A. E. PAIGE.

TELEPHONE SYSTEM.

APPLICATION FILED MAY 31, 1904. RENEWED MAR. 30, 1911.

1,012,699. Patented Dec. 26, 1911.

FIG. I.

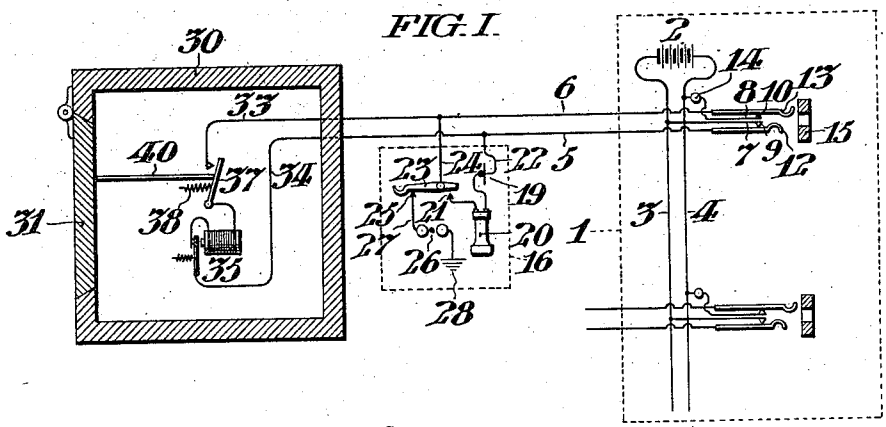


FIG. II.

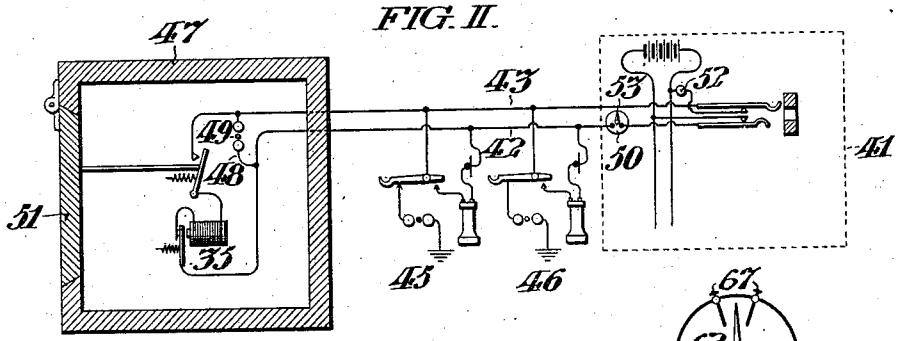


FIG. V.

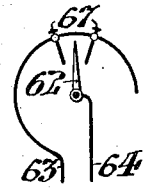


FIG. III.

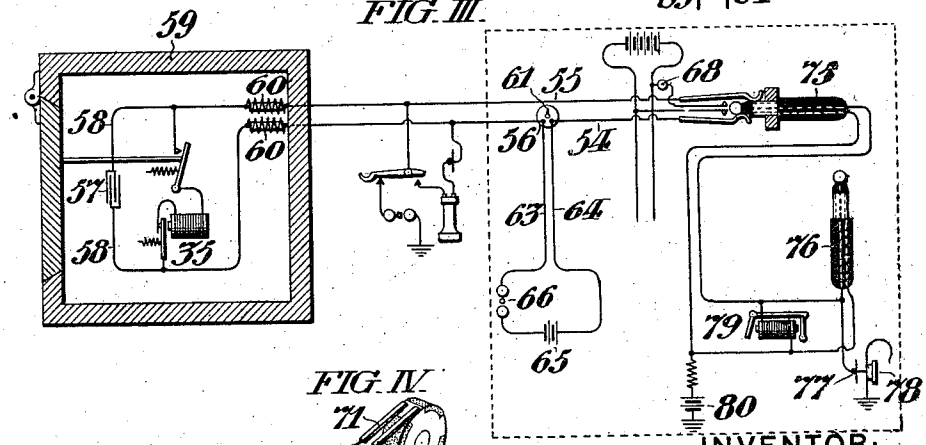
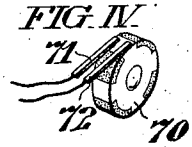


FIG. IV.



