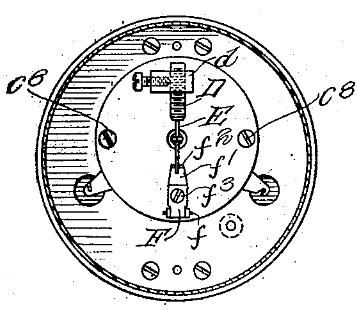


FIG. 3.

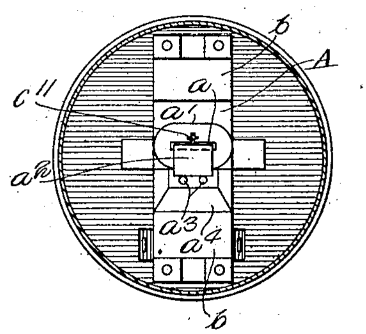


FIG. 4.

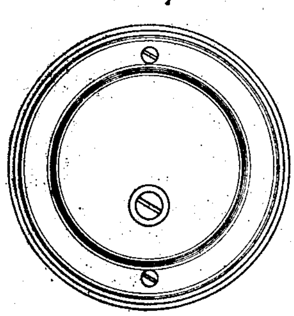
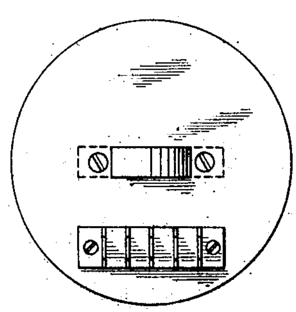


FIG. 5.



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 6.

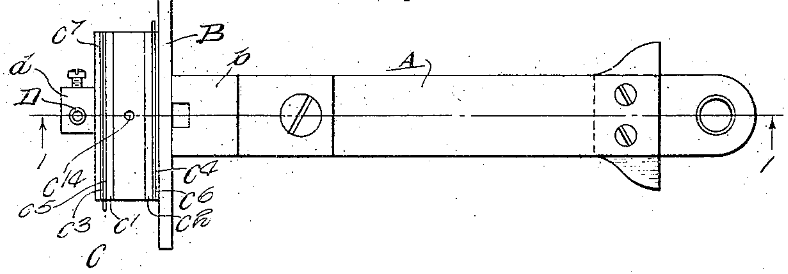


FIG. 7.

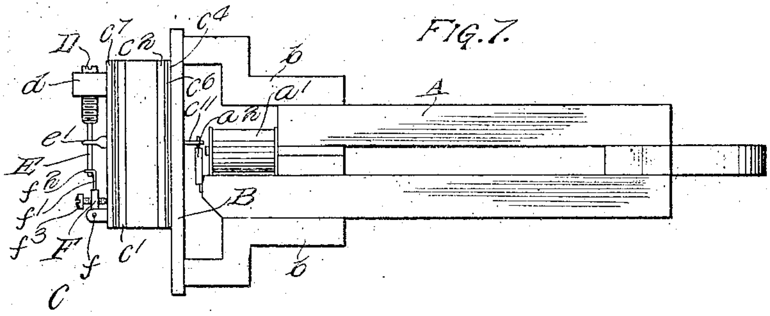
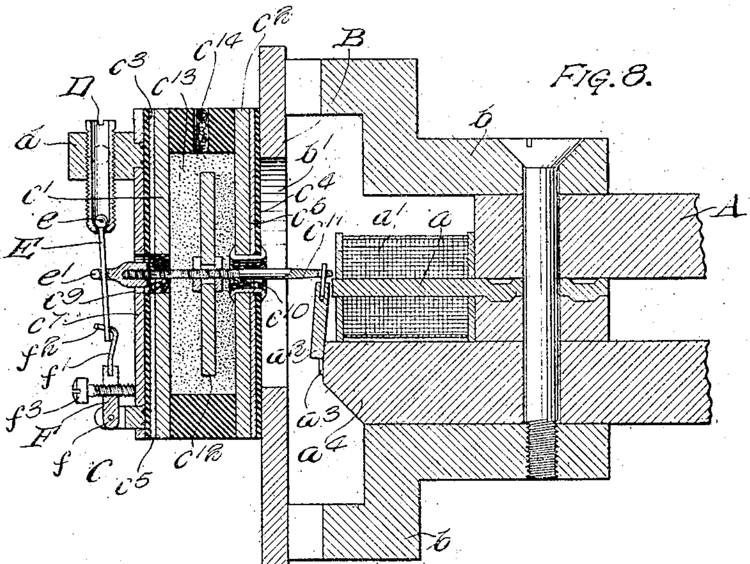


FIG. 8.



