

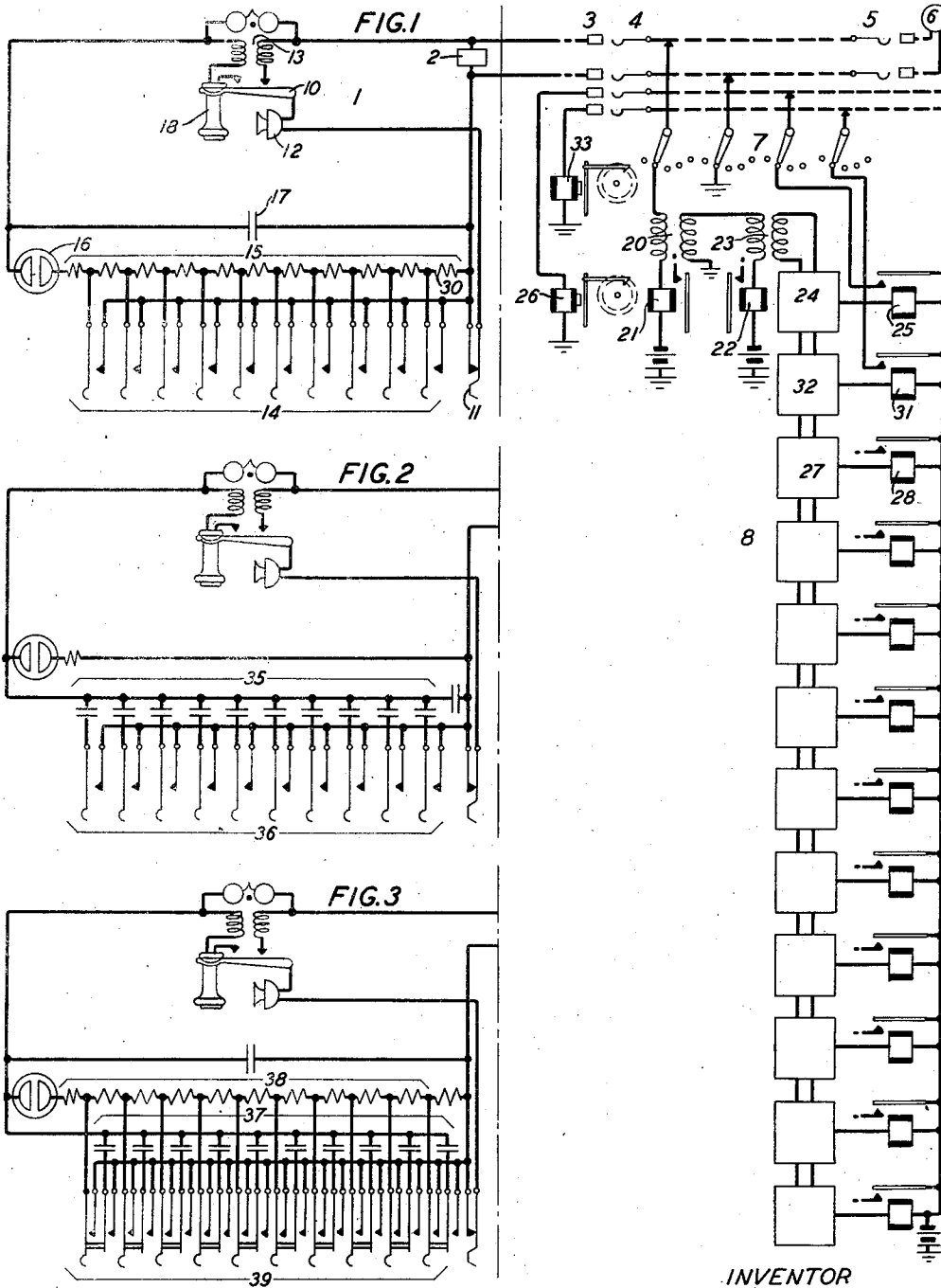
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R. E. HERSEY

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SELECTIVE SYSTEM

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INVENTOR
R. E. HERSEY

BY
M. M. Hersey
ATTORNEY

UNITED STATES PATENT OFFICE

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SELECTIVE SYSTEM

Ralph E. Hersey, Madison, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

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This invention relates to telephone systems and particularly to automatic telephone systems.

