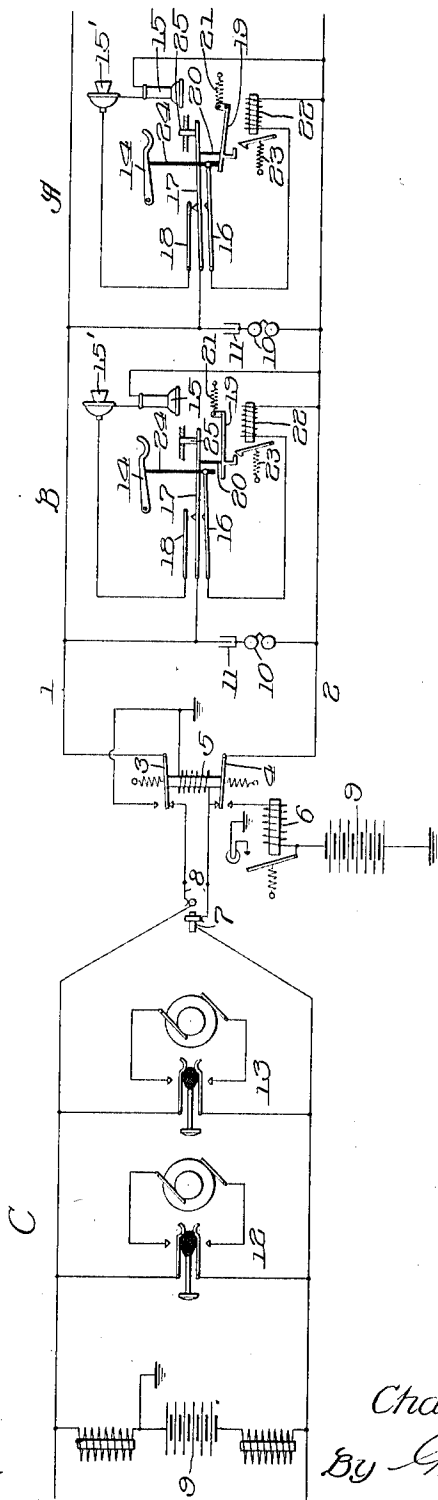


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TELEPHONY.

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TELEPHONY.

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To all whom it may concern:

Be it known that I, CHARLES A. BALS, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephony, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telephony and particularly to that class of telephony in which a plurality of telephone stations are connected with the same line to constitute said line and stations what is commonly known as a party telephone line.

Although the telephone line, in the embodiment of the invention illustrated, extends to an exchange, I do not wish to be limited to the extension of the party line to an exchange in all embodiments of the invention since there are characteristics of my invention that are of service in connection with party lines that do not have facilities at an exchange for extending the same into connection with other telephone lines.

In practicing my invention I employ an electro-magnet at each party line telephone station which serves, preferably when energized, to hold telephone connecting switching mechanism at the same station therewith in its idle condition so that the telephone at the same station with said electro-magnet cannot be cut into circuit. In the preferred embodiment of the invention the electro-magnet at each station is included in a normally open high resistance bridge of the telephone line and the telephone is included in another bridge of the telephone line. A source of current is connected with the line, the switch hook at each telephone station serving, when the line is initially taken for use, first to establish circuit through the electro-magnet to energize it and relieve the switching mechanism of its locking influence, the switching mechanism governed by the telephone receiver thereafter operating to establish circuit through the telephone receiver and preferably then to open circuit through the electro-magnet. The bridge at each station

which includes the telephone thereat is of low resistance, obviously, and operates as a guarding shunt to prevent sufficient current from flowing through the electro-magnet at a later station seeking the line and preventing the operation of the electro-magnet at this later station whereby this electro-magnet is maintained inert and the locking influence that it has upon the switching mechanism at this later station is undisturbed so that the telephone at this later station cannot be bridged across the line and thereafter the party at this later station cannot listen in whereby the system is rendered secret.

My invention has for another of its objects the provision of means whereby one party line subscriber may permit another party line subscriber to bridge his telephone across the party line so that the two subscribers upon the same line may have telephonic communication. I accomplish this result by introducing sufficient resistance into the telephone bridge of the party first appropriating the party line so as to remove the low resistance shunt from the electro-magnet at the second party line station that is to have telephonic connection with the party line. I preferably introduce the desired resistance by opening the telephone bridge, though I do not wish to be limited to the amount of resistance that is introduced for accomplishing this object of my invention.

