(No Model.)

# J. EMMNER, Jr.

## TELEPHONE.

No. 346,031. Patented July 20, 1886.

Fig. 1.

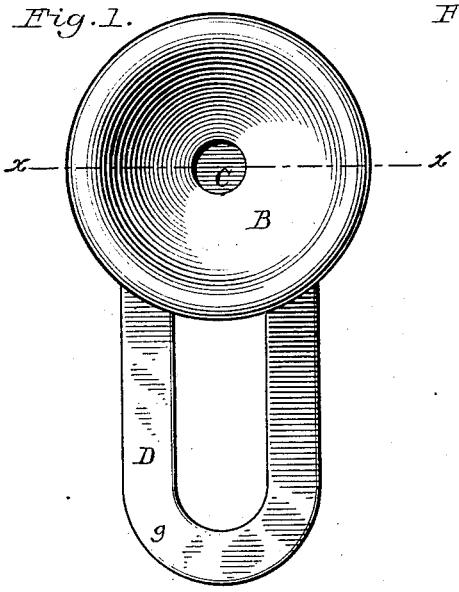



Fig. 2.

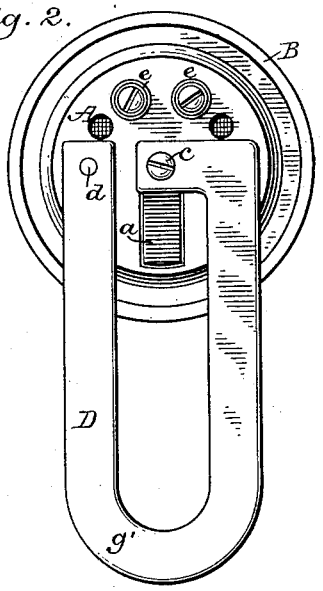



Fig. 3.

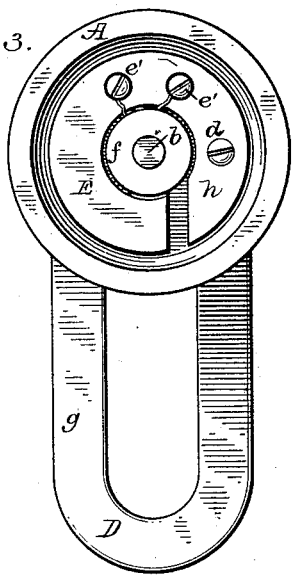



Fig. 4.

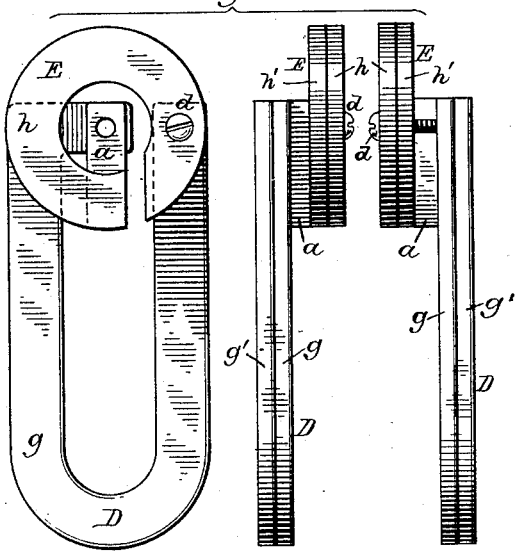
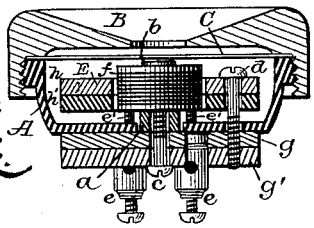



Fig. 5.

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# UNITED STATES PATENT OFFICE.

JULIUS EMMNER, JR., OF WASHINGTON, DISTRICT OF COLUMBIA.

## TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 346,031, dated July 20, 1886.

Application filed April 2, 1886. Serial No. 197,519. (No model.)

*To all whom it may concern:*

Be it known that I, JULIUS EMMNER, Jr., of the city of Washington, in the District of Columbia, have invented certain new and useful Improvements in Telephones; and I do hereby declare that the following specification, taken in conection with the drawings furnished, and forming a part of the same, is a clear, true, and complete description of my invention.

My said improvements pertain to receiving-instruments of the magneto variety, and to that particular class which embody multiple or compound magnets; and the object of my improvements is to provide a highly-effective magnetic field adjacent to the diaphragm and to correspondingly enlarge the capacity of the telephone for affording loud and distinct enunciation.

In developing my invention I have given special attention to devising such construction and arrangement of the compound magnets and the accompanying portions of the instrument as to render my telephone of compact and convenient form, and of as little weight as is consistent with good results, as well as with due reference to economy in its production.

After fully describing a telephone embodying my improvements in what I deem the most desirable form, as fully illustrated in the drawings, the several features deemed novel will be specified in the several clauses of claims hereunto annexed.

Referring to the drawings, Figures 1 and 2 are respectively front and rear views of one of my telephones. Fig. 3 is a view of the same with the mouth-piece and diaphragm removed. Fig. 4 in several views illustrates the compound magnet which underlies the diaphragm. Fig. 5 is a vertical central section of the telephone on line *x*, Fig. 1.