An object of the invention is the provision of a simplified arrangement for producing and transmitting digits and other symbols at a subscriber's station and for recording such symbols at a central office for controlling the establishing of automatic telephone connections.

Another object is to provide such symbols without the aid of the usual rotating dial.

Heretofore digit symbols have been produced by rotating dials or other moving elements in the form of different series of interruptions of the current in the telephone line representing different digits. Systems have also been provided in which such symbols have been produced by a reed or a reed vibrating in the field of a magnetic coil to produce beat frequency currents characterized by the presence of corresponding fields.

It is a feature of the present invention to produce digit symbols by a different frequency of the current in the line for each digit by the aid of a cold cathode gas-filled tube and a network of oscillatory circuit arrangements with keys for adjusting the network to produce the different frequencies. Preferred arrangements may comprise a tube in parallel with a capacity and a resistance in series in the line and keys for adjusting the capacity, or the resistance or both to cause changes in the frequency of the oscillations.

It is another feature of the invention to produce, in the case of party lines, partly line identifying symbols of a different frequency of the current on the line for each party. The arrangement may be such that when a party line subscriber removes his receiver from the switch-hook a fundamental frequency identifying this subscriber is transmitted over the line by the oscillation circuit arrangement individual to his station.

This invention has been illustrated in the accompanying drawing in which Fig. 1 shows the invention applied to an automatic telephone system and a party line;

Fig. 2 shows a modified subscriber's telephone circuit embodying the applicant's invention, and

Fig. 3 shows another modified subscriber's telephone circuit.

Referring now to Fig. 1 one subscriber's telephone circuit in the party line is shown in detail at 1 and the other subscriber's telephone equipment is shown merely as a box at 2. At 3 the line incoming from these party line subscribers'

equipments terminates in the line finder 4, through which connections may be made through intermediate switches to a connector 5 and from there to a called subscriber at 6. The connection from the party line may first be extended through connecting switch 7 to the register-controller equipment 8 which shows how a call from either one of subscribers is identified and the number dialed registered for use in establishing a connection through to a called subscriber such as 6.

The operation of this system is as follows: If the subscriber at station 1 desires to establish a connection to the called subscriber at 6, he will first remove his receiver from the switch-hook 10. It is evident that this closes a circuit through the key 11, transmitter 12, switchhook contacts and the right-hand winding of the induction coil 13 over the tip and ring conductors of the line to the terminals of the line finder 4. When the finder 4 finds the terminals 3, the line is extended through the register selector switch 7 to the register equipment 8. The details for establishing this connection through the line finder 4 and the connecting switch 7 have merely been illustrated in diagrammatic form as systems of this type are well known in the art and any such system may be employed. As is usual in such systems a dial tone is transmitted over the party line and when this tone is heard the subscriber will operate the desired key of the group marked 14 to send the first digit.

The operation of any one of the keys 14 will also cause the operation of key 11, and the sequence of operation of these keys is such that key 11 operates before any one of the keys in the group 14 is operated. It is therefore evident that for a short interval between the operations of these keys the oscillatory network comprising resistances 15, the discharge tube 16 and the condenser 17 will produce a fundamental identifying frequency that is individual to the calling subscriber on this party line. The oscillations in this case are produced through the network including all of the resistances in the group 15 and are transmitted over the tip and ring conductors through the induction coil 13 and the receiver 18, line finder 4, switch 7 to the left-hand winding of repeating coil 20, winding of relay 21 to battery and to ground over the two conductors as shown. This fundamental frequency is repeated through the right-hand winding of the repeating coil 20 over a circuit from battery winding of relay 22, the left-hand winding of the repeating coil 23, the right-hand

winding of repeating coil 20 to ground. This frequency is then again repeated through the right-hand winding of the repeating coil 23 and for example the frequency selecting network 24 for establishing a circuit for the operation of the relay 25. Relay 25 in operating closes a circuit from battery through its contacts over the switches 7 and 4 to the meter 26 which identifies and records in any suitable manner the fact that this particular party at 1 is the one calling. The network 24 and the others in the same circuit shown merely as boxes may be of any well-known type that respond each to a different frequency.