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UNITED STATES PATENT OFFICE.

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DIFFERENTIAL-MICROPHONE REPEATER.

1,050,104. Specification of Letters Patent. **Patented Jan. 14, 1913.**

Application filed October 24, 1910. Serial No. 588,791.

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 Differential-Microphone Repeaters, of which the following is a specification.

My invention relates to differential microphone repeaters. In a repeater of this kind, as is well known, the impulses transmitted over one circuit are received by a magnet which operates a differential microphone. The impulses are thus repeated by the microphone in another circuit.

Generally stated, the object of my invention is to provide a simple and highly efficient form or construction of microphone repeater having provisions for accurate adjustment thereof to insure good results and render the said repeater especially adapted for service in loud speaking systems or other similar systems requiring the use of heavy currents.

A special object is to provide an arrangement whereby a variable leverage may be effectively employed for changing or regulating the amplitude of vibration of the microphone repeater.

Another object is to provide an improved arrangement whereby the air gap between the magnet and its armature may be easily and accurately adjusted or regulated to insure the highest degree of efficiency of the repeater for all purposes and under all conditions of use.

Another object is to provide a construction of differential microphone repeater that will insure the transmission of repeated impulses of a character tending to insure greater clearness of enunciation and purity of tone than heretofore.

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

In the accompanying drawings—Figure 1 is a longitudinal section of a differential microphone repeater embodying the principles of my invention. Fig. 2 is a cross-section on line 2—2 in Fig. 1. Fig. 3 is a cross-section on line 3—3 in Fig. 1. Fig. 4 is a front end view of the said repeater. Fig. 5 is a rear end view of said repeater. Fig. 6 is a view looking down on the repeater shown in Fig. 1, with the casing thereof removed. Fig. 7 is a side view of the structure shown in Fig. 6. Fig. 8 is an enlarged section of the forward portion of the repeater, similar to Fig. 1, but showing the rear portion broken away.

As thus illustrated, my invention comprises a permanent magnet A, one pole of which is provided with a core or pole-piece a having a coil a^1. An armature a^2 is supported by a shoulder a^3 on the pole a^4 of the permanent magnet and is vibrated by the electrical impulses received in the coil a^1. A front plate B is secured by arms b to the said permanent magnet. The said front plate has an opening b^1 therein which is covered by the differential microphone C that is secured to the face of said plate. This microphone comprises a ring c of lava or other suitable material, and a pair of carbon disks c^1 and c^2 that close the open ends of said ring and serve as electrodes. The mica disks c^3 and c^4 are applied to the outer surfaces of the said carbon disks, to cover the same and serve as insulation; but the metal disks c^5 and c^6 are interposed between said electrodes and the mica disks to serve as terminals for the microphone. A metal plate c^7 is employed to cover the outer surface of the mica disk c^1, the entire structure thus built up being held together and upon the front of the plate B by means of screws c^8. The front and back walls of the microphone box have openings c^9 and c^{10} therein to allow the stem c^{11} to pass through the box. A movable electrode c^{12} is secured upon said stem and disposed between the two stationary electrodes c^1 and c^2. A filling of granular carbon c^{13} is introduced through the hole c^{14} in the top of the ring to serve as the variable resistance in the usual and well known manner. The different openings in the box can be filled with fluffy asbestos to prevent the carbon from escaping. The armature a^2 is connected with the end of the stem c^{11} and thereby operates the electrode c^{12}.

A fulcrum D is mounted in the support d, which latter is secured to the plate c^7, said fulcrum being in the form of a hollow screw which can be adjusted up and down in said support. The lever E is inserted downward through the screw or fulcrum D and has a head E that keeps it from falling through the lower end of said fulcrum. An arm F is pivoted to the front plate c^7 at f and provided with a spring f^1 having a slot f^2 engaged by the lower end of said lever. A screw f^3 extends through the arm F and bears against the plate c^7 to vary the tension of the spring f^1 and regulate the air gap between the armature a^2 and the core a. This is possible because the stem c^{11} has its forward end provided with an eye e^1 through which the lever E passes. The leverage is varied by raising and lowering the fulcrum D, as this changes the distance between the fulcrum and the point at which the lever receives the power. After the eye e^1 and the nuts c^{15}, which latter hold the electrode c^{12} and the stem c^{11}, are adjusted to bring about a rough adjustment of the parts, the fulcrum D is then adjusted to get the proper leverage, depending upon the stiffness of the spring f^1 and the condition generally. Then the screw f^3 is adjusted to give the right tension and regulate the air gap. In this way a very perfect and satisfactory adjustment can be obtained.

