

(No Model.)

2 Sheets—Sheet 1.

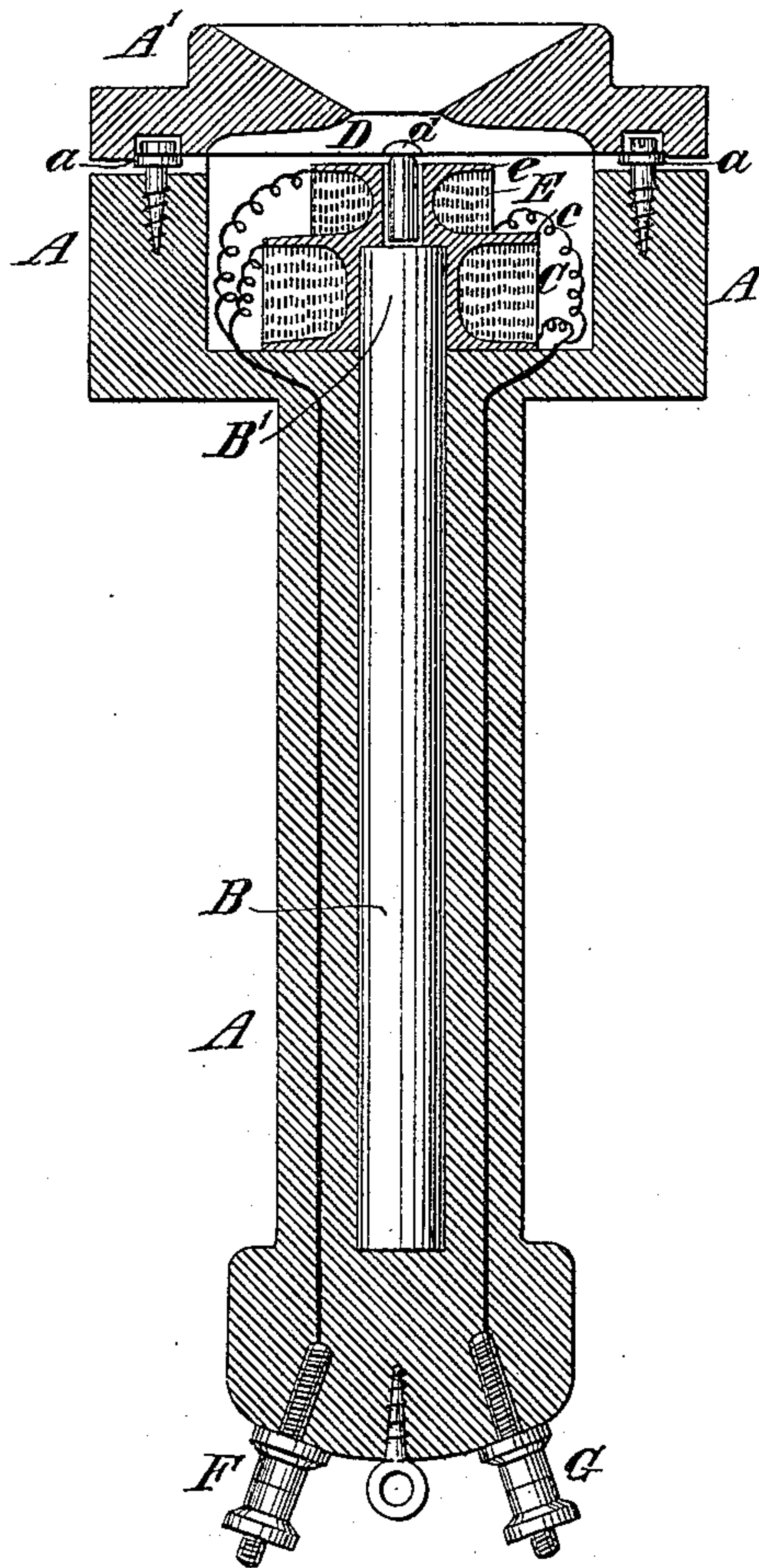
H. B. T. STRANGWAYS.

TELEPHONE.

No. 297,470.

Patented Apr. 22, 1884.

Fig. 1.