Then when one of the keys of the group 14 operates the fundamental frequency will change to a particular frequency depending on the key operated. For example, if the key at the extreme left is operated, the resistance elements 15 are changed to include only the resistance unit at the left of the oscillator circuit. This frequency is transmitted in the same manner over the line and repeated through the repeating coils 20 and 23 and received by the networks at 8 and cause the operation of a relay corresponding to the digit dialed. For example, the network 27 may respond and cause the relay 28 to operate. A circuit is closed from battery through the winding of this relay to identify or mark in register circuit equipments of any suitable type, well known in the art, the digit dialed for the control of switches in the automatic system to establish a connection.

Succeeding digits are transmitted in the same manner by operating the desired key in the group 14 and that while key 11 also operates relay 25 may be provided with the locking means in any other suitable manner to prevent further operations of the meter 26 when the fundamental frequency is transmitted. After all the digits have been transmitted over the line, the automatic system may operate in any suitable manner to cause the establishing of the desired connection through succeeding switches to the called subscriber at 6 and then cause the register equipment at 8 to be disconnected for use by other calling lines, as is well known in the art. While this invention may be applied to any well-known automatic telephone system having digit registering devices, it may readily be incorporated in systems of the type disclosed in the Patent No. 1,395,977 to F. A. Stearns et al. of November 1, 1921.

If the party at station 2 had called, the fundamental frequency would have been different. For example, the resistance element corresponding to the resistance element 30 in the oscillatory circuit of the subscriber at 2 would be of a different value. In this case the fundamental frequency will operate, for example, relay 31 through network 32 and close a circuit for the meter 33 to register or record that the subscriber at 2 has made the call; otherwise the operations to register the call are the same.

In Fig. 2 a subscriber's equipment has been shown identical with that in Fig. 1 at 1 except that instead of changing the values of the resistance elements in the oscillatory circuit, the capacity elements 35 are changed by the operation of the digit keys 36 to produce the different frequencies.

Fig. 3 shows an arrangement similar to that shown for subscriber 1 in Fig. 1 except that in this case both the capacity element 37 and the resistance elements 38 are changed in the oscil-

latory circuit by the operation of the digit keys 39 to produce different frequencies for the different digits.

It is evident that other specific forms of these oscillator circuit arrangements may be used for providing the various frequencies without departing from the spirit of the invention.

What is claimed is:

1. In a telephone system, a telephone line, a source of current on said line, a plurality of subscribers' stations on said line, an oscillatory device including a discharge tube at each subscriber's station, each device having a different fundamental frequency, means at each subscriber's station for adjusting the associated device to produce different frequencies representing digits, means associated with said line selectively operative in response to the different fundamental frequencies produced by said devices to identify a subscriber's station and selectively operative in response to the different frequencies produced by said devices when adjusted for recording the digits represented by said different frequencies.

2. In a telephone system, a telephone line, a source of current on said line, an oscillatory device at the subscriber station of said line and including a discharge tube, means for connecting said device in said line to cause it to oscillate, means for adjusting said device to produce different frequencies of current from said source to represent different digits and for transmitting said digits over said line, switching devices for extending a connection from said telephone line, means for recording said digits and means for operating said switching devices to establish a connection from said line in accordance with said recorded digits.

3. In a telephone system, a telephone line, a source of current on said line, an oscillatory device at the subscriber station of said line and including a discharge tube and a network, means for connecting said device in said line to cause it to oscillate, means for successively adjusting said network to produce different oscillations of current from said source, each oscillation representing a certain digit and for transmitting said digits over said line, switches for extending a connection from said telephone line, means for recording said digits, and means for operating said switches in succession to establish a connection from said line in accordance with said recorded digits.

