

(No Model.)

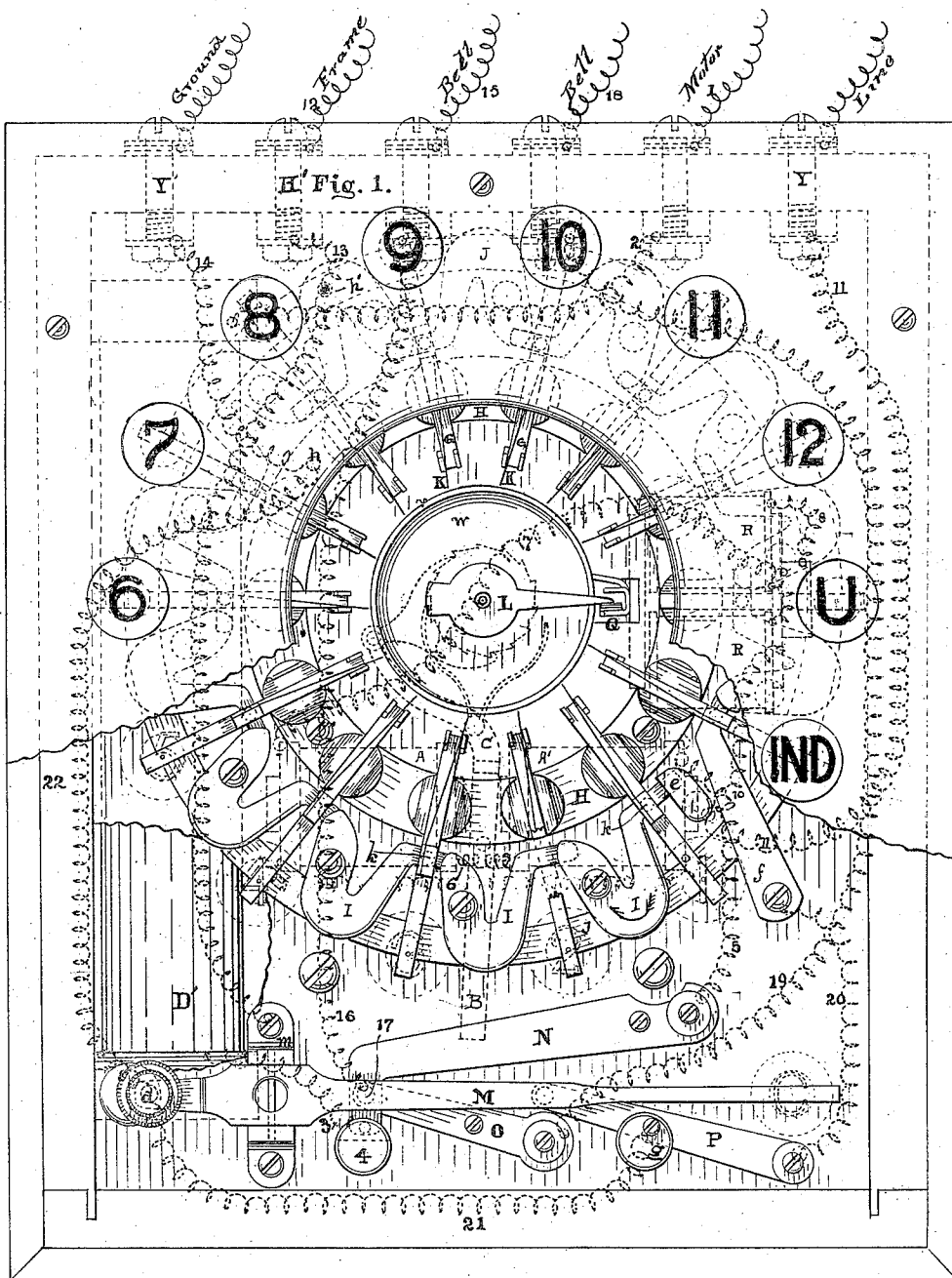
2 Sheets—Sheet 1.

J. P. STABLER.

CENTRAL OFFICE INSTRUMENT FOR TELEPHONE LINES.

No. 306,360.

Patented Oct. 7, 1884.