The cup-shaped casing A or head of the telephone is composed of non-magnetic material, and it may be metal or compressed paper, or wood or hard rubber, or any of the other well-known materials adapted to the purpose. Its front periphery is flanged and threaded to receive the internally-threaded mouth-piece B, which is usually composed of hard rubber; but other well-known materials may be employed. The diaphragm C is of the usual form, preferably composed of thin sheet-iron, and clamped firmly near its periphery between the front edge of the casing and the interior coincident surface of the mouth-piece, a thin narrow paper washer being desirable between said mouth-piece and diaphragm. If the diaphragm be composed of non-magnetic material, due provision must be made by mounting magnetic metal thereon in such form that it may be properly influenced by the magnet employed.

Attached to the back of the casing is a horseshoe permanent magnet, D, which, as in some prior instruments, serves as a handle. Within the casing there is an annular permanent magnet, E, split at one side for developing proper poles, and having an arm or bar, *a*, projecting inwardly from one of its poles, said bar being attached to the rear side of the magnet, and affording at its inner end a seat for a soft-iron core, *b;* and said core is coupled to the proper pole of the horseshoe-magnet by means of an iron clamping-screw, *c*, passing through said magnet and through said bar and into a threaded hole within said core, the casing being slotted for the reception of said bar, as shown. The opposite pole of said horseshoe-magnet is coupled to the appropriate pole of the annular magnet by means of an iron screw, *d*, passing through a hole in the casing, so that said screw not only unites said magnets, but also firmly unites them to said casing. The top of said screw *d* serves as a pole-piece and is located between the core and the periphery of the diaphragm. A further partial union of the annular magnet with the casing is effected by means of the insulated screw-posts *e*, having internal screws, *e'*, which extend through said casing from its rear side and into and through said magnet, and these at their inner ends are electrically connected to the terminals of the spooled helix *f*, which surrounds the soft-iron core *b*. The annular split magnet should be, as shown, practically concentric with the iron core and also parallel with the diaphragm.

As thus far described, it will be seen that the horseshoe-magnet D and the annular split magnet E constitute a compound magnet having one pole thereof coupled to the soft-iron core, which underlies the center of the diaphragm, and in the usual relation thereto, the

other pole substantially centering in the screw *d*, the head of which serves as a pole-piece and underlies the diaphragm at a point about midway between said core and the clamped periphery of the diaphragm.

The two junctions of the appropriate poles of the two magnets obviously constitute, respectively, the poles of the compound magnet, and the end of the iron core constitutes one pole-piece and the head of the screw *d* another, and these co-operate in influencing the vibrations of the diaphragm.

Although the central core, *b*, and the head of the screw *d* constitute the poles of the compound permanent magnet, it will be seen that the diaphragm is also influenced by the two poles of the annular permanent magnet.

It is desirable to locate the bar *a* in a plane at the rear of the annular magnet, so that the latter will be enabled to surround the helix and the soft core, and thereby place these parts in relative positions which are highly conducive to effective co-operation, although fairly desirable results will accrue if said bar be an integral inwardly-turned end of said magnet.

I have referred to the magnets D and E as separate single magnets co-operating as one compound magnet, and that feature of construction, under certain restrictions as to arrangement and combination, constitutes one portion of my invention; but I obtain still better results if one or both of the magnets D and E be also compound.

As shown in the drawings, the horseshoe-magnet D is composed of duplicate elements *g g'*, each being a perfect permanent magnet, and the two constituting a compound magnet. In like manner the annular split magnet is composed of counterparts *h h'*.

I have obtained thoroughly satisfactory results with a compound magnet comprising three elements—two of them constituting the annular split compound magnet coupled to a single horseshoe-magnet.

The variations in the construction of the instrument incident to the suggested variations in the multiple character of the magnet will obviously only involve mere variation in the proportions of the casing and length of screws, and even these variations need only occur if the thickness of the annular magnet be the same, whether it be composed of one or of two elements.

I prefer, for the sake of convenience in handling the instrument when in use, to have the horseshoe-magnet parallel with the rear side of the casing; but it will obviously perform the same magnetic functions if it be secured to the inner magnet and the casing, so as to stand at right angles to the rear side of the latter, as well as to the interior magnet.

I am aware that telephones embodying a horseshoe-magnet have heretofore had a soft-iron core within a helix and attached to one pole of said magnet, and a soft-iron ring surrounding the helix and connected with the other pole of said magnet; but it will be obvious that in such prior combinations the diaphragm is exposed by induction only to the influence of two poles of one magnet, whereas in my instruments the diaphragm is exposed to the influence of one of the two poles of the exterior horseshoe-magnet by induction, and also to the direct influence of the other pole of said horseshoe-magnet, and also of both poles of the interior magnet.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a receiving-telephone, the combination, substantially as hereinbefore described, with a suitable casing and diaphragm, a helix and a soft-iron core, of a compound permanent magnet embodying an annular split permanent magnet within said casing parallel with and at the rear of said diaphragm and concentric with said core, and an exterior horseshoe-magnet having its poles coupled to the appropriate poles of the annular magnet, and affording at one junction a seat for said core, and at the other junction a pole-piece located between said core and the periphery of the diaphragm.

2. In a receiving-telephone, the combination, substantially as hereinbefore described, with a suitable casing and diaphragm, a helix and a soft-iron core, of a compound permanent magnet within said casing surrounding and having one of its poles coupled to said core, and an exterior horseshoe-magnet having its poles respectively coupled to the appropriate poles of said interior magnet, and having at their junctions, respectively, the iron core, and a pole-piece which is located between said core and the periphery of the diaphragm.

JULIUS EMMNER, JR.

Witnesses:

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