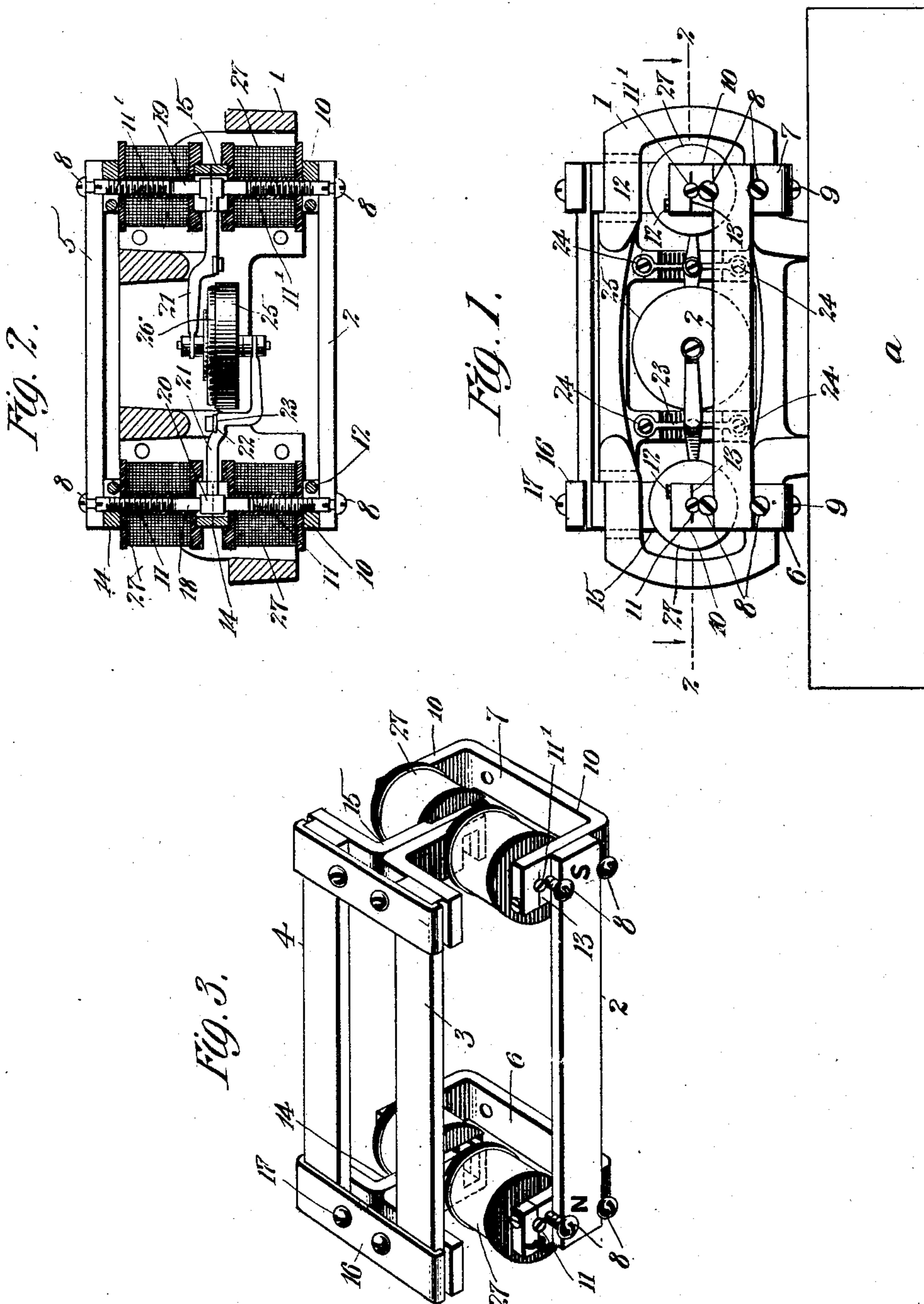


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MICROPHONE.

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MICROPHONE.

