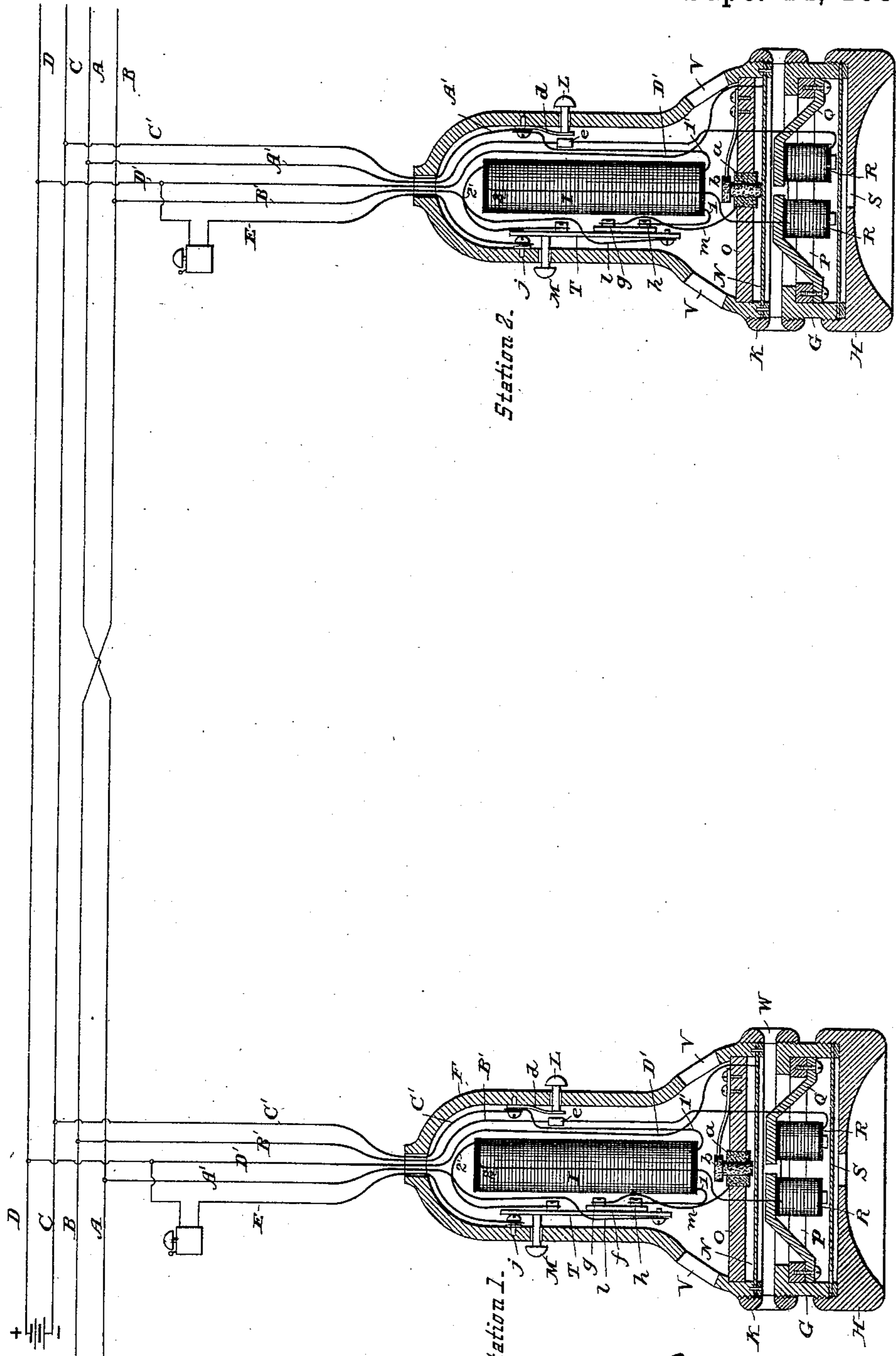


(No Model.)

C. HERZ.
TELEPHONE.

No. 349,043.

Patented Sept. 14, 1886.



Attest:

Count A. Cooper
Wm A. Harries

Station 1.

C. Herz
by
Foster & Freeman
attys

Inventor:

UNITED STATES PATENT OFFICE.

CORNELIUS HERZ, OF PARIS, FRANCE.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 349,043, dated September 14, 1886.

