(No Model.) 2 Sheets—Sheet 1.

E. POPE.

TELEPHONE SWITCH AND CIRCUIT.

No. 348,139. Patented Aug. 24, 1886.

Fig. 1

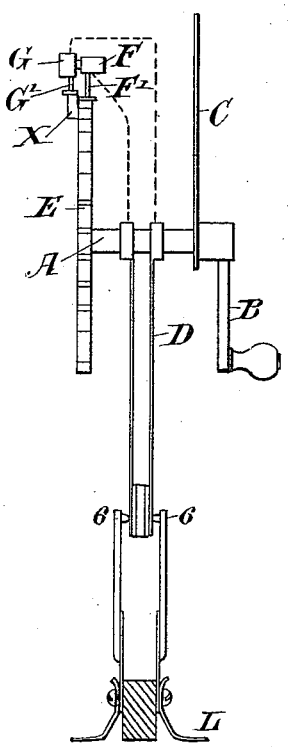
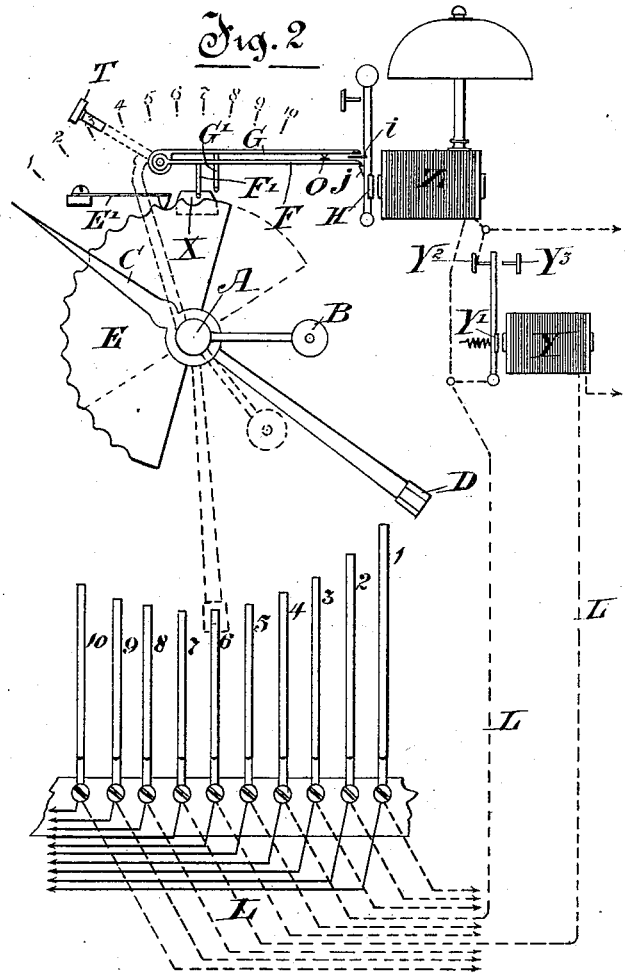


Fig. 2



Witnesses:
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per Reynolds & Kellogg
Attys.

(No Model.) 2 Sheets—Sheet 2.