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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

1,012,699. Specification of Letters Patent. Patented Dec. 26, 1911.

Application filed May 31, 1904, Serial No. 210,381. Renewed March 30, 1911. Serial No. 618,004.

To all whom it may concern:

Be it known that I, ARTHUR E. PAIGE, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Telephone Systems, whereof the following is a specification, reference being had to the accompanying drawings.

It is the principal object of my invention to utilize the apparatus of an ordinary municipal telephone system, to automatically manifest, at its central station, disturbance of the electrical conditions normally existing at a special station, which latter is connected with the central station apparatus like an ordinary subscriber's station, but includes means to automatically operate, distinctively, an ordinary subscriber's call signaling device at the central station. For instance, as hereinafter described, such a special station may be at a bank, and its automatic signaling apparatus be arranged in such relation to a vault, that opening of the vault door, will disturb such circuit by bridging the line through an automatic circuit breaker which, being thus set in operation, makes a predetermined sequence of breaks in the line, manifested by the call signaling device at the central station; for instance, an ordinary incandescent signal lamp may be caused to twinkle in a manner differing from that due to the ordinary making and breaking of the circuit which can be effected by a subscriber's hook lever. It is to be understood that disturbance of the normal condition of the circuit at the special station may also be manifested, by means which does not require such sequential breaking of the line circuit as above contemplated; for instance, a galvanometer may be employed as hereinafter described.

My invention comprehends the various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawings, Figure I, is a diagram, showing a simple embodiment of my invention. Fig. II, is a diagram similar to Fig. I, showing a modified form of my invention. Fig. III, is a diagram similar to Figs. I and II, but showing a more complex embodiment of my invention. Fig. IV, is a perspective view of a circuit breaker wheel which may be conveniently employed at the special station. Fig. V, is a diagram of the relay connections of the galvanometer shown in Fig. III.

Referring to Fig. I; the dotted outline 1, includes the apparatus located at the central station, which conveniently comprises the battery 2, having leads 3, and 4, common to a plurality of subscribers' line circuits, each including a pair of conductors 5, and 6. Said battery leads 3, and 4, are normally connected with said line conductors 5, and 6, by the branches 7, and 8, provided with respective spring terminals 9, and 10, which latter are normally in electrical contact with the spring terminals 12, and 13, comprised in the subscriber's line jack, having the connecting board socket 15.

As indicated in Fig. I, a call signal lamp 14, is included in the branch circuit 8, between the battery 2, and the spring terminal 10. However, it is to be understood that a signaling device of any other convenient construction or arrangement may be employed; for instance, a relay may be connected in the line circuit and a signal lamp be included in an auxiliary circuit controlled by said relay and energized from a different source.

An ordinary subscriber's station is included in the dotted outline 16, in Fig. I, whose equipment comprises the transmitter 19, receiver 20, and contact point 21, in the branch circuit 22; the hook lever 23, in the branch circuit 24, and the contact point 25, and signal bell 26, in the branch circuit 27, which latter is grounded at 28.

The special station apparatus is included in the vault 30, provided with the door 31, and comprises the bridge circuit 33, and 34, including the automatic circuit breaker 35, and the switch 37. Said switch 37, is provided with the spring 38, which tends to close it, but is opened by the rod 40, which extends from the door 31. It is to be understood that said rod 40, typifies any convenient mechanism which will operatively connect the door 31, with the switch 37, so that when the door is closed the switch is open, and when the door is open the switch is closed. Of course when said receiver 20, at the subscriber's station 16, is removed from the hook lever 23, the latter rises from the contact point 25, and makes contact with the point 21; so as to close the circuit including the line conductors 5, and 6, (common to said subscriber's station 16, and the special station 30,) and the battery 2, and signal lamp 14, at the central station 1; so as to render said lamp 14, continuously and uniformly incandescent until the circuit is

broken by the insertion of the cord circuit plug in the socket 15, at the central station 1, or until the receiver 20, is replaced upon the hook 23, at the subscriber's station 16. Opening of the vault door 31, at the special station 30, also lights said lamp 14, by closing, (at said special station 30,) the circuit including said line conductors 5, and 6, common to said subscriber's station 16; and said special station 30, and the battery 2, and lamp 14, at the central station 1; but said lamp 14, is then caused to twinkle, by the automatic operation of the circuit breaker 35, until the circuit is opened either by insertion of a cord plug in the socket 15, at the central station 1, or by closure of the door 31, at the special station 30.