Application filed March 3, 1886. Serial No. 193,894. (No model.)

To all whom it may concern:

Be it known that I, CORNELIUS HERZ, a citizen of the United States, residing at Paris, in the Department of the Seine, France, have
5 invented certain new and useful Improvements in Telephones, of which the following is a specification.

The ordinary telephonic apparatus consists of a number of independent distinctive parts,
10 which are located near each other, but still at different points of the station. Each element of the apparatus preserves its independent individuality, and all are connected with each other by conductors and switches. These con-
15 nections are always more or less complex, and in the higher organized instruments they become quite confusing, to such an extent that very frequently the best electricians find it difficult to trace the circuits. Thus, when an
20 apparatus is being mounted at a station, those having charge of the work are continually seen in search of the proper connections. Much time is thereby lost and the cost of the installation is proportionally increased. An-
25 other source of inconvenience in the ordinary telephonic apparatus is found in the considerable size of the transmitter and in the fact that the operator is compelled to assume a certain definitive position in relation to the
30 same. Holding the receiver to his ear, he must turn his head toward and approach closely to the transmitter. The attention of the operator, which should be confined to the conversation, is, in a great measure, diverted to-
35 ward the proper management of the instruments, as is well known by everybody, and whenever the operator fails to properly divide his attention the conversation becomes a source of annoyance. By the person with
40 whom he is in communication he is constantly requested to speak louder or lower, to retreat from or to approach the transmitter more or less, and he is obliged to make the same re-
quests.

45 It is the object of my present invention to overcome in a great measure all these difficulties; and to this end I have constructed an apparatus which comprises in one individual structure a transmitter, a receiver, and a push-
50 button, and I have succeeded in embodying all

these parts in a form similar to the ordinary magneto-receiver, all of which will more fully appear from the following description, in which reference is made to the accompanying drawing, which forms a part thereof, and which
55 represents two station apparatus showing my combined transmitter, receiver, and push-button in section and the bells and line-circuits in diagram.

The instruments are the same at both sta-
60 tions, and I shall therefore confine myself to the description of the instrument at station 1. The exterior of the apparatus is very similar to the ordinary magneto-telephone. It consists, essentially, of an elongated shell, F,
65 which is contracted at one end and flaring at the other end, a cylinder, G, which is connected to the flaring end of the shell by a screw-ring, K, and a mouth-piece, H. The shell F contains the inductorium I, the push-button
70 L, the switch-button M, switch-arm T, and the microphone. The diaphragm N of the microphone is applied to the open flaring end of the shell by screws or otherwise. Behind
75 the diaphragm, which is made of conducting material, and parallel thereto is a bar, O, of insulating material, fixed to the walls of the shell, and in the center of said bar is located a small tube, a, of carbon or other microphonic
80 substance. A carbon pin passes loosely through tube a, and is at one end in contact with the diaphragm. This contact is maintained and regulated by a spring, c, having a button, b, at one end, which presses upon the pin within
85 tube a, as shown. The spring c is secured to the rear of bar O by means of two screws, and by tightening or loosening one of these screws the contact is adjusted. Other suitable means of adjustment may, however, be employed.

To a flange on the cylinder G there is se-
90 cured a magnet, P, having the form of a flat rectangular frame, which is axially polarized, and to which the polar extensions Q are secured, to the ends of which the cores and mag-
95 net-coils R R are applied. The diaphragm S of the receiver is held in place by the mouth-piece H. The shell F has a series of perforations, V, immediately behind the bar O, and the ring K has similar perforations, W, which
100 communicate with the space between the dia-

phragm N and the re-entering flange of cylinder G. These perforations are the sound-openings for the microphone, and through them the sounds emitted by the operator are conducted to the diaphragm O while the instrument is held to the ear, as will be more fully explained further on. A push-button, L, when depressed, establishes contact between spring *d* and fixed contact-piece *c*. An elastic switch-arm, T, is fixed at one end and is operated by a button, M, projecting through the side of the shell F, like push-button L. Said switch-arm has secured upon one side, but insulated therefrom, a metal plate, *f*, which is adapted to make contact with fixed contact-pieces *g* and *h*. On the same side of the switch-arm there is also a contact-piece, *i*, while on the other side there is a contact-piece, *j*, in the path of the end of the switch-arm. The tendency of the elastic switch-arm is to make contact with *j*; but when button M is depressed said contact is broken, while contact of the arm with *i* is established, and at the same time plate *f* makes contact with *g* and *h*.