E. POPE.

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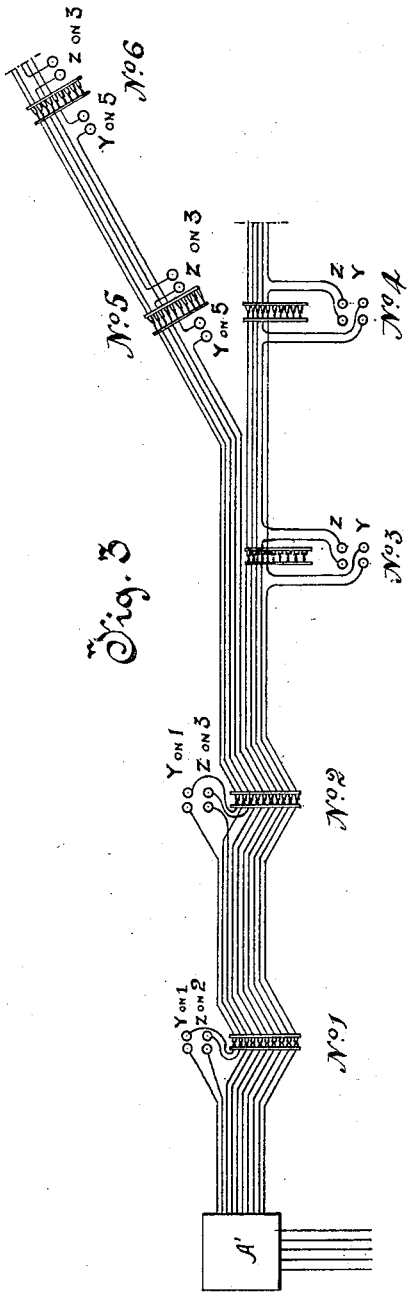

Fig. 3

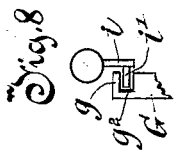

Fig. 8

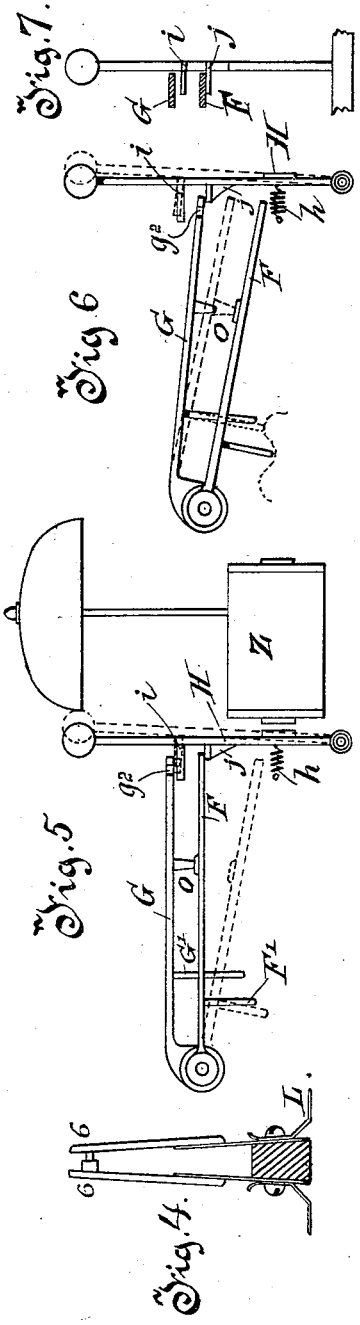

Fig. 7

Fig. 6

Fig. 5

Fig. 4.

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UNITED STATES PATENT OFFICE.

EDWIN POPE, OF QUEBEC, QUEBEC, CANADA.

TELEPHONE SWITCH AND CIRCUIT.

SPECIFICATION forming part of Letters Patent No. 348,139, dated August 24, 1886.

Application filed July 29, 1884. Serial No. 139,060. (No model.)

To all whom it may concern:

Be it known that I, EDWIN POPE, of the city of Quebec, in the county and Province of Quebec, Canada, have invented certain new and useful Improvements in Telephone Circuits and Switches; and I do hereby declare that the following is a full, clear, and exact description of the same.

The object of my invention is to secure privacy to wires used by more than one subscriber on single and grouped main lines, by enabling each subscriber to communicate with the central station and with another subscriber by any one of a number of wires under direction and control of the central station, either by direct action or joint action at the central and subscriber's stations, and to provide an individual call for each subscriber in such systems.

