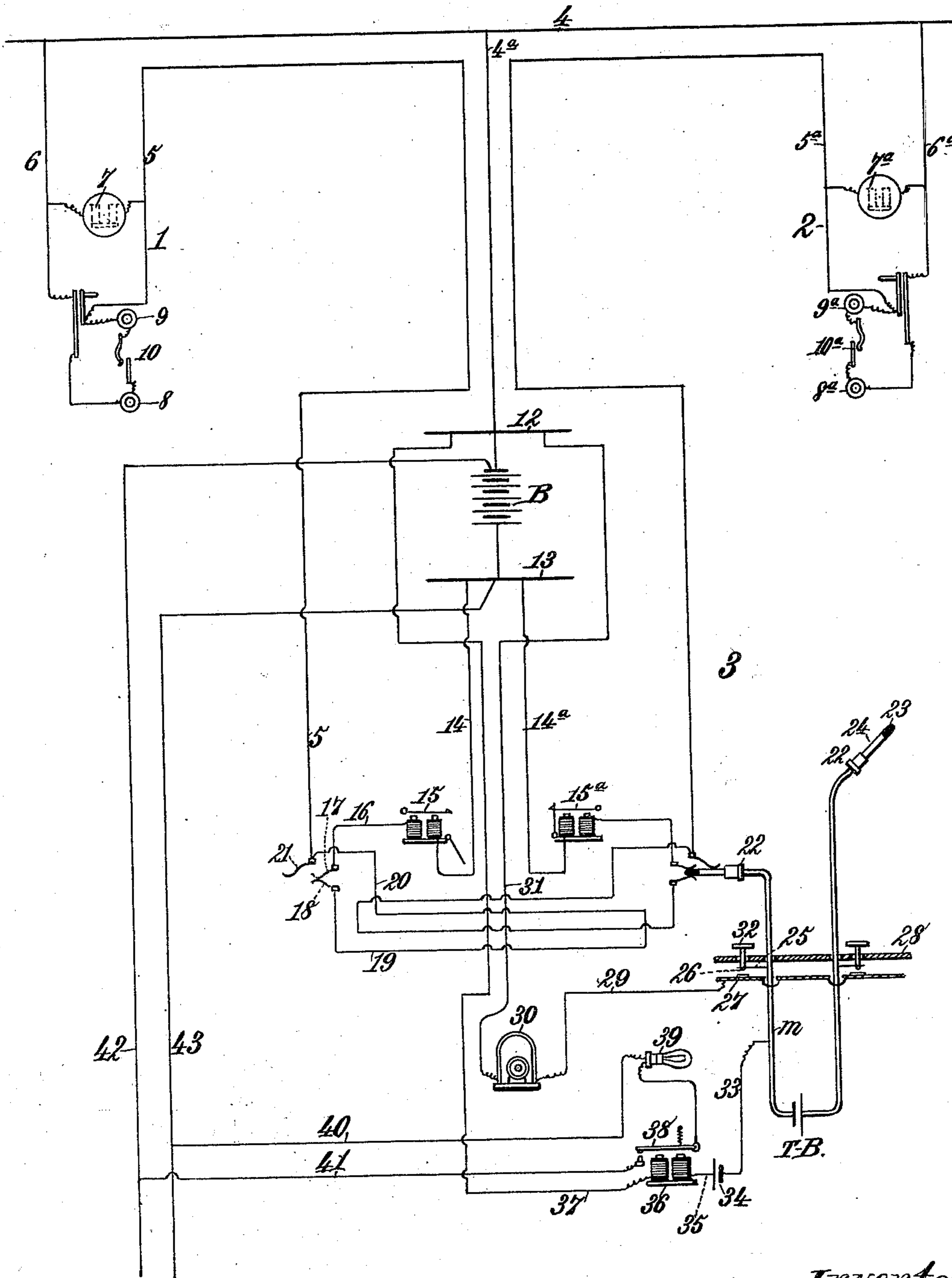


(No Model.)

P. MINNIS.
TELEPHONE EXCHANGE SYSTEM.

No. 561,418.

Patented June 2, 1896.



Witnesses:
Robert Everett
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UNITED STATES PATENT OFFICE.