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To all whom it may concern:

Be it known that I, HARVE R. STUART, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented certain new and useful Improvements in Microphones, of which the following is a full, clear, and exact description.

My invention relates to telephonic relays to be used for receiving and transmitting voice currents, such as are present in circuits of telegraphones, telephones, etc., and comprises a microphone and a pair of magnets, the armatures of which are connected respectively to the two electrodes of the microphone so as to move the same simultaneously in opposite directions, thereby intensifying the effects produced.

My invention also consists in improved details of construction of the mechanical and magnetic parts so as to increase the sensitiveness of the instrument, and the effects produced thereby, and to produce a light and compact instrument in which protection is afforded to the movable parts.

Reference is hereby made to the accompanying drawing, in which the same reference characters are used to designate corresponding parts in the several views, of which,

Figure 1 is a side elevation of a relay constructed in accordance with my invention. Fig. 2 is a section on line 2—2 of Fig. 1. Fig. 3 is a perspective view showing the arrangement of the magnetic parts of the relay, the supporting frame or body being removed for the sake of clearness.

The relay shown comprises a wooden base *a* carrying a frame or body 1 of non-magnetic material, such as aluminum, to which the magnetic parts are secured, and said parts, as shown, comprise four bar magnets 2, 3, 4 and 5, extending longitudinally with respect to the body, and in parallelism to each other. The magnets 2 and 5 are secured at their respective ends by clamping screws 8 to a pair of U-shaped members 6 and 7 of magnetic material, which are in turn secured to the body 1 by the screws 9. Threaded within the upper ends of the arms 10 of said U-shaped members, are pairs of

opposing screws 11 and 11' of magnetic material, which form the pole pieces of the magnets 2 and 5, said screws being held in any desired position of adjustment by small screws 12 threaded in the ends of the arms 10, said arms being formed with slots 13, which enable the arm to bind upon the screws 11 and 11'.

The magnets 3 and 4 are secured at their ends to the T-shaped members 14 and 15, each of which may be composed of two inverted L-shaped parts, as shown. The horizontal arms of the members 14 and 15 are secured to the body 1 by screws, not shown, and the magnets 3 and 4 are secured by clamping plates 16 held by screws 17, which are threaded in the members 14 and 15. The lower ends of the members 14 and 15 are cut out as shown in dotted lines in Fig. 3, forming notches within which are situated the armatures 18 and 19 respectively, which armatures are in the shape of elongated rods, the ends of which are respectively adjacent the ends of the pole pieces 11 and 11', and the centers of which are separated from the members 14 and 15 by a short air gap. Said armatures are movable in a longitudinal direction, being supported at their centers in sleeves 20 secured to or rigid with vibratory levers 21. These levers are of the form clearly shown in Fig. 2, having central bends which are secured by screws 22 threaded within said levers to flat torsion springs 23, the ends of which are enlarged to form rings, which are secured to the body 1 by the screws 24. The inner extremities of the levers 21 are secured respectively to the electrodes 25 and 26 of a microphone, which may be of any desired form, such as the well known carbon dust microphone, one of said electrodes being electrically connected to its operating lever which is in electrical connection with the frame or body 1, and the other electrode is insulated from its operating lever, and current is applied thereto through a wire (not shown) connected in any suitable manner. The electrodes 25 and 26 are supported by their respective levers 21, and are vibrated thereby. The magnets 3 and 4 are so arranged that similar poles are applied to the members 14 and 15 for