A set-screw d^1 is inserted through the side of the support d and engages the fulcrum D to hold the same in position after it has been adjusted. Any suitable circuit arrangement can be employed for the microphone. In such circuit arrangement the impulses received in the magnet a^1 will be repeated by the microphone C, in the usual manner.

A repeater of this kind can be used for loud talking systems, and will carry heavy currents, as the structure of the microphone including the mica insulation will not be affected injuriously by heat. It is simple and is, I find, a very satisfactory and highly efficient form of microphone repeater.

What I claim as my invention is:

1. In a repeater, a differential microphone, a magnet for operating said microphone, a spring, means including a lever for connecting the spring with the magnet, means for regulating the tension of said spring, and means for varying the leverage.

2. In a repeater, a differential microphone, a magnet having an armature for operating said microphone, a spring for retracting the said armature, and means for adjusting the said spring to regulate the air gap of said armature.

3. In a repeater, a differential microphone, a magnet having an armature for operating said microphone, a spring for retracting the armature, a lever through which the armature overcomes the tension of said spring, and means for varying the leverage.

4. In a repeater, a differential microphone, a magnet having an armature for operating said microphone, a spring for retracting the armature, a lever through which said armature overcomes the tension of said spring, a fulcrum for said lever, and means for varying the leverage by changing the distance between the fulcrum and the point where the lever receives the power from said armature.

5. In a repeater, a differential microphone, a magnet having an armature for operating said microphone, a spring for retracting said armature, a lever by which the armature overcomes the tension of said spring, and a fulcrum for said lever, said fulcrum being adjustable to change the leverage.

6. In a repeater, a microphone, a magnet having an armature for operating said microphone located on one side thereof, a spring for retracting said armature located on the other side thereof, and a variable leverage connection between said armature and spring.

7. In a repeater, a microphone, a magnet having an armature for operating said microphone located on one side thereof, a spring for retracting said armature located on the other side thereof, and means for adjusting said spring and armature to regulate the air gap of the latter.

8. In a repeater, a differential microphone, a magnet located upon one side thereof for operating the same, a spring located upon the opposite side of said microphone, and means including a lever for connecting said spring with the armature of said magnet.

9. In a repeater, a differential microphone, a magnet for operating the same, a spring, and means including a stem passing through said microphone and carrying a movable electrode for connecting said spring with the armature of said magnet.

10. In a repeater, a differential microphone, a magnet located upon one side of said microphone for operating the same, a spring located upon the opposite side of said microphone, and means including a stem passing through said microphone and carrying a movable electrode for connecting said spring with the armature of said magnet.

11. In a repeater, a differential microphone, a magnet located upon one side of said microphone for operating the same, a spring located upon the opposite side of said microphone, a lever connected to said spring, and a stem connected with said lever and the armature of said magnet for connecting the armature of said magnet with said spring.

12. In a repeater, a differential microphone, a magnet located upon one side of said microphone for operating the same, a spring located upon the opposite side of said microphone, a lever connected to said spring, a stem connected with said lever and the armature of said magnet for connecting the armature of said magnet with said spring, and an adjustable fulcrum for said lever for varying the leverage.

13. In a repeater, a differential micro-

phone and a magnet for operating the same, a stem passing through said microphone and carrying a movable electrode, a connection at one end of said stem to the armature of said magnet, and a connection from the opposite end of said stem to a lever extending at right angles to said stem, and a spring connected with one end of said lever.

14. In a repeater, a differential microphone and a magnet for operating the same, a stem passing through said microphone and carrying a movable electrode, a connection at one end of said stem to the armature of said magnet, a lever extending at right angles to said stem, a connection from the opposite end of said stem to said lever, a spring connected with one end of said lever, and an adjustable fulcrum for the opposite end of said lever whereby the leverage may be varied.

Signed by me at Chicago, Illinois, this 17th day of October, 1910.

JOHN J. COMER.

Witnesses:
H. Lewis,
E. H. Clegg.