

P. C. HEWITT.
VACUUM ELECTRIC APPARATUS.
APPLICATION FILED JUNE 27, 1916.

1,384,953.

Patented July 19, 1921.

Fig. 1

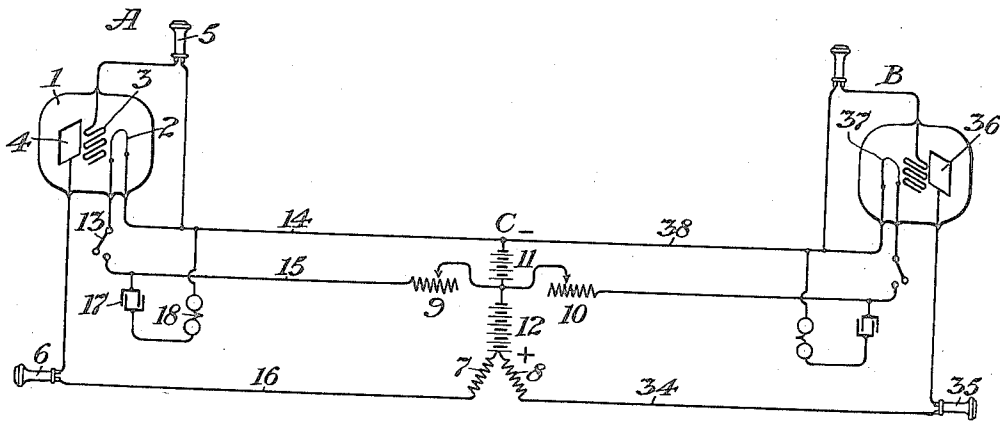
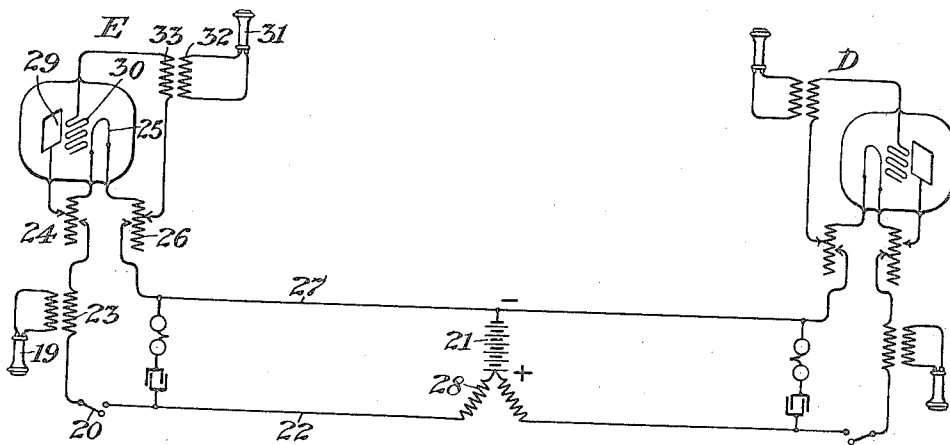


Fig. 2



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Application filed June 27, 1916. Serial No. 106,122.

To all whom it may concern:

Be it known that I, PETER COOPER HEWITT, a citizen of the United States, and resident of Ringwood Manor, county of Passaic, State of New Jersey, have invented certain new and useful Improvements in Vacuum Electric Apparatus, of which the following is a specification.

My invention relates to the creation and transmission of electric variations of all kinds and particularly of the periodicity of sound waves.

One of its objects is to produce in a circuit electric variations including variations of such delicate nature as those corresponding to the variations in articulate speech.

Another object of my invention is to electrically connect the device in such a manner, that it is operated by currents from a central station, and that every subscriber of a telephone system equipped as described hereafter can be connected with any other subscriber, without the use of batteries other than those at the central station. It will be understood that this latter feature is applicable to any system wherein vacuum, gas, or vapor devices are used at a subscriber's station, for any purpose.

In the practice of my invention, I contemplate the use of a so-called vacuum, gas, or vapor device as a means of impressing variations on a receiving apparatus, and also for their amplification; and my invention may be said to consist, first, in producing electric variations by means of variations of a magnetic field generating electric variations and causing them to act on the device; second, in utilizing the conductors of the circuit used for carrying current for modifying or annulling the negative electrode reluctance or resistance at an electrode in the device; third, thereby facilitating the passage of current from another electrode in the device; fourth, in suitably sub-dividing the current in the circuit; fifth, in affecting the device by electric variations generated by sound waves, so as to cause current variations in the circuit; and, sixth, utilizing the conductors of this circuit to transmit the variations; and, seventh, operating a transformer by means of the current variations produced by the device.

I have in this manner secured very perfect articulation.

My invention will be understood from

the following description and is illustrated in the accompanying drawings, in which Figure 1 shows two subscribers' stations of a telephone system, the apparatus of each being energized by a common battery; and three wires from the central station to each subscriber station; two of said wires act to place the vacuum, gas, or vapor device in action; while the third wire transmits the desired variations.

Fig. 2 illustrates a modification by which similar results are attained by the use of but two wires.