polarizing the same, and the magnets 2 and 5 are similarly arranged for polarizing the arms 10 and screws 11 and 11'. The screws 11 are of the same polarity, and are of opposite polarity to the pole piece 14. The screws 11' are also of the same polarity and of opposite polarity to the pole piece 15. The armatures 18 and 19 are therefore balanced by the attraction of pole pieces at their ends of like polarity and acting in opposite directions. There are four coils 27 applied to the pole pieces 11 and 11', so as to surround the same, and to also surround the ends of the armatures 18 and 19. These coils receive the voice currents and may be connected either in series, multiple, or series multiple, and they are so wound that a current flowing in one direction will simultaneously weaken the flux passing through one of the screws 11 and pole piece 14, and strengthen the flux passing through the other screw 11 and pole piece 14, so as to cause the armature to move toward the screw whose flux is strengthened thereby causing the lever 21 to move on its torsional pivot and move the electrode 25, for example, in a direction away from the electrode 26. At the same time, the coils which surround the pole pieces 11' will weaken the flux passing through one of said pole pieces and strengthen the flux passing through the other so as to move the armature 19 toward the pole piece whose flux is strengthened thereby turning the operating lever 21 on its pivot, and moving the electrode 26 away from the electrode 25. When the current is reversed, the various operations will be reversed and the electrodes 25 and 26 will be moved toward each other, whereby the two electrodes are vibrated in accordance with the waves of the voice currents.

Having now described my invention, what I claim, is:

1. In a relay, the combination of a microphone having a pair of electrodes movable toward and away from each other, a pair of armatures mounted independently of each other, pivotal arms connected respectively to said electrodes and armatures, one or more magnets adjacent said armatures, and means for varying the flux of the magnetic circuits and thereby moving the armatures in such a manner that the microphone electrodes will be simultaneously moved in opposite directions.

2. In a relay, the combination of two or more magnetic circuits comprising separate armatures, a microphone comprising a pair of electrodes movable toward and away from each other, a pivotal arm connected to one of said electrodes and one of said armatures and another pivotal arm connected to the

other of said electrodes and to the other armature, and coils for receiving the voice currents and varying the flux entering said armatures in such a way as to cause the microphone electrodes to move simultaneously in opposite directions.

3. In a device responsive to voice currents, the combination of the bar magnets 2 and 5, U-shaped members 6 and 7 secured to the ends thereof, and the pole pieces 11 and 11' threaded in said U-shaped members.

4. In a device responsive to voice currents, the combination of the bar magnets 2 and 5, U-shaped members secured to the ends thereof, and pole pieces extending inward from the arms of said U-shaped members.

5. In a device responsive to voice currents, the combination of the bar magnets 3 and 4, and T-shaped members secured to the ends thereof.

6. In a device responsive to voice currents, the combination of the bar magnets 3 and 4, and pole pieces secured thereto and having recessed ends for receiving the armature.

7. In a relay, the combination of two or more magnetic circuits comprising separate armatures, a microphone comprising a pair of electrodes and a pair of levers mounted on torsional pivots and connected at their ends with said armatures and microphone electrodes.

8. In a relay, the combination of two or more magnetic circuits comprising elongated longitudinally movable armatures, pole pieces adjustable toward and away from the ends of said armatures, and pole pieces of opposite polarity adjacent the intermediate portions of said armatures, and a microphone comprising a pair of electrodes movable toward and away from each other, one of said electrodes being connected to one of said armatures, and the other of said electrodes to the other armature.

9. In a relay, the combination of a hollow non-magnetic frame, a plurality of bar magnets applied longitudinally to the exterior thereof so as to inclose the same and pole pieces extending to the interior of the frame, an armature and a microphone within said frame, and a connection between said armature and said microphone for operating the latter.

10. In a relay, the combination of a hollow non-magnetic frame, a plurality of bar magnets applied longitudinally to the exterior thereof so as to inclose the same and a microphone situated within said frame, and connected with the armature of said magnet.

11. In a relay, the combination of a microphone electrode, an armature, a lever secured at its respective ends to said armature

and microphone electrode, and a torsion spring secured to the said lever intermediate its ends for supporting the same.

12. In a device responsive to voice currents, the combination of one or more magnets forming a magnetic circuit and comprising one pole-piece formed with an opening near the end thereof, a movable elongated armature extending through said opening and pole-pieces adjacent the ends of said ar-

mature and of opposite polarity to said first pole-piece and means for varying the magnetic flux of said magnetic circuit.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

HARVE R. STUART.

Witnesses:

FRANK S. OBER,
WALDO M. CHAPIN.