No. 737,345. PATENTED AUG. 25, 1903.

H. G. CHALKLEY.

TELEPHONE TEST INSTRUMENT.

APPLICATION FILED JUNE 19, 1902.

NO MODEL.

Fig. 1.

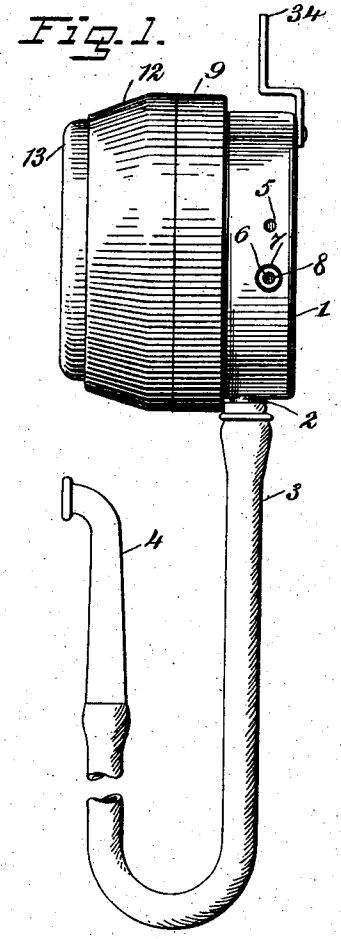


Fig. 2.

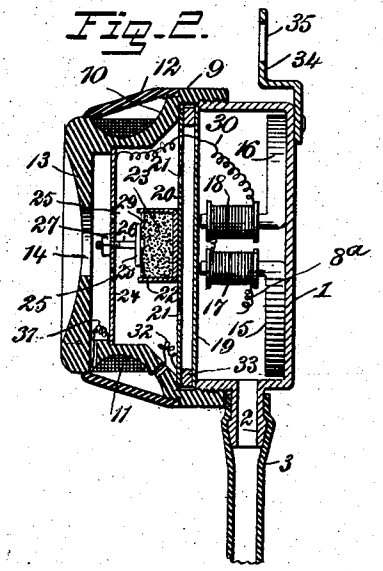


Fig. 3.

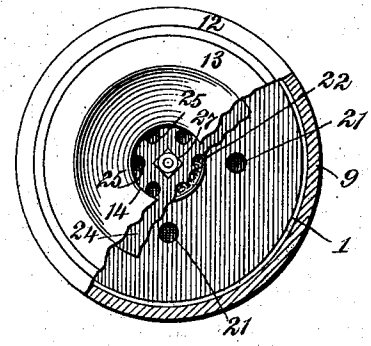
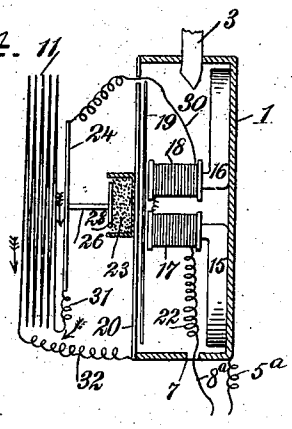


Fig. 4.



WITNESSES:

James F. Duhamel

Walton Harrison

INVENTOR

Henry G. Chalkley

BY Munn & Co.

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 737,345. Patented August 25, 1903.

UNITED STATES PATENT OFFICE.

HENRY GEORGE CHALKLEY, OF NEW YORK, N. Y.

TELEPHONE TEST INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 737,345, dated August 25, 1903.

Application filed June 19, 1902. Serial No. 112,304. (No model.)

To all whom it may concern:

Be it known that I, HENRY GEORGE CHALKLEY, a citizen of the United States, and a resident of the city of New York, (borough of Manhattan,) in the county and State of New York, have invented new and useful Improvements in Telephone Test Instruments, of which the following is a full, clear, and exact description.

My invention relates to test instruments of the kind more particularly used in detecting trouble upon telephone-lines.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of my device. Fig. 2 is a central section through the same. Fig. 3 is a front elevation of the same, partly broken away; and Fig. 4 is a diagram showing the electrical connections.

A hollow casing 1, preferably of metal, is provided with a nipple 2, upon which is secured a sound-tube 3, provided with an ear-piece 4. The casing 1 is provided with a plug-hole 5, whereby the line may be secured directly to the metal substance of the casing. Within a larger hole 7 is mounted a metallic sleeve 8, provided with a plug-hole 6 and insulated from the casing, as indicated in Fig. 1. These two plug-holes 6 7 constitute the terminals of the instrument.

A cap 9, preferably of insulating material, is provided with an annular channel 10, in which is wound a coil 11 of insulated resistance-wire, and an annular band 12 is mounted upon the cap 9 for the purpose of protecting the coil of resistance-wire. The cap 9 is provided with a concave facing 13, which has an aperture 14. A pair of permanent magnets 15 16 are provided will coils 17 18, thereby constituting a magnet of the type used in magneto transmitters and receivers. An iron diaphragm 19 is mounted immediately adjacent to this magnet and is free to move when actuated either by the magnet or by the voice of a person talking into the aperture 14. Immediately adjacent to the iron diaphragm 19 is a diaphragm 20, of any preferred metal, provided with apertures 21 and free to vibrate. Mounted upon this diaphragm 20 is a cup 22, filled with comminuted carbon 23. A stiff diaphragm 24 is mounted within the cap 9 and is provided with apertures 25. A threaded rod 26 engages this diaphragm, and upon the threaded rod is screwed a nut 27 for the purpose of adjusting the same. A disk 28 upon the rod 26 is in contact with the comminuted carbon 23. As the diaphragm 20 is free to vibrate and the diaphragm 24 is comparatively rigid, the resistance of the comminuted carbon 23 is varied by the sound-waves of the voice. These sound-waves passing through the aperture 14 of the facing 13 and through the apertures 25 of the diaphragm 24 cause the diaphragm 20 to vibrate. A portion of the sound-waves passes also through the apertures 21, causing the diaphragm 19 to vibrate. It follows, therefore, that the diaphragms 19 and 21, which are quite close together, are simultaneously caused to vibrate by the voice. An annular washer 29, of flexible material, engages both the cup 22 and the disk 28, thereby preventing the escape of the comminuted carbon around the edges of the disk 28. A wire 8^a connects the sleeve 8 with the magnet-coil 17, and a wire 30 connects the magnet-coil 18 with the diaphragm 24. A wire 31 connects the diaphragm 24 with the resistance-coil 11, and a wire 32 connects the resistance-coil with a metallic ring 33, which is in electrical communication with the casing 1. A bracket 34 is mounted upon the casing and is provided with a slot 35, whereby the instrument may be suspended.

