(No Model.)

E. T. GILLILAND.

TELEPHONE CIRCUIT.

No. 306,239. Patented Oct. 7, 1884.

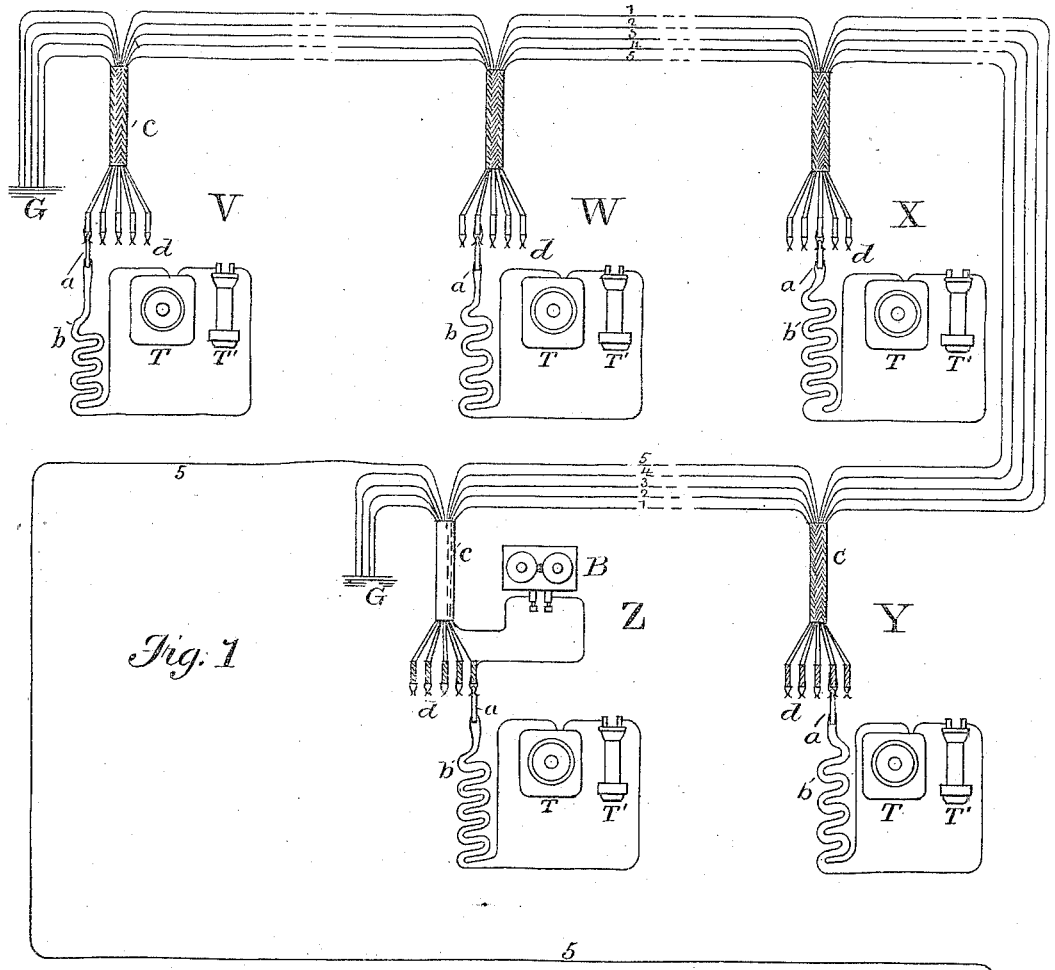

Fig. 1

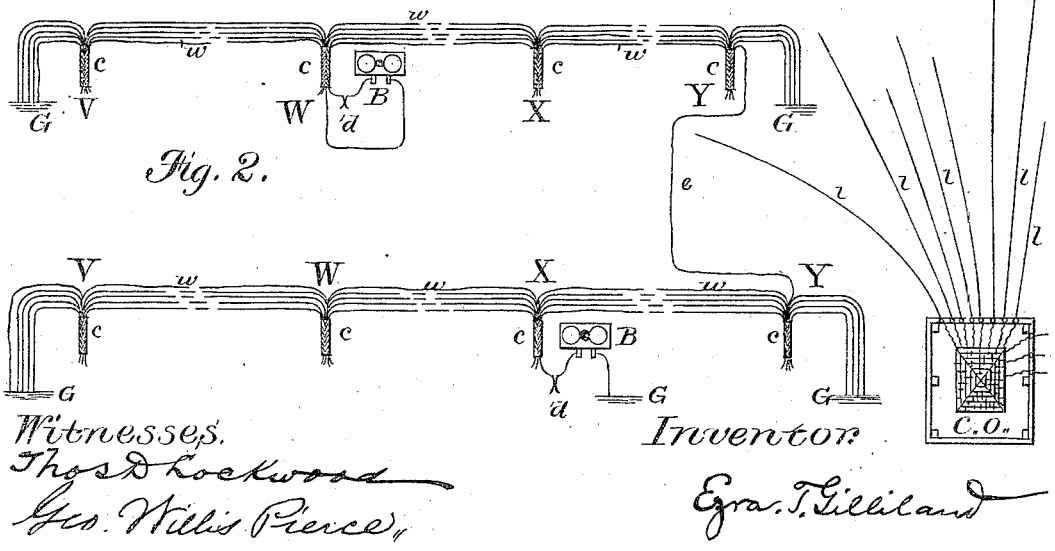

Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

EZRA T. GILLILAND, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN BELL TELEPHONE COMPANY, OF SAME PLACE.

TELEPHONE-CIRCUIT.

SPECIFICATION forming part of Letters Patent No. 306,239, dated October 7, 1884.

Application filed May 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, EZRA T. GILLILAND, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Telephone-Circuits, of which the following is a specification.

My present invention relates to systems of telephonic communication, and constitutes an improvement in the construction and arrangement of such systems, whereby intercommunication between telephonic centers distant from one another may be facilitated and readily maintained, whether the various corresponding centers be of the same general character or otherwise.

In an application for Letters Patent filed April 21, 1884, Serial No. 128,677, I have shown and described a system of telephony consisting, broadly, in a series of main lines extending between and entering all of the said sub-stations, a looping-in switch being provided at each station, whereby the subscriber may introduce his signaling mechanism and telephones into any one of the main-line circuits, and call and converse with the sub-stations normally connected thereon. In the same specification, to which reference may be made, I have provided for connecting the said apparatus at each station normally in some particular one of the said main lines, so that when the entire system is quiescent a certain number of stations—say five—are normally connected in and with No. 1 main line, five more with No. 2, five more with No. 3, and so on *ad libitum*, so that each station may call and communicate with any other station on the same line without a change in its connections, and may furthermore connect with any station on any other line by transferring his instrument's loop to the said line. In such a system each sub-station, therefore, has its calling and telephonic instruments normally connected in one of the said main lines, and is understood by all stations to be so connected, while at the same time each station has the power of withdrawing its instruments from their