The invention may be thus briefly described: I propose to group together, as is to some extent done at present in telephone-exchanges, say, one hundred subscribers or stations, supplying these with ten wires, which will usually run into each station and be connected with the central exchange. It is not, however, absolutely necessary that all the wires should run into each station, as they may be branched into different routes and a less number run to certain subscribers. The number of wires is also given merely as an example, and not as the absolute working proportion to the number of subscribers. Upon any two of these lines, at each station, are placed electro-magnets worked from the central station and operating to switch in and cut out the station or subscriber. As the lines running into each station and the central office are all correspondingly numbered, it will be seen that many permutations can be effected in the arrangement of these magnets. The subscriber, by breaking connection mechanically between two levers through which the current normally passes, cutting out his telephone, or by any ordinary and suitable means, connects himself with central office and calls it in any of the ordinary methods, or by speaking directly to the listening operator. The central station, in answering, directs him what line to take. This he does by means of the mechanism to be hereinafter described, (or any other suitable for the purpose,) and the point indicated is put in connection by a current sent from the central office. Any approved type of switch-board may be used, and the receiving and transmitting instruments be those generally employed. When the subscribers have finished their conversation, the connection is broken in the usual way, and the stations cut out by closing the circuit through the levers.

For full comprehension, however, of the invention, reference must be had to the annexed drawings, in which—

Figure 1 is a side view, and Fig. 2 a part plan or front view, of the mechanism which I propose to place in a subscriber's station; Fig. 3, a diagram of the system, showing the arrangement of the electro-magnets at several stations; Fig. 4, a detail showing position of spring-bars when plug is withdrawn; Fig. 5, a detail of contact-levers, showing their position when telephone is cut out; Fig. 6, the same when telephone is cut in; Figs. 7 and 8, detail views of armature-striker. It must be clearly understood that these do not show the exact relative sizes or positions of the several parts, as any of these may be exaggerated to show the invention more clearly.

Similar letters of reference indicate like parts.

By referring to Figs. 1 and 2 it will be seen that upon an axle, A, rotated by a crank-arm, B, is mounted rigidly a plug, D, constructed, as shown, with its two sides insulated from each other and from the axle A. This plug D serves as a connection through the spring-bars 1 1 2 2 3 3 &c., between the line-wires and the levers F and G, which operate, as will be presently described, to cut out the telephonic instruments, its normal position, however, being clear of any contact with the bars.

C is a disk or a segment of a disk or a pointer mounted upon the axle A, and serving to indicate by figures, openings, pointers, &c., the points of contact of the arm or plug D with the several wires through their spring-bars.

E is also a disk or segment of a disk mounted on and turning with the shaft A, and has its periphery corrugated, as shown in Fig. 2, and for the purposes to be described, being retained in the position in which it is set by a spring or equivalent device, E′. This disk or

segment is insulated, either wholly or where it comes in contact with the pins or projections F′ and G′ on the levers F and G, respectively.

X is an insulated plate attached to the disk E, which, when E is turned, lifts the lever G, so as to break its contact with the lever F, and thus put the telephonic instruments in circuit. This device, as will be seen, works simultaneously with the plug D, and when, as above described, it is supporting lever G the plug is necessarily inserted between the spring-bars, thereby connecting his instrument with the line to signal central office.

Y is the first electro-magnet, connected with one of the line-wires L L, led into the station, Y′ being its armature, which rests normally against a stop, Y^2, both being connected with the circuit-wire of the second electro-magnet, Z, forming a cut-out. When, however, a current is passed through Y, the armature Y′ is brought against another stop, Y^3.