4. In a telephone system, a telephone line, a source of current on said line, an oscillatory device at the subscriber station of said line and comprising a discharge tube with a resistance in series and a capacity in parallel therewith, means for connecting said device to said line to cause it to oscillate in accordance with the characteristics of said resistance and capacity, means for adjusting said resistance to cause said device to produce different corresponding oscillations of current from said source, each oscillation representing a certain digit and for transmitting said digits over said line, switches for extending a connection from said telephone line, means for recording said digits and means for operating said switches in succession to establish a connection from said line in accordance with the recorded digits.

5. In a telephone system, a telephone line, a source of current on said line, an oscillatory device at the subscriber station of said line and comprising a discharge tube with a resistance

in series and a capacity in parallel therewith, means for connecting said device to said line to cause it to oscillate in accordance with the characteristics of said resistance and capacity, means for adjusting said resistance and capacity to produce successively different oscillations of current from said source, each oscillation representing a certain digit and for transmitting said digits over said line, switches for extending a connection from said telephone line, means for recording said digits and means for operating said switches in succession to establish a connection from said line in accordance with said recorded digits.

6. In a telephone system, a telephone line, a source of current on said line, an oscillatory device at the subscriber station of said line and comprising a discharge tube and a network, means for connecting said device in said line to cause it to oscillate in accordance with the characteristics of said network, keys for adjusting said network to cause said device to produce different oscillations of current from said source depending on the key operated with each oscillation representing a certain digit and for transmitting said digits over said line, switches for extending a connection from said telephone line, means for recording said digits and means for operating said switches in succession to establish a connection from said line in accordance with said recorded digits.

7. In a telephone system, a telephone line, a source of current on said line, a plurality of subscriber's stations on said line, an oscillatory device at each subscriber's station, each having a different fundamental frequency, means for connecting the device at any subscriber's station to said line to cause it to produce its fundamental frequency from said source and for transmitting it over said line, means for adjusting the device at any one of said subscriber's stations to any one of a plurality of frequencies different from any one of the fundamental frequencies of any one of said devices, each frequency representing a certain digit and for transmitting said digits over said lines, switches for extending a connection from said telephone line, means for recording any one of said fundamental frequencies when transmitted from a corresponding subscriber's station to identify said station and for recording said digits in succession when transmitted, and means for operating said switches in succession to establish a connection

from said line in accordance with said recorded digits.

8. In a telephone system, a line, a source of current on said line, a plurality of subscribers' stations on said line, an oscillatory device at each subscriber's station, each having a different fundamental frequency and comprising a discharge tube with a resistance and a capacity in parallel therewith, means for connecting the device at any subscriber's station to said line to cause it to produce a fundamental frequency from said source and for transmitting it over said line, means for adjusting the resistance at any one of said subscribers' stations, to produce successively different oscillations of current from the fundamental frequency of the associated device, each oscillation representing a certain digit and for transmitting such digits over said line, switches for extending a connection from said line, means for recording any one of said fundamental frequencies when transmitted from a corresponding subscriber's station to identify said station and for recording said digits in succession when transmitted, and means for operating said switches in succession to establish a connection from said line in accordance with said recorded digits.

9. In a telephone system, a line, a source of current on said line, a plurality of subscribers' stations on said line, an oscillatory device at each subscriber's station, each having a different fundamental frequency and comprising a discharge tube with a resistance and a capacity in parallel therewith, means for connecting the device at any subscriber's station to said line to cause it to produce a fundamental frequency from said source and for transmitting it over said line, means for adjusting the resistance and capacity at any one of said subscribers' stations to produce successively different oscillations of current from the fundamental frequency of the associated device, each oscillation representing a certain digit and for transmitting such digits over said lines, switches for extending a connection from said line, means for recording any one of said fundamental frequencies when transmitted from a corresponding subscriber's station to identify said station and for recording said digits in succession when transmitted, and means for operating said switches in succession to establish a connection from said line in accordance with said recorded digits.

RALPH E. HERSEY.