

Oct. 26, 1926.

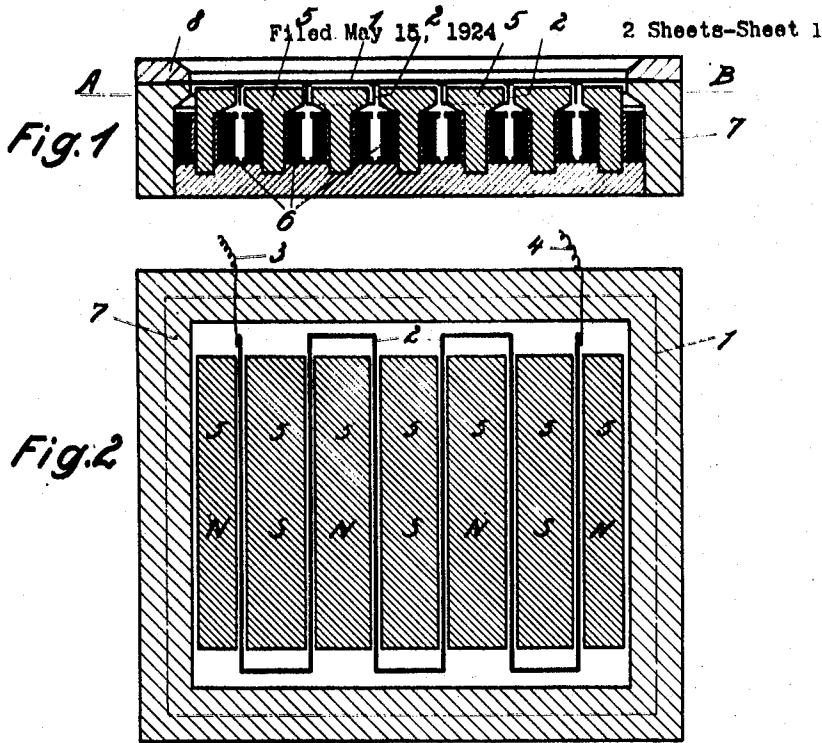
1,604,532

H. RIEGGER

ELECTRODYNAMIC TELEPHONE

Filed May 15, 1924

2 Sheets-Sheet 1



Inventor  
Hans Riegger  
by Knight B. attorney

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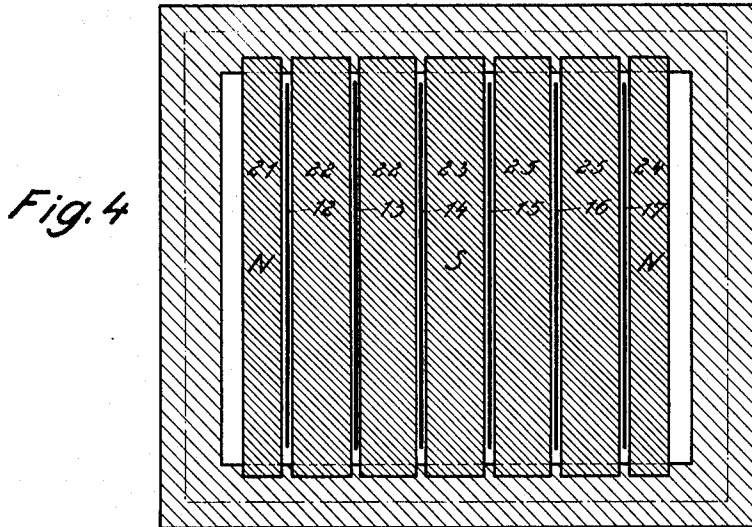
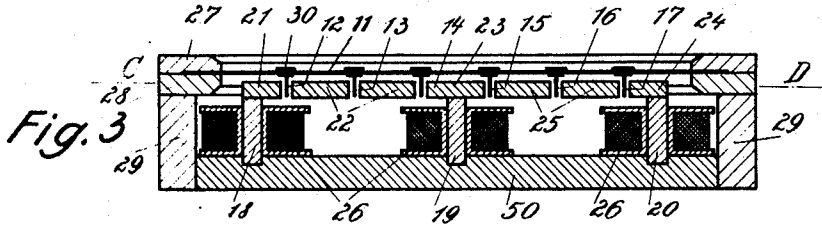
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2 Sheets-Sheet 2



Inventor  
Hans Riegger  
by Knight B. *attorneys*

# UNITED STATES PATENT OFFICE.

HANS RIEGGER, OF BERLIN-PANKOW, GERMANY, ASSIGNOR TO SIEMENS & HALSKE, AKTIENGESELLSCHAFT, OF SIEMENSSTADT, NEAR BERLIN, GERMANY, A CORPORATION OF GERMANY.

## ELECTRODYNAMIC TELEPHONE.

Application filed May 15, 1924, Serial No. 713,481, and in Germany June 8, 1923.

This invention relates to improvements in electrodynamic telephones, and has for its purpose to obtain a true reproduction of music and speech.

5 My invention consists essentially in providing upon the telephone diaphragm, which itself is not concerned in conducting electric currents and the magnetic flux, ribs through which the telephone currents flow  
10 and which ribs are so disposed between the pole-shoes of the exciter magnets that it is traversed by the magnetic flux. The electric currents and the magnetic field then generate forces which are at right angles to the plane  
15 of the diaphragm, so that the diaphragm is vibrated. As it is possible to distribute such current carrying ribs all over the surface of a diaphragm, it is possible to exert forces upon the diaphragm, which act fairly  
20 uniformly over the entire surface. In this manner undesired deflections of the diaphragm and harmonic oscillations are avoided even when the diaphragm possesses very little stiffness. Any suitable size may be  
25 chosen for the diaphragm and the latter need possess no elasticity at all, since it is not called upon to offer resistance to any magnetic forces. In this manner the disturbing natural vibrations are also eliminated,  
30 which usually distort the sounds to be reproduced. The possibility thus afforded to use diaphragms of very large size is particularly advantageous in constructing loud speaking telephones.