normal location and of transferring them to any other of the entering main lines, so that the stations on those lines may readily be called and communicated with. I employ either manually-operated or automatic devices to effect the necessary changes or transfers. In my present invention, which is an improvement on and extension of the invention described in the specification which I have hereinbefore cited, all the above instrumentalities and organizations are employed; and it consists in combining with the said organizations a separate line-circuit, also looping into all the stations, but having calling, signal-receiving, and telephone instruments normally connected therewith at but one of the said stations. This separate line, after running through each sub-station of the system, is extended from the system and runs outward to another exchange territory, there entering the second system and virtually constituting a trunk line between the two systems. The second system may be identical in character with the first, or it may be an ordinary central-office system. In the former case the trunk line will necessarily be looped into all the stations of the second exchange in the same way it is into the first, while in the latter contingency it will only be required to connect with the central-station switch-board and annunciator in a manner well understood. Each loop of the connecting-line into a sub-station terminates in a loop, to which the station-instrument may be transferred for the purpose of including them when necessary in that line when communication is desired with the distant exchange.

The object, then, of this invention is to provide a convenient circuit arrangement whereby a telephone system of the class described in the hereinbefore cited application may be electrically connected for oral intercommunication with a second system of the same class or with a separate system of the central-office type.

In the drawings which accompany this specification, Figure 1 is a diagram showing a system, such as described in my aforesaid application, connected with a system of the central-office type; and Fig. 2 is a diagram of two like systems connected by a trunk wire, the said systems being of that class wherein a central station is dispensed with.

Any or all of the forms of switching apparatus shown in my prior application may be used in connection with this improvement.