The circuit-connections within the instrument are very clearly illustrated, and need not be specifically described; but they will be referred to in the description of the operation.

When there are only two stations connected, as shown in the drawing, there are four line-wires, A B C D. Between C and D the battery is placed, and branches A' B' C' D' run from the line-wires to the telephone. These wires are in practice bunched together, and are distinguished from each other by different colors. A signaling-bell connects on one side with wire D', and on the other side by a wire, E, with contact-piece *j* of the telephone. The line-wires A and B are crossed in the drawing, for convenience of illustration.

The operation of this apparatus is as follows: If station I desires to establish communication, the operator grasps the instrument so as to press upon button L without touching the switch-button M. Contact between *d* and *c* is thereby established, which closes the bell-circuit for station 2—viz., from the positive pole of the battery over line D, to and through wire D' of station 2, through the bell of that station, wire E, contact *j*, switch-arm T, wires *l* and B', to line B, back to station 1. At this station the circuit proceeds over wire B' to contact *c*, spring *d*, wire C', and line-wire C to the negative pole of the battery. The operator at station 2 being thus notified that station 1 desires to speak, will grasp the instrument, so as to depress button L, without, however, touching the switch-button M. This closes the bell-circuit for station 1, which circuit need not be here described, since it is in all respects like that of the bell-circuit of station 2. Both operators now relieve the pressure upon buttons L, and each of them depresses the switch-button M, whereby the

microphone-circuits for both stations and also the common receiver-circuits are closed.

For station 1 the microphone-circuit is from the positive pole of the battery over line-wire D, conductor D', to the diaphragm N of the microphone, through the microphone, and from tube *a* of the same by a wire, *m*, to contact *g*, over insulated plate *f* to contact *h*, and by wire *l* to and through the primary of the inductorium, from where it issues at 1', and runs to the fixed end of spring *d*, then over wire C' and line-wire C back to the negative pole of the battery. The microphone-circuit for station 2 is quite similar, and need not be described.

The common receiver-circuit is from the secondary of the inductorium of station I, by wire 2, to and through magnet-coils R R, to the fixed contact *e*, over conductor B' and line-wire B, to station 2, where it enters at B', which at that station connects by a wire, *l*, with the switch-arm T. From T the circuit is over contact *i*, and by wire 2' to and through the secondary of the inductorium, and by wire 2 to and through the magnet to contact *e*. From *e* the circuit continues over conductor A' and line-wire A, back to station 1, where it enters by conductor A', running by wire *l* to switch-arm T, and by contact *i* and wire 2' back to the secondary of the inductorium. During conversation the instrument is constantly held against the ear, and the words are uttered in the ordinary tone of conversation without directing them to any particular point. The sound-waves emanating from the mouth of the speaker expand in concentric spheres in all directions, and entering through the holes V and W, the microphone is operated in the ordinary manner.

In instruments which I have constructed, and of which the drawing here described is a slightly exaggerated illustration, I have found that conversation can be carried on with great comfort without at any time removing the same from the ear.

It will be observed that the bells and microphones are in multiple-arc branches from the battery-line conductors, and this arrangement enables me to arrange any desired number of stations all in condition to call and converse with every other station without disturbing the other stations. This I have shown, described, and claimed in another application filed by me, and I make no claim to such matter in this application.

What I do claim, and desire to secure by Letters Patent, is—

1. A portable telephonic apparatus consisting of a magneto-receiver, a microphonic transmitter arranged behind and supported independently of the same, a signaling push-button, and suitable circuit-connections, substantially as described.

2. In a portable telephonic station apparatus, the combination of a microphone with a magneto-receiver covering the same and sound-

openings between the receiver and microphone communicating with the latter.

3. A hand-telephone consisting of a sectional case containing a microphone, a receiver in front of and covering the same, a push-button, and switch, in combination with an induction-coil, also located within the case, substantially as described.

4. In a hand-telephone, the combination of a microphone and magneto-receiver with a push-button for signaling projecting through the side of the handle of the instrument, and

another push-button, similarly located, operating a switch within the case for closing and opening the microphone and line-circuit, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CORNELIUS HERZ.

Witnesses:

GEORGE WALKER,
JOSEPH LYONS.