In the preferred embodiment of my invention I employ a switching device for including and excluding resistance from the telephone bridge at each party line station that is visibly brought into operative position at the party line station first appropriating the line for use, and which is withheld from operative position at each other party line station irrespective of the position of the telephone receiver thereat so that this resistance introducing switching device also may serve as a signal to inform a party line subscriber seeking to take the line whether or not the line has previously been appropriated.

I will explain my invention more fully by reference to the accompanying drawing showing the preferred embodiment thereof

and in which I have illustrated a party telephone line extending from two stations to a manual exchange, a sufficient portion of a manual exchange equipment being illustrated to show the cooperative relation of the party line with an exchange. The number of party line stations may be varied and while I have associated the same with a manual exchange, I do not wish to be limited to the character of the exchange to which the party line extends.

As illustrated, the party telephone line extends in two limbs 1 and 2 from party line stations A B to a telephone exchange illustrated at C. As the invention is illustrated in connection with manual telephone exchange practice, I have shown one of many types of equipment that may be associated with the party line. I have shown the line sides 1 and 2 as terminating in armature switches 3 and 4 controlled by a cut-off relay 5 at the exchange, the normal contacts of the armature switches 3 and 4 being respectively connected directly with ground and with ground through a line signal mechanism 6 so that when a bridge is established at a station seeking to appropriate the party line, the line signal at the exchange is operated. The operator in response to the line signal will insert an answering plug 7 of a connecting cord circuit in a spring jack 8, the tip contact of the spring jack being connected with the alternate contact of the armature switch 3 while the sleeve contact of the spring jack is connected with the alternate contact of the switch 4 and also with ground through the cutoff relay 5. In accordance with well known practice, the cut-off relay 5 is energized when the operator plugs into the jack of the party line for the purpose of removing the line signal and for establishing a substitute connection of the common battery 9 with the party line. The common battery, whose illustration is duplicated, is normally in connection with the line signal device 6 but is disconnected from the line signal device and brought into circuit with the cut-off relay 5 as indicated in the drawing when the operator plugs in to the party line. With either association of the battery 9 with the party line, a party line subscriber who first appropriates the line excludes other party line subscribers from the same line unless the first subscriber desires communication with another, since with either association of the battery 9 with the party line both sides of the party line are in similar circuit connection with said battery.

I will now describe the equipment that is employed at each party line station and the parts at both stations will be given similar characters of reference.

There is preferably only one normally

closed bridge at each party line station and this includes a signal receiver 10 and a condenser 11. When code signaling is not employed, the signals 10 may be selected for operation by the operator at the exchange, to which end I have illustrated a ringing outfit 12 that may be individual to the signal 10 at station A and a ringing outfit 13 that may be individual to signal 10 at station B. If the signals at the stations A and B are of a harmonic type one may respond to current of one periodicity and the other may respond to current of another periodicity, each periodicity being individual to one signal receiver, all as is well understood by those skilled in the art. A switch hook 14 is illustrated at each station for the purpose of supporting the telephone receiver 15 thereat, this switch hook mechanically governing a switch hook contact 16, this switch hook contact 16 being at all times free to move upwardly when the telephone receiver is taken down and to move downwardly when the telephone receiver is replaced irrespective of the condition of use of the line. A switch 17 is preferably free of switch hook operating influence. This switch 17 is desirably in the form of a leaf spring under such inherent tension that it moves or tends to move toward the switch hook contact 16. An electro-magnetic controlling device is employed at each station for normally permitting the switch 17 to be engaged by the spring 16 due to the resiliency of the switch 17, this engagement of the parts 16 and 17 occurring when the corresponding receiver is removed from its switch hook irrespective of the condition of use of the line. The switching mechanism includes operating means that is adapted, when free to operate, to overcome the resilience of the leaf spring switch 17 to move this leaf spring switch upwardly away from the contact 16 and bring it into engagement with the telephone contact 18 to bring the telephone receiver 15 and the telephone transmitter 15' into bridge of the line. This switch operating mechanism desirably includes a bell crank 19 having engagement at one end with a strut 20 that is carried by the switch 17 and which bell crank is connected at its other end with an operating spring 21 that is capable, when free to act, of moving the spring switch 17 from the contact 16 from which it is normally disconnected and into engagement with the contact 18. The switch operating mechanism is normally restrained from having operating influence upon the switch 17 by means of an electro-magnet 22 whose armature normally catches the end of the bell crank 19 that is in engagement with the strut 20 to hold this end of the bell crank down against the force of the spring 21, a

spring 23 normally preserving the engagement of the armature of the magnet 22 with the bell crank lever, while the resilience of the spring 17 then serves to keep the spring 17 in position to enable it to be engaged by the contact 16 when the corresponding telephone receiver is taken from its switch hook, during which relative normally separated positions of the contacts 16 and 17, the contact 17 is out of engagement with the contact 18.