PAUL MINNIS, OF MOBILE, ALABAMA, ASSIGNOR OF ONE-HALF TO THE
HOME TELEPHONE COMPANY, OF SAME PLACE.

TELEPHONE-EXCHANGE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 561,418, dated June 2, 1896.

Application filed February 17, 1896. Serial No. 579,646. (No model.)

To all whom it may concern:

Be it known that I, PAUL MINNIS, a citizen of the United States, residing at Mobile, in the county of Mobile and State of Alabama, have invented new and useful Improvements in Methods of Telephonic Communication, of which the following is a specification.

My invention relates to means for preventing inductive disturbances upon telephone-circuits, my object being to connect a series of subscribers' circuits with a common return-wire, talking sets directly in the line-circuits, and talking-batteries in loop-cords at the central station, the arrangement being such that the polarity of the several talking-batteries in the return-wire shall be the same at all times.

My invention also comprises other novel points whereby I am enabled to greatly simplify and expedite the telephone service and improve the same, all of which will be fully explained hereinafter and then particularly pointed out and defined in the claim which concludes this specification.

To enable those skilled in the art to which my invention pertains to fully understand and practice the same, I will now describe said invention in detail, reference being had for this purpose to the accompanying drawing, in which the figure is a diagram showing an arrangement of circuits for a multiple-station system, two line-stations, a central station, and the necessary connections being included.

In said drawing the reference-numerals 1 and 2 indicate, respectively, two line-stations, and the numeral 3 denotes a central station. Along the series of line-stations is led a single wire 4, which I will hereinafter term the "common return-wire." This wire is of a diameter sufficient to equalize the combined resistance of all the service-wires connecting the several line-stations in the system to the central station and the return-wire. The latter is not grounded or connected to earth at any point.

From the several line-stations service-wires are led to the return-wire 4 and to the central station, where they are connected to the line-jacks. These service-wires, which are denoted by the numerals 5 and 6 in the diagram, are arranged at each line-station so as to form two branches, which may be parallel in or-

der to give convenient bridging connection to the terminals of the bell-coils 7, which are wound for a high degree of self-induction. Beyond these terminals the ends of the two branches of the service-wire are connected to one terminal of the transmitter 8 and one terminal of receiver 9, respectively. The circuit is normally open at each subscriber's station by means of a switch 10. (Shown conventionally in the drawing and explained in detail hereinafter.) Said switch is opened automatically when the person using the telephone moves his hand from the handle supporting the transmitter and receiver.

From the return-wire 4 a tap-wire 4^a is carried to a single battery or generator B, usually placed in the central station. Opposite each pole of said battery is a spread terminal, to one of which (denoted by the numeral 12) the tap-wire 4^a is connected before passing to the adjacent pole of the battery. A continuation of the tap-wire 4^a connects the other pole to the second spread terminal 13, and from the latter a wire 14 is carried to an annunciator 15, which has a number denoting the line-station 1. A similar wire 14^a goes to a second annunciator 15^a, which is identified with line-station 2. These and other parts which are mere duplicates require no separate description, and I will denote the same by reference-numerals which are similar to those used on the parts actually described, but differentiated by adding the letter "a."

From the annunciator 15 a wire 16 is carried to annunciator spring-contact 17 of the corresponding line-jack in the switchboard, which is, until the plug is inserted, in electrical contact with a second annunciator spring-contact 18, from which annunciator multiple wire 19 is carried through the annunciator multiple spring-contacts of all corresponding multiple jacks, beyond the last of which it is connected to line multiple wire 20, which line multiple wire 20 is carried back across the switchboard to the line multiple spring-contacts of all corresponding multiple jacks, and finally to line spring-contact 21 of the corresponding line-jack, from which line spring-contact 21 the service-wire 5 is carried to the line-station 1.

At the central station each flexible cord is provided, as usual, with two plugs 22 at the

end of the cord. Each plug is provided with an insulating point or tip 23 and a conducting-body portion 24, and when inserted in the line-jacks or multiples the annunciator spring-contacts 17 and 18 will be separated, and resting on the insulating-point of the plug the circuit which includes the annunciator will be opened at this point, and line spring-contact 21 rests upon conducting-body 24, thus completing the connection between the service-wire 5 and the conducting-body 24.