Witnesses:

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Matthew Pollock

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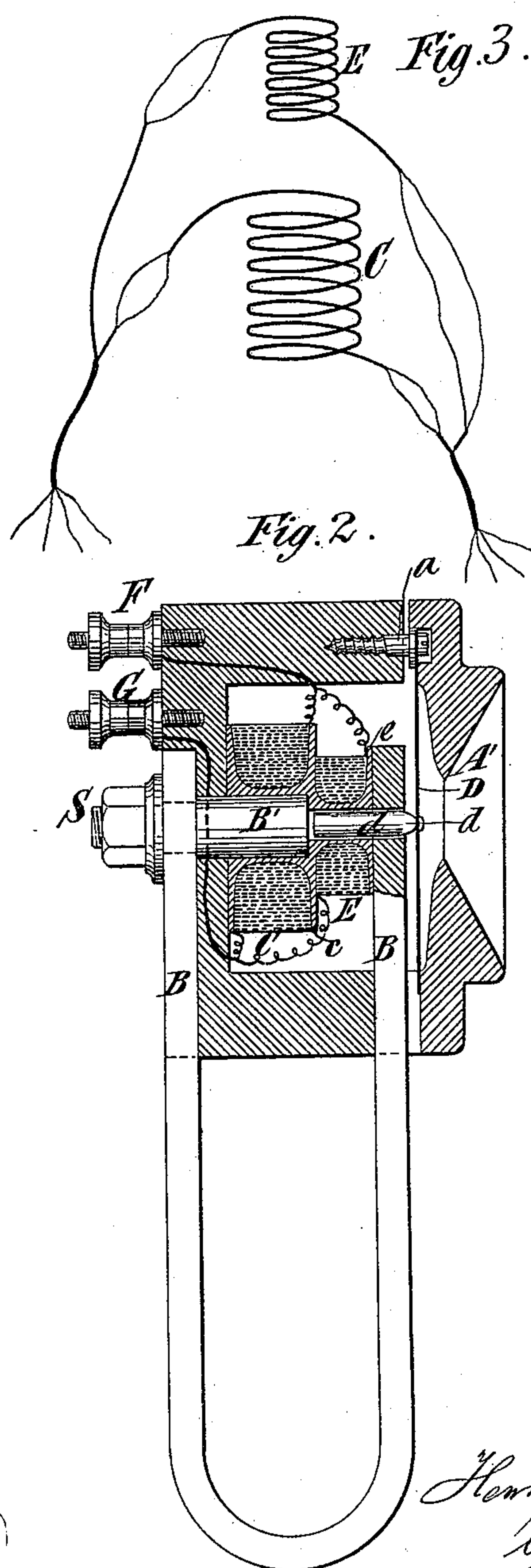
(No Model.)

2 Sheets—Sheet 2.

H. B. T. STRANGWAYS.
TELEPHONE.

No. 297,470.

Patented Apr. 22, 1884.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

HENRY B. T. STRANGWAYS, OF LONDON, ENGLAND.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 297,470, dated April 22, 1884.

Application filed November 22, 1882. (No model.)

To all whom it may concern:

Be it known that I, HENRY BULL TEMPLER STRANGWAYS, barrister at law, of Pump Court, Temple, in the city of London, England, have
5 invented a new and useful Improvement in Telephones, of which the following is a specification.

My invention is applicable to telephones, whether used as transmitters or receivers, and
10 relates to telephones in which a small magnet or short bar of metal capable of inductive action is attached to the center of the diaphragm or other vibrator in line with another magnet or piece of metal, both said magnets being surrounded by helices through which the current
15 is passed.

My invention consists in the combination, in an electric telephone, with the diaphragm or other vibrator fitted with a small magnet or
20 piece of metal capable of inductive action, and a main magnet opposed to said small magnet, of coils or helices arranged concentric with the two said magnets, and wound so that a divided current will flow through each of the coils or
25 helices in one and the same direction, and act simultaneously and in precisely the same manner upon the two magnets.

The result of the combination above described is to increase the electric effect of the
30 action of the diaphragm or vibrator, and consequently the strength of the current produced in and transmitted by the instrument, and to increase the electrical effect of the varying currents upon the receiver, and consequently the volume of sound produced.

In the accompanying drawings, Figure 1 is a longitudinal section of a telephone-receiver of the ordinary type arranged to suit the purposes of my invention. Fig. 2 is a similar section
40 of a telephone-receiver, in which is used a horseshoe or two-legged magnet instead of a straight bar-magnet, and which also embodies my invention; and Fig. 3 is a diagram illustrating one manner of winding the helices.