Assuming that the line is free for use, the party taking the line for use will remove his telephone receiver 15 from its switch hook 14, the spring contact 16 then rising into engagement with the contact 17 to close the bridge that includes the magnet 22, this bridge being desirably of one thousand (1,000) ohms resistance, the resistance being located preferably in said magnet. The closure of this magnet bridge establishes a circuit for the magnet 22 that includes the battery 9 so that this magnet 22 is energized to attract its armature against the force of the spring 23 to remove the armature from engagement with the bell crank 19 whereupon the spring 21 is free to move the switch spring 17 upwardly, this switch spring then breaking contact with the contact 16 and making contact with the contact 18 whereby the low resistance telephone bridge is established at 18 and the high resistance magnet bridge is thereafter broken at 16, it being desirable to remove the magnet from bridge connection with the line after the magnet has performed its function, to prevent loss of transmission. When the magnet bridge has been opened, the armature of the magnet drops back into position to be engaged by the bell crank 19 through the intermediation of the strut 24 that presses downwardly upon the bell crank against the force of the spring 21 when the corresponding telephone receiver 15 has been placed upon the switch hook 14. The switch hook contact 16 is connected with the strut 24 and is moved downwardly out of reach of the switch 17 when the switch hook 14 is depressed by the receiver it supports.

I have described the condition which occurs when the line 1 2 is taken for use by a party line subscriber in initiating a connection with another telephone line or in responding to a call originating at a station of some other line. If the party line subscriber taking the line for use desires to have another party line subscriber upon the same line called, the calling party line subscriber will, in the case of a manual exchange, inform the operator of his desire and the operator will signal the wanted party line subscriber in the usual way. The calling party line subscriber, in order to permit the called party line subscriber upon the same line to

respond, will introduce sufficient resistance in the telephone bridge at the calling station to permit the magnet 22 at the called station to be energized so as to allow the switch operating mechanism 19, 20 and 21 at the called station to operate the switch 17 at the called station for the purpose of establishing the telephone bridge at 18 at the called station when the switch operating mechanism 19, 20 and 21 is permitted so to do upon the removal of the telephone receiver 15 at the called station. I preferably introduce an infinite resistance by opening the telephone bridge at the calling party line station, and to this end I employ a button 25 for pressing upon the switch 17 to move it away from the telephone bridge contact 18 and there to open the telephone bridge with the object and results stated. The button 25, by the position which it has when the associate receiver is removed from its switch hook, indicates the busy or idle condition of the party line, since it is moved upwardly at the station first taking the party line for use and is prevented from being moved upwardly at the other station or stations when the party line has been previously appropriated (unless such other station is a called station) owing to the engagement of the armature of the magnet 22 with the bell crank lever 19 at such other station or stations.

While I have herein shown and particularly described the preferred embodiment of my invention, I do not wish to be limited to the precise details of construction and circuit arrangement illustrated nor do I wish to be limited to the adaptation of my invention to manual exchange practice.

Having thus described my invention I claim as new and desire to secure by Letters Patent the following:

A plurality of telephone stations connected with the same line; a normally open high resistance bridge at each station including an electro-magnet; a second and normally open low resistance bridge conductor at each station including the telephone thereat; switching mechanism at each station for completing the magnet bridge thereat and thereafter the telephone bridge thereat, there being present a source of current for inclusion in circuit with the magnet when its bridge is established whereby the associate switching mechanism is permitted to operate to establish the associate telephone bridge; and means at a telephone station for including sufficient resistance in the telephone bridge thereat when this station has taken the line for use to permit the electro-magnet at another station upon the same line to be operated in order to permit the closure of the telephone bridge at said other station and thereby enable the establishment

of telephonic connection between two stations upon the same line, this means being adapted for operation by the switching mechanism associated therewith when actuated to establish the telephone bridge at the same station therewith, whereby said means is constituted a busy test signal.

In witness whereof, I hereunto subscribe my name this sixteenth day of May A. D., 1911.

CHARLES A. BALS.

Witnesses:

G. L. CRAGG,
ETTA L. WHITE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
