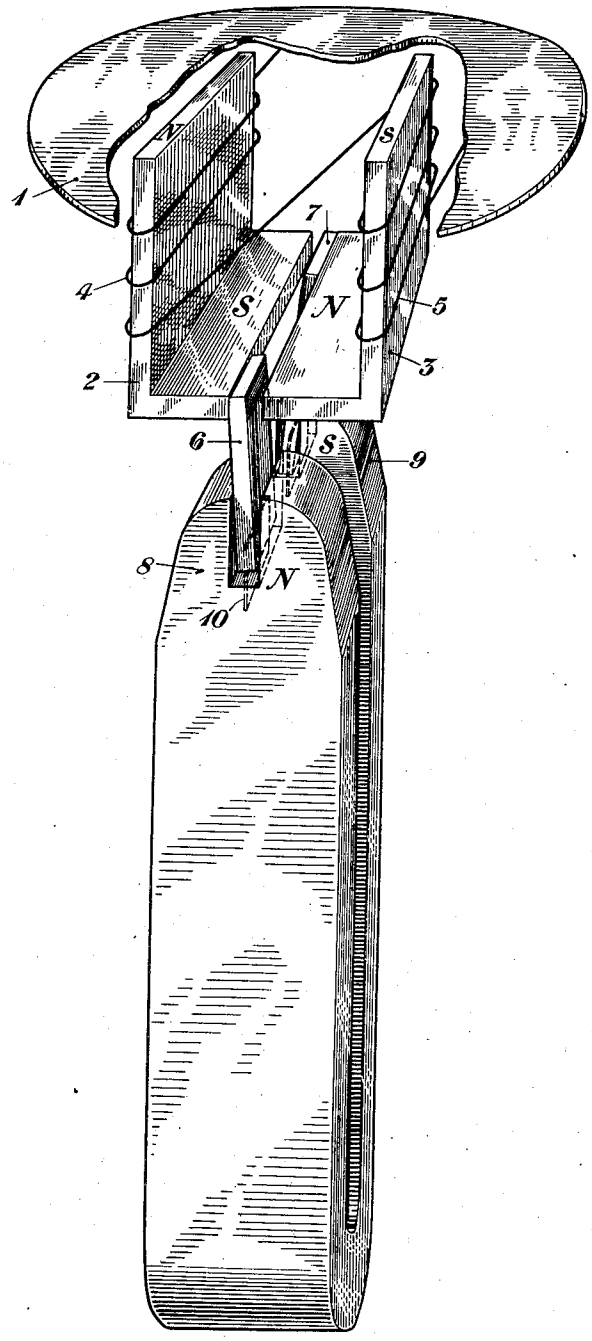
June 23, 1925. 1,542,922

G. K. THOMPSON

TELEPHONE RECEIVER

Filed April 21, 1923



INVENTOR

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BY

ATTORNEY

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UNITED STATES PATENT OFFICE.

GEORGE K. THOMPSON, OF MAPLEWOOD, NEW JERSEY, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

TELEPHONE RECEIVER.

Application filed April 21, 1923. Serial No. 633,754.

To all whom it may concern:

Be it known that I, GEORGE K. THOMPSON, residing at Maplewood, in the county of Essex and State of New Jersey, have invented certain Improvements in Telephone Receivers, of which the following is a specification.

This invention relates to telephone receivers, and more particularly to electromagnetic telephone receivers including permanent magnets.

In the development of electromagnetic receivers, difficulty is found on long lines with the current at its minimum in securing the desired steady magnetic flux. One method of producing the additional flux desired is to use a permanent magnet. To such an arrangement, however, there is this objection: In order that the best results may be obtained, the receiver must be properly poled; and, if the current flow through the windings happens to be such as to neutralize the effect of the permanent magnet, there is a serious loss in efficiency. Furthermore, in common battery circuits it is not desirable to use a receiver which requires poling, as there are many points at which the circuit may be transposed, with the result of an improper poling of the receiver.

Applicant's invention aims to solve the problem outlined above, and has as its principal object the production of a telephone receiver which will have a uniform magnetic flux through the pole pieces regardless of the direction of the energizing current.

The arrangement includes the usual electromagnets with coils wound in opposite directions and connected in series and a diaphragm adjacent to the upper poles. A U-shaped permanent magnet carries pole pieces attached by means of flexible strips and free to move laterally; and the lower ends of the electromagnet cores and these pole pieces are so arranged that upon the energizing of the electromagnets one pole piece is attracted to each core, whatever the direction of the current in the electromagnet windings, thus maintaining a steady magnetic flux through the pole pieces regardless of the direction of the current in the windings.

The following is a detailed description of one desirable embodiment of the invention. This description is to be read with reference to the accompanying drawing, in which the single figure shows in perspective one construction and arrangement of the essential parts of the receiver according to applicant's invention.