35 The drawings affixed to this specification and forming part thereof illustrate in:—

Fig. 1 one construction of the improved telephone in cross-section,

40 Fig. 2 a horizontal section along line A—B of Fig. 1,

Fig. 3 a modified construction in cross-section,

45 Fig. 4 the same in horizontal section along line C—D of Fig. 3.

Referring to Figs. 1 and 2, it will be seen that on the underside of the diaphragm 1, which may for instance, consist of mica, a sinuous rib 2 is fastened. This rib consists preferably of a strip of aluminium, in order  
50 to keep the weight as low as possible. The telephone currents are led to this strip 2 by the conductors 3 and 4. The strip passes along between the magnetic poles 5 in such a manner, that each longitudinal rib is situ-

ated between a north and a south pole. The  
55 electro-magnets are constantly excited by the coils 6. The diaphragm is clamped between the frame 7 and the cover 8. A rush of current flowing through the aluminium strip produces at all points of the magnetic  
60 fields a force of equal size and equal direction, so that the diaphragm rises or falls along its entire extent. The diaphragm may be made of any suitable size, so that in this  
65 manner a telephone capable of large volumes of sound is produced.

Referring to Figs. 3 and 4, it will be seen that in this construction a series of individual aluminium strips 12, 13, 14, 15, 16, 17  
70 are fixed upon the underside of the diaphragm 11. The ribs 12, 13 and 14 are traversed by the telephone currents in the same direction and the other three ribs 15, 16 and  
75 17 in opposite direction. In correspondence herewith the first three ribs are traversed by a magnetic field in one direction and the latter three by an oppositely directed magnetic field. The fields are excited by the  
80 electro-magnets 18, 19, 20, so that in the middle, for instance, a south pole S and at both sides a north pole N is produced. The fields pass from pole-shoe 21 across iron bridge 22, the pole-shoe 23 and the yoke 50. The other magnetic field passes from the pole-shoe 24 across the bridge 25. Between  
85 the pole-shoes 21, 23 and 24 and the bridges 22 and 25 are situated the ribs 12 to 17. As compared with the arrangement according to Figs. 1 and 2 winding space for the electro-magnets is saved by the present  
90 construction, so that ample space is available for the exciting coils 26. The pole-shoes 21, 23, 24 and the bridges 22 and 25 together with the diaphragm 11 are fixed in a single  
95 frame, which consists of the two parts 27 and 28. This common enclosure in the same frame enables the maintenance of exact spacing between the ribs and the pole-shoes. The frame with its parts is then inserted as self-contained unit into the casing 29 with the  
100 yoke 50, in which the electro-magnets 18, 19, 20 are fixed. The ribs are cemented to the diaphragm by means of bent over edges. In order to render the attachment more reliable  
105 parts of the edges of the strips may be passed through the diaphragm and bent over on the upper side of the diaphragm.

It will be readily understood that I do not

limit myself to the exact details of the construction described and shown and that these may be altered within the scope of my claims without departing from the spirit of my invention.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In an electrodynamic telephone in combination a non-conducting non-magnetic diaphragm, a plurality of ribs of suitable material adapted to conduct the telephone currents, said ribs being distributed over the surface of said diaphragm and fixed to it, and means for producing a magnetic field, whose lines of force cut said ribs in a transverse direction.

2. In an electrodynamic telephone in combination a non-conducting non-magnetic diaphragm, and a plurality of magnets distributed over the area covered by said diaphragm and a rib of suitable material adapted to conduct the telephone currents, said ribs being fixed to said diaphragm and being suitably wound across the area of said diaphragm within and transversely to the path of the lines of force of said magnets.

3. In an electrodynamic telephone in combination a mica diaphragm and a plurality of magnets distributed over the area covered by said diaphragm and a rib of suitable material adapted to conduct the telephone currents, said rib being fixed to said diaphragm and being suitably wound across the area of said diaphragm within and transversely to the path of the lines of force of said magnets.

4. In an electrodynamic telephone in combination a mica diaphragm, a plurality of aluminum ribs distributed over the surface of said diaphragm and fixed to it and adapted to conduct the telephone currents and

magnets suitably disposed adjacent to and within the area of said diaphragm, to cause lines of force of said magnets to cut said ribs in a transverse direction.

5. In an electrodynamic telephone in combination a mica diaphragm and a plurality of magnets distributed over the area covered by said diaphragm and a rib of aluminum adapted to conduct the telephone currents, said rib being fixed to said diaphragm and being suitably wound across the area of said diaphragm within and transversely to the path of the lines of force of said magnets.

6. In an electrodynamic telephone in combination a non-conducting non-magnetic diaphragm, a plurality of ribs of suitable material adapted to conduct the telephone currents, said ribs being distributed over the surface of said diaphragm and fixed to it, and magnets disposed adjacent to said diaphragm in suitable polarity sequence with relation to said ribs to cause similarly directed magnetic flux to transversely cross ribs traversed by the current in similar direction.

7. In an electrodynamic telephone in combination a non-conducting non-magnetic diaphragm, a plurality of ribs of suitable material adapted to conduct the telephone currents, said ribs being distributed over the surface of said diaphragm and fixed to it, and magnets for producing a magnetic field whose lines of force cut said ribs in a transverse direction and a frame adapted to support and hold said diaphragm and pole shoes for said magnets connected with said frame to form a rigid unit therein.

In testimony whereof I affix my signature.

HANS RIEGGER.