The arrangement above described may be utilized as follows:—The special station being, for instance, in a bank vault 30, which should not be opened except at certain predetermined times; the central station operator in charge of the jack with which said station 30, is connected may be instructed to answer the automatic call from said special station, (which indicates the improper disturbance of the normal conditions thereat,) by calling up the residence of an officer of said bank, or by calling up the police department of the municipality in which said institution is included.

Fig. II, shows a party line extending from the central station 41, and comprising the conductors 42, and 43, which are similar to the conductors 5, and 6, of the line circuit shown in Fig. I, and are common to two subscribers' stations 45, and 46, and the special station in the vault 47. The apparatus at said special station 74, comprises the permanent bridge 48, across said line and including a high resistance 49, (for instance, a bridging bell,) through which latter the circuit is normally closed, so as to normally maintain a predetermined manifestation of the galvanometer 50, at the central station.

The arrangement shown in Fig. II, is not only capable of manifesting the disturbance at the special station 47, due to the opening of the door 51, but is also capable of manifesting at the galvanometer 50, any disturbance of the circuit occasioned either by breaking it, or by increasing or diminishing the resistance normally included therein. For instance, if any attempt is made to bridge the line shown in Fig. II, with a resistance equivalent to that of the special station 47, with a view to cutting out the latter, so that the vault may be tampered with without operating the signal lamp 52, at the central station; such disturbance would be manifested by deflection of the movable index 53, of the galvanometer 50; which latter may be under the charge of a special operator at the central station.

As shown in Fig. III, a circuit comprising the line conductors 54, and 55, and including the galvanometer 56, with certain advantages above described, may have a condenser 57, in a bridge 58, at the special station 59, in lieu of the resistance 49, shown in Fig. II. However, inasmuch as there may be a slight diminution of voice transmission, to the line, due to the presence of the bridging condenser 57, *per se;* I find it convenient to employ with the condenser, the inductive resistance or impedance coils 60, which prevent such waste of the voice currents. Moreover, as indicated in Fig. III, the galvanometer 56, may have its movable index 61, operatively connected with the switch lever 62, (shown in Fig. V,) so that any disturbance of the electrical conditions normally existing in the line 54, 55, will close the local circuit comprising the conductors 63, and 64, and including the source of current 65, and the signal bell 66; through either adjustable contact 67. By the arrangement last described, the bell 66, or any other suitable signal indicator in said local circuit 63, and 64, may be caused to operate by a disturbance in the line circuit, of so slight a character as to be incapable of operating the ordinary signal lamp 68.

Although I have shown in Figs. I, II, and III, automatic circuit breakers 35, of the simple vibratory spring type, it is to be understood that any suitable device may be employed in lieu thereof. For instance, as shown in Fig. IV, the rotary circuit breaker wheel 70, may be so related to the spring contact brushes 71, and 72, in the bridge circuit at the special station, as to alternately close and open the same four times during each revolution of said wheel 70, which latter may be rotated by an electric motor included in said bridge circuit.

Although it is to be understood that I do not wish to limit myself to any particular type of central station apparatus, I have shown in Fig. III, an ordinary form of cord circuit, comprising the plugs 75, and 76; operator's transmitter 77, and receiver 78; automatic drop 79, battery 80, etc., adapted to coöperate with the line circuits above described.

I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention.