Referring more particularly to Fig. 1 of the drawings: 1 is a vacuum, gas, or vapor amplifier, in which is a filamentary conductor, 2; a grid or shield, 3, and a plate electrode, 4. An electro-magnetic telephone, 5, is used as a transmitter and a similar telephone, 6, is used as a receiver. At the central station, designated as C, there are shown batteries, 11 and 12, which are common to all subscribers, repeating coils, 7 and 8, and variable resistances, 9 and 10; but it will be understood that the operators' listening-in devices, the signaling and the ringing apparatus may be of any desired type. This system operates as follows: A subscriber at A for example, wishing to talk with a subscriber at B, lifts his receiver 6 from the hook (not shown) which closes a switch, 13, thus allowing current to flow from the battery 11, through line wire 14, filament 2, line wire 15, and resistance 9, thus completing the circuit. On closing switch 13, A signals the operator at C who connects station A with station B, and then clears himself from the line. After switch 13 has been closed the circuit is ready for use and when the subscriber at A talks into the electro-magnetic transmitter 5 corresponding electrical variations are set up between grid 3 and filament 2. The instrument 5 should be constructed in such a manner as to cause the greatest possible variation in potential between grid 3 and filament 2. These variations affect the current flowing from the electrode 4 to electrode 2 and consequently cause variations in the current flowing through the remainder of the circuit 14, 11, 12, 7, 16, and 6. These latter variations are reproduced in circuit 34, 35, 36, 37, 38, 11, 12, and 8, by means of the repeating coils 7 and 8, and the subscriber at B hears the signals from station A in the telephone 35.

Due to the amplifying action of the device this resulting current is of much greater magnitude than the original variations. The function of battery 12 is to impress the proper voltage on electrode 4, and it need have very little current capacity. The apparatus at B operates in an entirely similar manner, the arrangements being symmetrical. 17 is a condenser and 18 is a bell connected as is customary for calling at a subscriber's station.

In Fig. 2, a subscriber at E desiring to converse with a subscriber at D, removes his receiver 19 from the hook (not shown) which closes switch 20; current then flows from battery 21, through repeating coil 28, transformer primary 23, variable resistance 24, filament 25, variable resistance 26, and line wire 27, at the same time actuating a signal for the operator, who makes the proper connection to the subscriber at D. Battery 21 is of sufficient voltage to impress on the plate electrode 29 the required potential to cause it to pass current when variable resistance 24 is adjusted so that the potential across it is of proper magnitude. Variable resistance 26 may be likewise adjusted to give the required potential between grid 30 and filament 25 that will insure the best action of the transmitter 31, through the transformer primary 32 and the secondary 33. It is clear from the drawings that the difference of potential between any of the elements 25, 29, and 30, may be adjusted by varying one or more of the sliding contacts of variable resistances 24 and 26.

I claim as my invention:

1. In a telephone system, the combination with an electric device having main electrodes, and an electrified conductor, of an electro-magnetic transmitter, and line conductors, one at least of which conductors is common to two electrodes of said device, said transmitter being connected to said electrified conductor and to one of the line conductors.

2. In a telephone system, the combination with an electric device having a cathode, an anode and an electrified conductor in operative relation thereto, of an electro-magnetic telephone for impressing variations on the electrified conductor, an inductance, and two line conductors leading to the cathode, one at least of which is connected through said inductance to the anode.

3. In a telephone system, the combination with an electric device having a cathode, an anode and an electrified conductor in operative relation thereto, of an electro-magnetic telephone for impressing variations on the electrified conductor, line wires leading to a central station, a source of electrical energy at the central station, and means at the device for connecting the device with the said source at the central station,

4. A telephone system comprising a central exchange station, a plurality of sub-stations, each sub-station comprising an electric device, electrodes therein, means located at the central station for rendering one of the electrodes active, local means at the sub-station for bringing the latter means into operation, and means at the sub-station for impressing upon the said device electrical variations whereby amplified variations are impressed upon the main circuits.

5. In a telephone system, the combination of a battery located at the central station, an amplifying device comprising a sealed container having main electrodes and an electrified conductor located at each sub-station, means at the central station for supplying the energy to render active the said device, and local means at each sub-station for bringing such central-station means into operation.

6. The combination with a central station and a plurality of sub-stations, of an amplifying or current varying device comprising three electrodes, an inclosing chamber, one electrode being adapted to be rendered active by heat and the other two serving to cause amplified variations in the current flow, electro-magnetic means at each sub-station for initiating variations of current flow through said device, means at the central station for supplying the energy for rendering the said device active, and means at the device for bringing said means at the central station into operation.

7. In a telephone system, a sub-station comprising an electric device having a plurality of electrodes, one of which is constantly active, a telephonic transmitter connected between one electrode and the active electrode of said device, a telephonic receiver connected to another electrode and through the central station with the active electrode and the first-named electrode of said device, substantially as described.

8. Vacuum devices located at two or more sub-stations, each being connected with a central station, each vacuum device being included in a circuit leading to the central station, by means of two terminals within the device, in combination with electro-magnetic means for affecting the device so as to cause electrical variations in a separate circuit at the central station associated with its circuit.

9. In a system of distribution, the combination with a plurality of electric devices, each device having a plurality of terminals, of a common source of current connected to like terminals in each of said devices, a transformer in the current path of said devices, and an electric wave generator connected to a terminal in one of said devices and affecting the path between the terminals connected to the common source of current,

10. In a telephone system, the combination of a battery located at the central station, an electric device comprising a sealed container having main electrodes and an electrified conductor located at each substation, means at the central station for supplying the energy to render active the said

device, and local means at each substation for bringing said central station means into operation.

Signed at New York, in the county of New York, and State of New York, this 26th day of June, A. D. 1916.

PETER COOPER HEWITT.