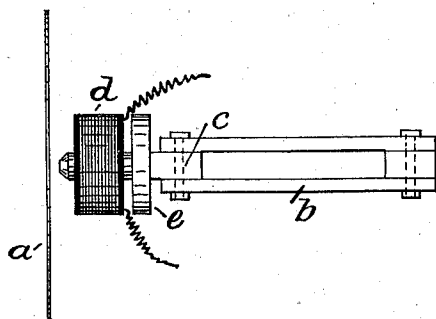


(No Model.)

S. D. FIELD.
TELEPHONE.

No. 558,584.

Patented Apr. 21, 1896.



Attest.

E. J. White
R. M. Young

Inventor,

Stephen D. Field
by Joseph Mauro
his attorney.

UNITED STATES PATENT OFFICE.

STEPHEN D. FIELD, OF STOCKBRIDGE, MASSACHUSETTS, ASSIGNOR TO THE
AMERICAN BELL TELEPHONE COMPANY, OF BOSTON, MASSACHUSETTS.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 558,584, dated April 21, 1896.

Application filed August 24, 1895. Serial No. 560,419. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN D. FIELD, residing at Stockbridge, in the county of Berkshire and State of Massachusetts, have invented certain Improvements in Telephones, of which the following is a specification.

My invention concerns the construction of magneto-telephones. It is a device for reducing or suppressing the loud and disagreeable "side tone" which attends the operation of powerful transmitting instruments.

The invention consists in encircling the core or pole-piece of the telephone-magnet by a closed conducting-circuit, preferably a cylinder or thick ring or disk of copper or other non-magnetic metal. When a receiving-telephone thus equipped is placed in a circuit near a powerful transmitting-telephone in the same circuit, the side tone in the receiving instrument is observed to be of much less volume or loudness than in a similar telephone devoid of the closed auxiliary circuit, while if it be placed at a distant station of the same telephone-circuit its efficiency in receiving transmitted speech is found to be practically as high as that of the ordinary telephone, and reproduced sounds are characterized by improved clearness of articulation. The employment of this invention in the receiving-telephone is thus advantageous in suppressing the obnoxious side tone and in improving the transmission, but is not detrimental in the use of the instrument for receiving voice-currents from a correspondent station. The reason of this action is not fully apparent. The following may, however, serve as a provisional explanation: As is well known, the current flowing in a telephone-circuit at any point is of less volume as the point is more distant in the circuit from the transmitting instrument. This is especially true of circuits of high capacity, such as are the usual long-line circuits. The phenomenon results from the "absorption" of the energy of the current in the insulating medium, so to speak. Hence the pulsations of current, particularly the slow pulsations corresponding to the fundamental tones of the voice in the circuit near the transmitter, are of much greater volume than the corresponding undulations at the receiving instrument of the distant station.

Now when such heavy current-pulsations traverse the magnet-coil of the telephone they tend to induce profound magnetic disturbances in the iron of the magnet-core; but such large changes are reduced in my invention by the "damping" or demagnetizing effect of currents induced thereby in the copper ring. On the other hand, suddenly and feebly undulating currents produce only slight and superficial disturbances in the pole-piece or core, which affect the diaphragm but do not affect the copper ring, and are not "damped" thereby.

On the assumption that slowly pulsatory currents, corresponding to fundamental tones, are damped to a greater extent than the more rapid harmonic vibrations, the superior clearness of articulation also observed in telephones provided with this invention may be explained.

In transmission through the line-circuit the rapid harmonic waves are more largely absorbed than the slower waves, whereby the consonance or correspondence between the original acoustic vibrations and the telephone-current is impaired, and the timbre is altered; but in the reconversion of the telephonic current into acoustic vibrations in the improved receiving-telephone the fundamental electric pulsations are reduced, leaving the harmonic vibrations accentuated in relation to them, and to some extent restoring the original timbre. In short, the reproduction of the transmitted sound in its original quality is attained by two complementary processes of degradation of the vibrations.

The accompanying figure illustrates the invention. The elements only of the telephone are shown, the details of construction of such instruments being well known.

The telephone has the usual diaphragm *a* of magnetic material, permanent magnet *b* terminating in a pole-piece *c* presented to the diaphragm, and magnet-coil *d* wound about the core *c*. On the core is placed a disk or ring *e*, of copper. The coil *d* and ring *e* should be placed in close proximity to each other upon pole-piece *c* and near the diaphragm, the ring being at the rear of the coil.

I have found that when the ring *e* is placed about one thirty-second of an inch from the

coil *d* the results with an ordinary hand-telephone are satisfactory.

Obviously any closed conducting-circuit would serve equally well in place of ring *e*, and the position of the ring or closed circuit may of course be varied to suit requirements of construction.

I claim as new—

1. In a telephone, the combination with the diaphragm, magnet-coil, and core thereof, of a closed conducting-circuit surrounding the core, as described.

2. In a telephone, the combination with the diaphragm, magnet-coil and core thereof, of a tube or ring surrounding the core near the coil, as described.

3. In an electric telephone, the combina-

tion of the magnet, coil and diaphragm with a non-magnetic conductive disk or ring constituting a low-resistance reaction-circuit, the said coil and ring being arranged to surround the magnet-pole in close proximity to each other, and to the diaphragm, whereby side-tone disturbance is suppressed or diminished, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 20th day of August, 1895.

STEPHEN D. FIELD.

Witnesses:

WILLIAM W. FRENCH,
JOHN CALLENDER.