With reference to the details of the drawing, 1 designates the diaphragm, partially cut away to expose the parts below. 2 and 3 are two L-shaped soft iron cores, the upper ends of which are placed adjacent to the central section of the diaphragm, according to the practice well established in the art. 4 and 5 designate the core windings, which are wound in opposite directions and connected in series—the usual arrangement in bi-polar receivers. The lower extremities of the cores 2 and 3 are placed adjacent to two movable soft iron tongues 6 and 7. These tongues are given each a permanent polarity by means of a U-shaped permanent magnet, whose two arms are shown as 8 and 9. In each arm of the permanent magnet there is a deep slot, as clearly shown in the drawing. The tongue 6 is mounted in the slot of the magnet arm 8 by means of a thin and flexible soft iron strip 10, being free to move from one side of the slot to the other. The tongue 7 is in a like manner movably mounted in the slot of the magnet arm 9.

The pole marking in the drawing will lead to a clear understanding of the operation of the receiver parts, which is now described as follows:

Suppose the end of the arm 8 to be the north seeking pole of the permanent magnet and the end of the arm 9 to be the south pole. It is obvious that the movable tongues 6 and 7, mounted as described above, will act as pole pieces, having a north and a south polarity, respectively. Now, suppose a current to be passed through the core windings in such a direction as to make the upper end of the core 2 a north pole. The lower end of the core 2 will, of course, have a south polarity, and the upper and lower poles of the core 3 will be south and north, respectively—as appears clearly from a consideration of the winding of the cores. The tongue 6, which constitutes the north seeking pole piece of the permanent magnet, will be attracted to the lower end of the core 2, which has a south polarity, and likewise the tongue 7, which constitutes the south pole piece of the permanent magnet, will be attracted to the lower end of the core 3, which is shown to have a north polarity. The

drawing shows the parts of the receiver in this position. Should the current in the windings be reversed in direction, the polarity of the cores 2 and 3 would be the opposite of that shown in the drawing. As a result, the pole pieces 6 and 7 would move, 6 being attracted to the core 3 and 7 being attracted to the core 2. Thus, the reversal of the current in the receiver windings has no effect on the amount of the magnetic flux through the pole pieces—but merely reverses the direction of the flux.

What is claimed is:

1. A telephone receiver comprising a permanent magnet, two electromagnets presenting upper ends of opposite polarity to a diaphragm, the lower ends of said electromagnets lying above said permanent magnet, and two pole pieces movably mounted on said permanent magnet, said pole pieces extending between the lower ends of the electromagnets, each pole piece being free to respond to attraction toward either electromagnet.

2. A telephone receiver comprising a U-shaped permanent magnet, two electromagnets presenting upper ends of opposite polarity to a diaphragm, the lower ends of said electromagnets lying above said permanent magnet, and two pole pieces movably mounted on said permanent magnet, said pole pieces extending between the lower ends of the electromagnets, each pole piece being free to respond to attraction toward either electromagnet.

3. In a telephone receiver, in combination, a U-shaped permanent magnet, two electromagnets presenting upper ends of opposite polarity to a diaphragm, the lower ends of said electromagnets lying above said permanent magnet, and two pole pieces movably mounted on said permanent magnet, said pole pieces extending between the lower ends of the electromagnets, each pole piece being free to respond to attraction toward either electromagnet.

4. In a telephone receiver, in combination, two electromagnets including coils wound in opposite directions and connected in series, the upper poles of said electromagnets lying adjacent to a diaphragm and the lower poles facing each other; and a U-shaped permanent magnet, said magnet carrying pole pieces movably mounted thereon, said pole pieces extending between the lower poles of the electromagnets, being free to move laterally between said poles.

5. In a telephone receiver, in combination, two electromagnets comprising L-shaped cores and coils wound in opposite directions and connected in series, a diaphragm adjacent to the upper poles of said electromagnets, a U-shaped permanent magnet, and pole pieces connected to said magnet by flexible strips, said pole pieces extending between the lower ends of the L-shaped electromagnet cores, being free to move laterally between the same.

6. In a telephone receiver including two electromagnets comprising cores and coils wound in opposite directions and connected in series, a diaphragm adjacent to the upper ends of said cores, and a U-shaped permanent magnet; as means for maintaining a steady magnetic flux in the receiver, two pole pieces movably mounted on said permanent magnet and extended between the lower ends of the electromagnet cores, said pole pieces being free to respond to attraction toward either of said cores.

7. In a telephone receiver including two electromagnets comprising cores and coils wound in opposite directions and connected in series, a diaphragm adjacent to the upper ends of said cores, and a U-shaped permanent magnet; as means for maintaining a steady magnetic flux in the receiver, two pole pieces mounted on said permanent magnet by flexible strips, said pole pieces extending between the lower ends of the electromagnet cores, each pole piece being free to respond to attraction toward either of said cores.

In testimony whereof, I have signed my name to this specification this 20th day of April, 1923.

GEORGE K. THOMPSON.