In the drawings, a series of lines, 1, 2, 3, and 4 extend through a series of stations, V, W, X, Y, and Z. Other stations may, of course, be located on any of the lines. Each of the

stations is normally in circuit with any one of the said circuits, and has a loop entering it from all the other circuits, so that the central-station apparatus may be transferred thereto as occasion demands. The several lines enter the several stations by means of the cables *c*, and the lines, after passing through all the stations of the system, are grounded at their respective termini.

Although in the drawings the lines are represented as being all grounded at the same point, it is obvious that such an arrangement is by no means necessary.

The office-instruments are represented by the transmitter T and receiver T′, and are placed in an instrument-loop, terminating in a double wedge or similar device, adapted to be inserted in any of the loop-terminal spring-jacks of the entering lines. The trunk or extension line 5, after passing through all of the stations, being represented in each station by a suitable spring-jack or connecting device, extends outward any distance to the next district center, C O. This is a central station from which subscribers' lines 1 radiate in the usual manner, and the line 5, being provided with connecting devices, may be connected in the central station, C O, of the second system for through-communication with any of the said radiating lines 1. At one of the sub-stations, Z, the station-instruments are kept normally in the circuit of the trunk or extension wire 5, and that station alone will receive signals direct from the distant exchange. It will be the duty of the operator at such station to receive incoming calls from the distant exchange for any of the sub-stations of his own system, and upon receiving such call he will transfer his apparatus to the spring-jack *d* of the line with which the desired subscriber is normally connected, signal the said subscriber, and by the telephone instruct him to connect his apparatus with line No. 5 for conversation with the distant exchange. Any sub-station, however, desiring to initiate communication with the distant exchange, may do so directly by transferring his apparatus to the line No. 5 and signaling the distant exchange direct.

In the station Z, I have shown the call-bell B as being permanently connected with the long line No. 5, to indicate that that station may always be reached on that line.

I have not regarded it as being necessary to indicate signaling devices at the other stations, it being well understood that such devices are an essential.

At each station I have indicated suitable telephone-instruments T and T′, included in the circuit of a loop, *b*, terminating in a wedge, *a*, adapted to be inserted in any of the spring-jacks *d*.

The several line-wires enter the stations through cables *c*, as fully described in my former application.

In Fig. 2 I show two systems of like character connected by a trunk line, *e*. Each of these systems consists of any required number of line-circuits, *w*, running into all the stations by the cables *c*, and being at each station provided with suitable connections, *d*, whereby the station-instruments may be looped into any line, each line having several stations normally connected therewith. The trunk line *e* connects with all of the stations of both systems, and at one special station of each system the telephone-instruments are normally included in said trunk line.

In the operation of this system, when any station desires to speak with any station in the same exchange, it is only necessary to transfer his instruments to the required line and call. When a station desires to speak with a station in the adjacent system, he loops into the trunk line and calls. When such call-signal is in circuit with the trunk wire at the adjacent exchange, the operator at that station connects himself with the line controlling the station wanted and signals it. When the said station responds, he is told to answer on the trunk wire, and he thereupon connects his instrument with the trunk wire and communicates with the distant station.

Although I have shown but one trunk line, it is evident that my invention contemplates any desired number, and that I am by no means limited to any specific number. Furthermore, I may, without departing from the spirit of my invention, connect more than two telephonic centers in the manner indicated, the same trunks extending through the series whatsoever the number of the series may be.

I claim—

1. The combination of two or more separate telephone-exchange systems, each consisting of a series of stations, a series of main lines entering all of the said stations, and telephonic apparatus at each station capable of being connected in circuit at will with any of the said main lines with one or more trunk or extension lines, the said trunk lines extending between the said exchange systems and to each of the stations thereof, substantially as described.

2. In a system of telephonic intercommunication, a series of subscribers' stations, a series of main lines extending between and entering all of the said stations, a telephonic apparatus at each station capable of being connected in circuit at will with any of the said main lines, and an extension or trunk line looping into all of the said stations, and having the telephonic apparatus of one of the said stations normally in circuit therewith, the said trunk line extending outward from the said system to a distant system for the purpose of electrically connecting the two systems, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 1st day of May, 1884.

EZRA T. GILLILAND.

Witnesses:
THOS. D. LOCKWOOD,
GEO. WILLIS PIERCE.