H is the armature of the second electro-magnet, Z, which may operate the striker on the bell, or serve as the striker itself. When the current is sent from the central office on the line on which the electro-magnet Y is in contact, its armature Y′, which, when resting on the back-stop Y^2, cuts out the electro-magnet Z on another wire, is attracted by the current, and Z is put in circuit on its wire, and a current sent upon it will cause the armature H to be attracted and the bell to sound. The attraction of the armature H by the current sent through Z causes the lever F to drop from *j*, as shown by dotted lines in Fig. 5, and its pin F′ will fall into one of the corrugations (the number of which will correspond with the wire with which the plug D has made connection) of the disk E, breaking the contact at O, between F and G, thereby putting the speaking-instrument T in circuit. The pin *i* in the meantime holds up the lever G by the projection *i′* from its side, the projection *g* of the lever G resting on it, and on the return-stroke, caused by the retractile spring *h* of the armature, drops it, by *i′* coming below the opening g^2 in the lever G, onto the catch *j*, as shown in Fig. 6. By sending another current through the electro-magnet Z the central operator drops G from *j*, thereby restoring the connection at O, and cutting out the speaking-instrument. This may also be done by a further rotation of the wheel E, which lifts F back onto catch *j*, and restores the connection with G. When the wheel E lifts the lever G by side piece, X, the subscriber is connected to the line switched through plug D at the particular point.

Although I have in the immediately-foregoing paragraphs described an apparatus for putting in and cutting out of circuit the speaking-instrument by means of levers actuated by the armature of the second of two electro-magnets, it must be understood that I do not confine myself to this, as many modifications may be adopted to meet differing requirements, and the general proportion and arrangement of the several parts (which will be contained in a suitable box or casing) be varied.

The arrangement of the electro-magnets in a number of stations will be seen by reference to Fig. 3, where A′ will represent a central office, from which ten wires are taken and connected with said stations, and some with branches. It will be seen that by placing the electro-magnets Y and Z on different lines and working with magnetized armatures and positive and negative currents four separate calls may be obtained with two lines, and with each additional line of the circuit the number of individual calls is proportionately increased.

I am aware that in Patent No. 248,134, granted on the 11th of October, 1881, to C. E. Buell, is described a telephone-exchange system in which multiple or alternative lines are all connected to each subscriber's station, on any one of which they (such subscribers) can call or be called, and on any of which they can switch their instruments at will. I am also aware that in Patent No. 306,239, granted on the 7th of October, 1884, to E. T. Gilliland, a telephone-exchange system is shown in which a series of main lines enter each station, on each of which any number of subscribers are grouped for signaling purposes, and in which each subscriber can switch his instrument at will onto any line. In both the systems above mentioned, when the central office signals one station or one subscriber calls another, the signal apparatus of all the other stations in the same circuit is operated, and in both arrangements all the subscribers can switch their instruments at will onto any line of the system, so that there can be no privacy, and I therefore disclaim both the systems above mentioned.

In the foregoing specification I have described a system of multiple lines in which are provided means by which the central office can call any one station without operating the call at any other station, and switching arrangements by which the subscribers require the aid of the central office before they can switch their instruments onto any wire of the system, except the wire on which they signal the central office, thus securing absolute privacy, and giving the central office control.

What I claim is as follows:

1. In telephone-exchange systems, the combination of the following elements: a central office connected by a given number of wires with a larger number of stations, two or more of the wires being taken to each station, in each station an individual call operated only from the central office, and the within-described switch, connecting at will subscribers' instruments with a particular wire, and by joint action with the central office connecting such instruments with any wire of the system, all as herein set forth.

2. In a subscriber's station of a telephone-exchange system, the combination of two electro-magnets placed on separate wires connected with the central office, and armatures and levers for the purpose of operating an indi-

vidual call and switching the instrument in and out of circuit, the armature of the first magnet breaking the circuit at the second magnet, and the armature of said second magnet liberating said levers, substantially as described and shown.

3. In each station of a telephone-exchange system, the combination of an electro-magnet and pivoted levers, forming a short circuit around the telephone, operated through the armature of said electro-magnet by currents from the central office to control the short circuit, with a switch operated by each subscriber to cut his instrument in and out of circuit with another station, all as herein set forth.

Quebec, July 12, A. D. 1884.

EDWIN POPE.

In presence of—
DAVID GOUGE,
HENRY BROWN.