45 Similar letters of reference designate corresponding parts in all the figures.

Referring first to Fig. 1, A designates the telephone-case, within the handle of which is fixed a permanent bar-magnet, B, having, as
50 usual, a coil or helix, C, of insulated wire, wound around a bobbin, c, on its upper end, or that

end which is nearest the diaphragm D. To this diaphragm, which may be made of wood or metal or any other substance capable of rapid vibration, is attached, by riveting or
55 otherwise, the small magnet or short bar of metal d, capable of inductive action, and of such small size and weight as not to unduly check or impede the vibrations of the diaphragm or tympan.

Though the dimensions of the small magnet d may vary with the size of the other parts of the telephone, I have found that a piece of iron wire No. 9, B. W. G., from one-fourth to three-eighths of an inch long, answers admirably for the said magnet d. The piece d is preferably rounded off or reduced in diameter at the point where it touches the diaphragm D to the smallest size consistent with its secure attachment thereto. The diaphragm D does
60 not require to be attached to the case A all around its periphery, as usual, but may rest upon the heads of three or more screws, a, a, which may for convenience of adjustment have shoulders formed upon them to receive
65 the edge of the diaphragm and insure its exactly concentric position in the case A, and relatively to the magnet B and solenoids or helices.

Surrounding the small magnet d is a second helix, E, of insulated wire, which is wound
80 around the wooden bobbin c, formed in or so as to be one with the bobbin c, on which is the helix C. Wire No. 36, B. W. G., answers well for the helix E. The two helices C E are so
85 wound that the current will pass through them both in the same direction, and the line-wire leading from the terminal G is divided, so as to split the currents, sending one half through each helix, and after passing through the two
90 helices in one and the same direction the two portions of the split current enter the return-wire and pass to the terminal F. If it is desired to further reduce the resistance of the two helices, they or either of them may be
95 wound with two or more wires, as shown in Fig. 3, the current being sent through all in the same direction. The bobbin c of the helix E is accurately turned and drilled at the center to receive the small magnet d, being of
100 such size as will just allow the magnet to reciprocate freely without touching the bobbin.

The diaphragm D is adjusted at such a distance from the pole B' of the magnet B that the end of the small magnet *d*, when the diaphragm is vibrating, shall be as close as possible to, though without coming in contact with, the pole B'. The diaphragm D is held in place by the mouth or ear piece A' of the telephone-case, which may be screwed down upon it, so as to hold it all around, or so as to hold it in three or more places; and the concentric adjustment of the diaphragm may be effected by shifting it with the finger-nail or otherwise before finally screwing down the mouth-piece A'.

It will be understood that, on speaking into the mouth-piece A' the diaphragm D will be caused to vibrate, and the consequent endwise movement of the small magnet *d* within the coils of the helix E, and in close proximity to the pole B' of the main magnet, will have the effect of greatly increasing the electrical currents transmitted to the line-wires.

If the instrument be used as a receiver, the variations in the electrical current passing through the line-wire and around the helices C E will cause the piece *d* to receive a rapid reciprocation endwise corresponding to the variations in the current, and thereby set the diaphragm D in action.

Fig. 2 shows the invention embodied in a telephone having a permanent or horseshoe magnet, B, when it is desired to utilize the

inductive influence of both legs. B' is a pole-piece made fast to one of the legs by a nut, S, and surrounded by the larger helix, C.

The horseshoe-magnet is attached to the telephone-case A by one leg, and the other leg, which is situated in front of the small helix E, has a hole made in it of sufficient size to receive the small magnet *d*, which is attached to the diaphragm D, and allow it to work freely through the leg of the magnet.

The magnet B may be either a permanent or an electro magnet, and the piece *d* may be a permanent magnet.

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

In an electric telephone, the combination, with the diaphragm or vibrator D, fitted with a small magnet or piece of metal, *d*, capable of inductive action, and a main magnet, B', opposed to said small magnet, of the coils or helices C E, arranged concentric with such magnets, and wound, as described, so that a divided current will flow through each of the coils in one and the same direction, and act simultaneously and in precisely the same manner upon the two magnets, substantially as herein set forth.

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Witnesses:

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