Each flexible cord is divided between its ends and the two parts are connected to the opposite poles of a small battery TB, which I term the "talking-battery." One of the parts of each flexible cord is connected by a conducting spring-strip 25 to a contact 26, arranged over a conducting-piece 27, which I usually place beneath the switchboard-apron 28. This strip or conducting-piece 27 is connected by a wire 29 to one pole of a magneto call-generator 30, its other pole being connected by a wire 31 to the first spread terminal 12, from which point the circuit is completed by the tap-wire 4^a, return-wire 4, one branch of service-wire 6, bell-coils 7, the other branch of the service-wire 5, to the spring-contact 21, and thence by the plug 24 and flexible cord to the contact 26, conducting-piece 27, and wire 29 to the magneto 30. The contact 26 is pressed against the piece 27 by a pusher 32. By pressing the pusher, therefore, when the plug is inserted in one of the line-jacks or one of its multiples the operator at the central station can ring the bell at the corresponding line-station.

The series of talking-batteries all have the same pole turned toward and connected to the return-wire, and the arrangement at the central station is such that this same polarity throughout the series is preserved when the batteries are plugged in.

Connected to one member of each flexible cord is a wire 33, which leads to one pole of a "ring-off" battery 34, so arranged that the pole to which said wire is connected is similar or of the same polarity as the pole of the battery TB with which the connected member of the flexible cord communicates. For example, if the part *m* of the flexible cord is connected to the negative pole of its battery TB, then the wire 33 is also connected to the negative pole of the battery 34, whereby said batteries are in opposition and cannot short-circuit. From the other pole of the battery 34 a wire 35 leads to one terminal of electromagnets 36, and from the second terminal a wire 37 leads to the first spread terminal 12, the circuit being completed by tap-wire 4^a, return-wire 4, one branch of service-wire 6, the connections and switch of the telephone, the other branch of the service-wire 5, spring-contact 21, plug 24, flexible cord, and wire 33. The electromagnets 36 thus energized attract an armature-switch 38, which closes the circuit of a small incandescent lamp 39, which is in multiple-arc connection through wires

40 and 41 with open-circuit wires 42 and 43, leading from the opposite poles of the main battery B. The circuit of the ring-off battery 34 is closed at the corresponding line-station by a switch, which the subscriber must close in order to cut his transmitter and receiver into circuit. This switch is automatically thrown open as soon as the telephone is released by the user's hand, and the circuit of the ring-off battery being thus opened the armature-switch, being no longer attracted, opens also, breaking the lamp-circuit and extinguishing the lamp 39. This is a signal to the operator that communication between any two line-stations is at an end. I thus avoid the constant neglect of those using the wires to ring-off when conversation ceases, as well as the annoyance and delay of compelling the central-station operators to make constant inquiries whether connected stations are still in communication. The questions are sometimes not answered and then stations are cut out in the midst of a conversation. They are a source of continual annoyance to all concerned, and as they frequently provoke sharp replies the central-station attendants dislike to ask them, and when asked the attendant must either wait to make sure there is no reply or run the risk of cutting out stations which are actually transacting business. My invention avoids all these objections and leaves no act to be performed by the person using the telephone except to release the handle of the instrument, by which the central station is at once notified that the line is no longer in use between the stations. Each divided flexible cord has one of its members or parts connected in the manner described with a separate ring-off battery 34, the connected pole of which is opposed to the like pole of the battery TB, which is also connected to the same part of the flexible cords. These ring-off batteries are all independent, each operating its own electromagnet 36; but the local circuits, each embracing one of the armature-switches 38 and one of the lamps 39, are all in multiple-arc connection with the common pair of open-circuit feed-wires 42 and 43 by means of tap-wires 40 and 41, there being one of these local lamp-circuits to each ring-off circuit.

What I claim is—

A series of subscribers' circuits connected to a common return-wire, a series of talking-sets directly in the line-circuits and talking-batteries in loop-cords at the central station, the arrangement being such that the polarity of the several talking-batteries in the return-wire shall be the same, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

PAUL MINNIS.

Witnesses:

CLAYTON B. CLARK,
WILLIAM H. SULLIVAN.