

(No Model.)

M. MARTIN.
ELECTRIC SPEAKING TELEPHONE.

No. 369,256.

Patented Aug. 30, 1887.

Fig. 1.

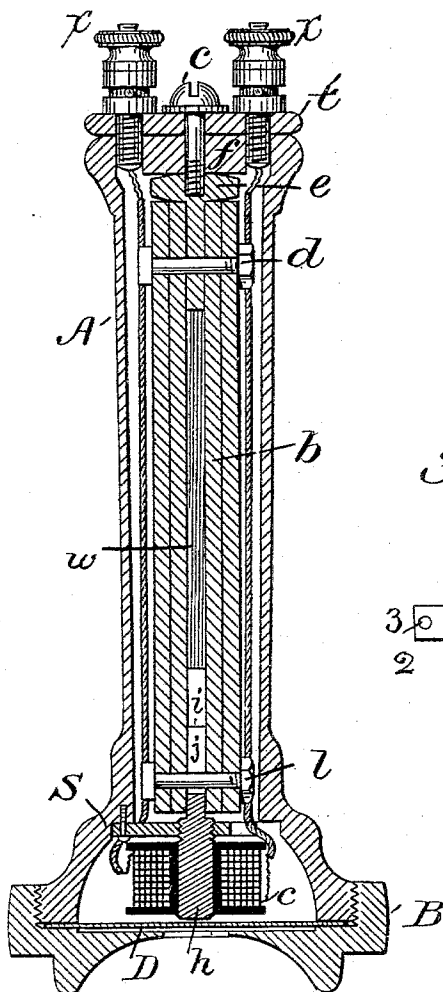


Fig. 2.

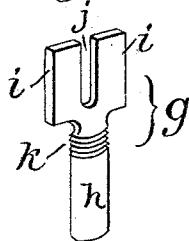


Fig. 3.

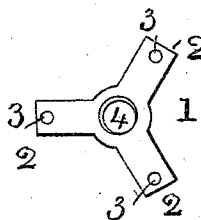
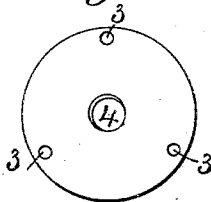


Fig. 4.



Witnesses.
Geo. Willis Pence
Thos D Lockwood

Inventor.
Morris Martin

UNITED STATES PATENT OFFICE.

MORRIS MARTIN, OF MALDEN, MASSACHUSETTS, ASSIGNOR TO THE
AMERICAN BELL TELEPHONE COMPANY.

ELECTRIC SPEAKING-TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 369,256, dated August 30, 1887.

Application filed April 2, 1887. Serial No. 233,429. (No model.)

To all whom it may concern:

Be it known that I, MORRIS MARTIN, residing at Malden, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Electric Speaking-Telephones, of which the following is a specification.

This invention has reference to that class of speaking-telephones commonly known as "magneto-receivers," (although capable of use also as transmitters,) which comprise a vibratory diaphragm and an exciting-magnet, with a spool or bobbin of insulated wire adapted for inclusion in an electric circuit fixed upon one or more poles of said magnet.

It constitutes an improvement and modification of the ordinary and widely-known Bell receiving-telephones; and its objects are to retain simplicity of construction while producing an instrument which shall not be susceptible to derangement due to variations in temperature and climatic conditions, and also to produce generally an instrument which requires an initial adjustment only, and which is in every respect of high efficiency.

My invention consists, specifically, in preventing the pole-piece of the telephone-magnet from being thrown out of adjustment with respect to the adjacent diaphragm by unequal expansion of the magnet and case arising from changes in temperature, by dispensing with the usual rigid attachment of the pole-piece to the main exciting-magnet, and by providing a loose pole-piece the end of which is surrounded, as usual, by the helix, and by inserting the stem of this pole-piece between the ends of two side bars of the inducing-magnet.