I claim:—

1. In a telephone system, the combination with a central station including a signaling device distinct from the receiving instruments; of a subscriber's line connected with said central station and including a hook lever arranged to operate said signaling device; an inclosure having a door and containing an automatic mechanically opera-

tive circuit closer, an electrical vibrator and means which, regardless of changes in temperature, connect them with said subscriber's line in a normally open circuit parallel with said hook lever; and, means connecting said door with said automatic circuit closer, normally holding the latter opened; whereby when said door is opened said circuit closer is mechanically operated and said vibrator is electrically operated in connection with said signaling device to manifest at the latter a signal different from that manifested by the operation of said hook lever.

2. In a telephone system, the combination with a central station including a galvanometer and signaling device distinct from the receiving instruments; of a subscriber's line connected with said central station and including said galvanometer and a hook lever arranged to operate said signaling device; an inclosure having a door and containing an automatic mechanically operative circuit closer, an electrical vibrator and means which, regardless of changes in temperature, connect them with said subscriber's line in a circuit parallel with said hook lever; and, means connecting said door with said automatic circuit closer, normally holding the latter opened; whereby when said door is opened said circuit closer is mechanically operated and said vibrator is electrically operated in connection with said galvanometer and signaling device to manifest a signal different from that manifested by the operation of said hook lever.

3. In a telephone system, the combination with a central station including a signaling device distinct from the receiving instruments; of a subscriber's line connected with said central station and including a hook lever at the subscribers' station arranged to operate said signaling device; a vault at said subscribers' station containing an automatic mechanically operative circuit closer, an automatic electrically operative circuit breaking vibrator, a condenser, and means, independent of changes of temperature, connecting them with said subscriber's line in parallel relation with said hook lever; and, means connecting said door with said automatic circuit closer, normally holding the latter opened; whereby when said door is opened said circuit closer is mechanically operated and said vibrator is electrically operated in connection with said signaling device to manifest at the latter a signal different from that manifested by the operation of said hook lever.

4. In a telephone system, the combination with a central station including a signaling device distinct from the receiving instruments; of a subscriber's line connected with said central station and including a hook lever at the subscribers' station, arranged to operate said signaling device; a vault having a door; automatically operative means in said vault included in a normally open circuit parallel with said hook lever and arranged to operate said signaling device differently from its operation by said hook lever; and means mechanically connecting said door with said automatically operative means; whereby when said door is opened said normally open circuit is closed and a distinctive signal manifested by said signaling device.

5. In a telephone system, the combination with a central station including a signaling device distinct from the receiving instruments; of a subscriber's line connected with said central station and including a hook lever arranged to operate said signaling device; an inclosure having a door; a circuit closer, an electrical vibrator and means which, regardless of changes in temperature, connect them with said subscriber's line in a normally open circuit parallel with said hook lever; and, means connecting said door with said circuit closer; whereby when said door is opened said circuit closer is operated and said vibrator is electrically operated in connection with said signaling device to manifest at the latter a signal different from that manifested by the operation of said hook lever.

6. In a telephone system, the combination with a central station including a signaling device distinct from the receiving instruments; of a subscriber's line connected with said central station and including a hook lever arranged to operate said signaling device; an inclosure having a door; a circuit closer, an electrical vibrator and means which, regardless of changes in temperature, connect them with said subscriber's line in a circuit parallel with said hook lever; and, means connecting said door with said circuit closer; whereby when said door is opened said circuit closer is operated and said vibrator is electrically operated in connection with said signaling device to manifest at the latter a signal different from that manifested by the operation of said hook lever.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania this twenty-eighth day of May, 1904.

ARTHUR E. PAIGE.

Witnesses:
ANNA F. GETZFREAD,
E. L. FULLERTON.

Corrections in Letters Patent No. 1,012,699.

It is hereby certified that in Letters Patent No. 1,012,699, granted December 26, 1911, upon the application of Arthur E. Paige, of Philadelphia, Pennsylvania, for an improvement in "Telephone Systems," errors appear in the printed specification requiring correction as follows: Page 2, line 39, for the reference-numeral "74" read *47;* page 3, lines 41, 43, and 64, for the word "subscribers'" read *subscriber's;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of January, A. D., 1912.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.