The operation of my device is as follows: When trouble upon a line is suspected, the terminals of the line are connected by means of the plugs with the plug-holes 5 and 6, whereby the test instrument is placed in circuit with the line. If the line is alive—that is to say, if a battery current is flowing through the same—the current flows from the casing 1 through the sleeve 8 and wire 8^a to the magnet-coils 17 18, thence through wire 30 to diaphragm 24, where it divides, a part passing through the rod 26, disk 28, carbon 23, diaphragm 20, and metal ring 33 to plug-hole 5 in the casing 1, the other part of the circuit flowing from diaphragm 24 through wire 31, resistance-coil 11, and wire 32 to plug-hole 5 of casing 1. The purpose of thus dividing the current is to enable the instrument to work with either a live wire or a dead wire. In

other words, the object is to send the current through the magnet for the purpose of actuating the diaphragm 19 and through the comminuted carbon for the purpose of enabling the voice to effect it by means of the carbon.

When the device is used as a transmitter, the voice in causing vibrations of the diaphragm 20 causes variations also in the resistance of the carbon 23, the action being the same as an ordinary carbon transmitter. The vibrations of the voice passing through the apertures 21 and causing the diaphragm 19 to vibrate set up electric impulses in the magnet-coils 17 18, causing this part of the device to act as an old-style magnet-transmitter. If the instrument is properly proportioned, the two sets of electric impulses thus controlled by the voice are rendered cumulative, so that a maximum effect is produced and there is comparatively little interference, if any. If, however, the line-wire is dead, the only electric impulses sent into the line are those made by the vibrations of the diaphragm 19, adjacent to the magnet. In other words, the instrument acts a magneto-transmitter only. In all cases the instrument acts as a receiver. The sounds reproduced by it may be heard either through the tube 3 or through the aperture 14. It will be seen, therefore, that while with a dead wire the effect produced by the voice in talking through the aperture 14 is merely that of an old-style magneto-transmitter, yet if the wire is energized by a battery-current the instrument serves as a carbon transmitter and a magneto-transmitter combined together, so as to obtain a maximum effect. The resistance-coil 11 serves to balance the resistance of the comminuted carbon 23, so that a proper proportion of current will pass through the carbon and through the magnet.

When the instrument is used as a receiver, of course the magnet-coils 17 18 are energized from a distance, either by a battery-current or by a current generated by means of a magneto-transmitter.

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

1. A telephone test instrument, comprising a casing, a magneto device capable of use either as a transmitter or a receiver, and a carbon transmitter and a resistance-coil connected to said magneto device and with each other, said carbon transmitter having a plurality of vibratory diaphragms provided with apertures, and said magneto device being provided with a diaphragm parallel with said first-mentioned diaphragms, the arrangement being such that talking-currents may pass through said magneto device and then divide and pass in parallel through said carbon transmitter and said resistance-coil, respectively.

2. A telephone test instrument, comprising a casing, a magneto device capable of use either as a transmitter or as a receiver, and a carbon transmitter and a resistance-coil connected in series with said magneto device and in parallel with each other, the parts being so arranged that talking-currents are free to pass through said magneto device and then divide and pass in parallel through said carbon transmitter and said resistance-coil, respectively.

3. In a telephone test instrument, the combination of a magneto device provided with a vibratory armature and with a winding, and a resistance-coil and a carbon-contact connected in series with said winding and parallel with each other.

4. In a telephone test instrument, the combination of a magneto device provided with a vibratory armature and with a winding, a carbon transmitter provided with a vibratory diaphragm free to move in unison with said armature, said carbon transmitter being connected serially with said winding, and a metallic member connected with said winding and free to complete a circuit independently of the connection through said carbon transmitter.

5. In a telephone test instrument, the combination of a magneto device provided with a winding and with a diaphragm of magnetic material, a carbon transmitter provided with a movable diaphragm disposed adjacent to said diaphragm of said magneto device and free to vibrate simultaneously therewith, and a metallic connection between said winding and said carbon transmitter.

6. In a telephone test instrument, the combination of a magneto device provided with a winding and with a diaphragm of magnetic material, a carbon transmitter provided with a movable diaphragm disposed adjacent to said diaphragm of said magneto device, and free to vibrate simultaneously therewith, a low-resistance connection between said winding and said carbon transmitter, and a high-resistance member connected with said winding and joined in parallel with said carbon transmitter.

7. In a telephone test instrument, the combination of a plurality of transmitters connected serially together, and each provided with a vibratory diaphragm, said diaphragms being disposed face to face and free to move in unison, and a high-resistance member connected in series with one of said transmitters and in parallel with the other.

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

HENRY GEORGE CHALKLEY.

Witnesses:

WALTON HARRISON,

EVERARD BOLTON MARSHALL.