A bridge or yoke-piece, which may be in the form of a spider or disk, is rigidly fastened to the pole-piece just below the helix, and rests upon a shoulder in the telephone-case just above the end of the magnet proper. By adopting this appliance it is easy to maintain a full intensity of induced magnetism in the pole-piece, as its stem can readily be fitted quite close to the inner surface of the magnet-bars, and yet be capable of sliding easily over and within the said surfaces in response to temperature expansions and contractions.

It is well-known that the ordinary "Bell" magneto-receiver comprises a hard-rubber

case inclosing a compound bar-magnet, a soft-iron pole-piece rigidly attached by screw or otherwise, and a diaphragm mounted in close juxtaposition to the end of said soft-iron pole-piece and clamped in position by a cap, which performs also the functions of an ear or mouth-piece. This magnet is rigidly fastened by a screw to the other end of the case, and as the expansion and contraction of hard rubber and steel differ in a very pronounced degree under equal changes of temperature, experience has demonstrated that under comparatively small variations of temperature the distance between the pole-piece end and the diaphragm center has greatly varied.

It is most desirable not only that the diaphragm and pole-piece end shall be as close as possible to one another without touching, but that this distance shall be substantially invariable; and these conditions are both met by my invention.

In the drawings which illustrate this specification, Figure 1 is a longitudinal section of a hand-telephone fitted with my invention. Fig. 2 is a perspective view of the pole-piece detached. Fig. 3 is a plan view of the supporting-spider therefor; and Fig. 4 is a view showing a disk-supporter which may, if desired, be substituted for the said spider-support.

In the drawings, A is a telephone-case of usual form, provided with cap-piece B, and inclosing the compound bar-magnet b, which at the rear end of the instrument is fastened and held in place by a screw, c, passing through the finishing-disk t and the end f of the case and entering the back pole-piece, e, this being rigidly affixed to the magnet by a bolt or bolts, d. The several component bars of the compound magnet are also, as usual, held together at the front end by a bolt, l.

Heretofore it has been, as already stated, customary to rigidly attach the front pole-piece, and this has been done by constructing the same with a single flat stem and by causing the bolt or bolts l to pass through the said stem, as well as through the bars of the magnet. I provide, however, a stem which is mounted without fastenings upon the end of the bar-magnet. There are various modes by which this may be done; but the mode I prefer, and

which I show and describe in this specification, is to provide a soft-iron pole-piece, *g*, having a projecting core, *h*, a bifurcated or split stem, *i*, and a screw-threaded neck, *k*. I mount this pole-piece by inserting the core end through the hole 4 of a metal spider or yoke, 1, which yoke is adapted, by means of its arms or rays 2, to rest in and upon a shoulder, *S*, cut within the flare or bell-shaped expansion of the telephone-case, as shown in Fig. 1, where one of the said rays and a portion of another are indicated. The yoke may now be fastened in place by small screws passing through the holes 3 into the substance of the telephone-case. The forks *i* of the pole-piece are now slid between the two pairs of the bar-magnets *b*, as in Fig. 1, the bolt *l* passing into the slit or recess *j* between the forks *i*, and the two ends *i* passing for a considerable distance between the two bar-magnet sides, in close contact therewith. The pole-piece stem or fork is in no way fastened to the magnet, being inserted between its bars in permanent contact therewith and capable of freely sliding in the socket formed by the distance between the two pairs of bars.

The bars may be retained a proper distance apart by the interposition of a partition, *w*, of wood or like material, between them.

To provide for the free sliding of the pole-piece stem between the magnetic surface, and at the same time to insure a full intensity of induced magnetism therein, the said surfaces, as well as the adjacent pole-piece surfaces, may be filed, planed, or ground perfectly smooth before the magnets are hardened. The helix *c* surrounds the core *h* in the usual manner, and its ends are connected by insulated wires passing within the case to the binding-screws *x x*. The pole-piece, after being affixed to the yoke 1, may be adjusted so as to bring its end to a proper distance from the center of the diaphragm *D* (which is, as usual, clamped and held in place by the cap or ear-piece *B*) by turning it after the yoke is fastened to the case; or it may be fixed rigidly to the yoke (by soldering or brazing, for example) and adjusted by placing one or more sheets of paper thereunder upon the shoulder *S* of the case.

I do not confine myself to the yoke or spider form of pole-piece support, since it is obvious that other forms can readily be adopted without necessitating further invention. I may, for example, use a disk-shaped support, as in Fig. 4, this being in every respect, except external form, identical with the yoke shown in Fig. 3.

Among the advantages of this plan for preventing derangement due to changes in temperature, I may mention the fact that it can readily and at small cost be applied to telephones now in use if it be found that they require adjustment, and that new telephones can be made and fitted with this device at no greater expense than when the present construction only is adopted.

Of course this method of compensating for unequal expansion and contraction is not restricted to telephones of the special form shown, it being obviously applicable to other forms, nor is the number of component bars a material point.

I claim as my invention—

1. In a telephone, the combination, with the exciting-magnet, of a loose core or pole-piece therefor, magnetized thereby, but supported by the frame or case independent thereof and near to the diaphragm, whereby variation of distance between the core and diaphragm due to variations of temperature is practically prevented.

2. In a magneto-telephone, a permanent magnet, a soft-iron pole-piece in contact therewith and magnetized thereby, but unattached thereto, and a fixed support therefor, upon which the said core is rigidly mounted, attached to the telephone-case and maintaining the distance between the end of the said core and a vibratory diaphragm practically unchanged independent of the expansions and contractions of the bar-magnet, substantially as and for the purposes specified.

3. In a magneto-telephone, a permanent magnet, a soft-iron pole-piece in contact therewith and magnetized thereby, but unattached thereto, and a fixed support therefor, to which the said core is rigidly but adjustably attached, affixed to the telephone-case and adapted to maintain a uniform distance between the end of said pole-piece and the diaphragm irrespective of the expansions and contractions of the magnet under variations of temperature.

4. The hereinbefore-described improvement in magneto-telephones, comprising the compound permanent bar-magnet, the soft-iron pole-piece therefor, having a bifurcated stem adapted to be inserted between and to be embraced by the ends of the component bars of the said magnet and to bestride the clamping-bolt thereof, being in firm but sliding contact therewith, a spider or yoke support for the said pole-piece, to which the said pole-piece is rigidly and adjustably attached, mounted upon a shoulder in the telephone-case, a helix forming or adapted to form part of an electric circuit surrounding the core end of the pole-piece, and a vibratory diaphragm mounted in close proximity to the end of said core, all in combination and substantially as and for the purposes specified.

5. The combination, substantially as hereinbefore described, in a magneto-telephone, of a soft-iron pole-piece comprising a core and a flat stem, an electro-magnetic helix surrounding said core, and a supporting-yoke for said pole-piece permanently and rigidly mounted upon a shoulder in the telephone-case, and provided with a threaded central hole adapted to receive a corresponding male thread cut on the pole-piece between the stem and core thereof for the purpose of adjusting the said core with reference to a vibratory diaphragm, with a permanent compound mag-

net having a space between the ends of its component bars, within which space the stem of the pole-piece is slid without fastenings, whereby it may be magnetized without permanent mechanical attachment, for the purposes specified.

6. The combination of the magnet, the soft-iron pole-piece *g*, the spider-shaped yoke *l* therefor, adapted to adjustably support the said pole-piece, and the telephone-case *A*, having a shoulder cut in its flaring expansion,

on which shoulder the said yoke rests and to which it is rigidly affixed.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 31st day of March, 1887.

MORRIS MARTIN.

Witnesses:

JOS. P. LIVERMORE,
GEO. WILLIS PIERCE.