Witnesses:
J. C. Turner
L. C. Mills

Inventor:
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R. D. Smith

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2

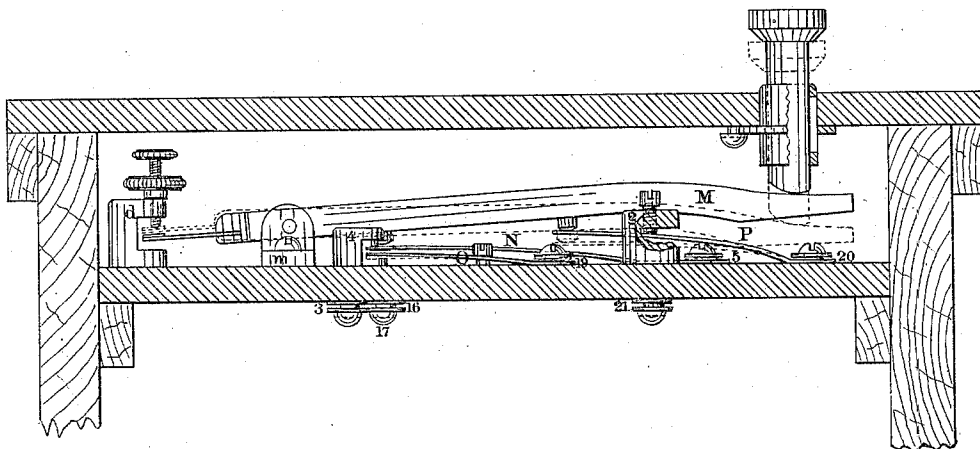
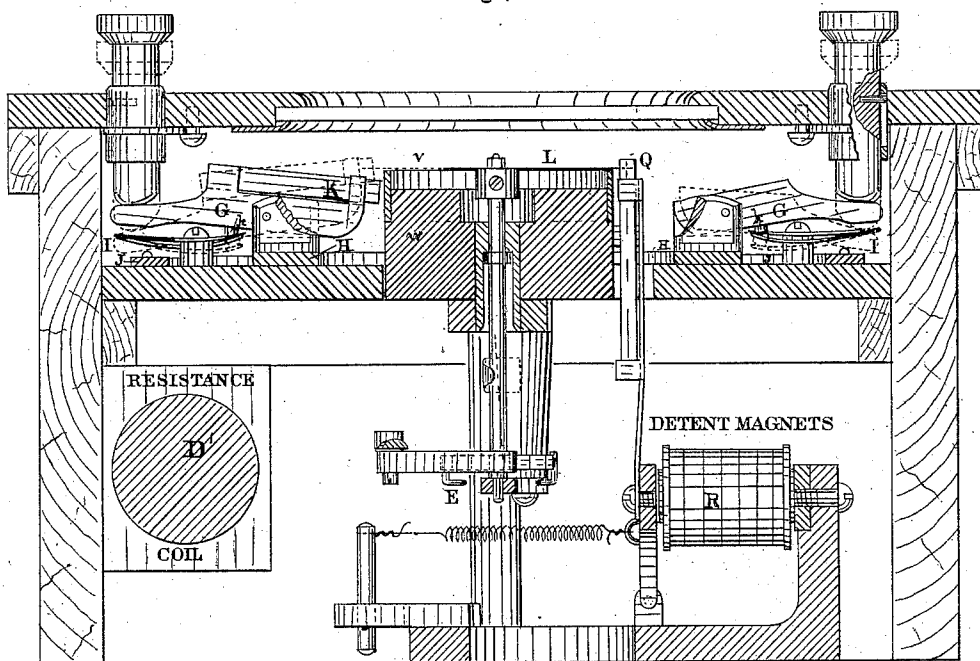


Fig. 3



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UNITED STATES PATENT OFFICE.

JAMES P. STABLER, OF SANDY SPRING, MARYLAND.

CENTRAL-OFFICE INSTRUMENT FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 306,360, dated October 7, 1884.

Application filed January 26, 1884. (No model.)

To all whom it may concern:

Be it known that I, JAMES PLEASANTS STABLER, of Sandy Spring, in Montgomery county, and State of Maryland, have invented a new and useful Improvement in Individual-Call Apparatus for Telephone-Lines; and I do hereby declare that the following is a full and accurate description of the same.

This invention relates to improvements in the "central-office instrument" employed in my system of individual calls for telephone-lines for which Letters Patent No. 265,455 and No. 265,456 were granted to me October 3, 1882; and it consists, principally, first, in a normal ground-loop connection for the line, whereby the break in the circuit through the instrument-line to ground is bridged when the instrument is not in use without throwing its motor-magnets and other initial resistance into the line with which it may be connected; second, in the strong or re-enforce current switch-key; third, in a resistance-coil in the motor-magnet circuit, but not in the strong or re-enforce circuit, whereby the effective margin or difference in strength is increased without corresponding increase in the size of the generator.

Other minor improvements in mechanical structure will be noted in the description and claims.

That my invention shall be fully understood, reference is hereby made to the accompanying drawings, wherein Figure 1 is a plan of my central-office instrument as now constructed and in use on telephone-lines in various parts of the United States. Fig. 2 is a sectional elevation, showing the re-enforce-current key and connections. Fig. 3 is a vertical transverse section through the center of the dial.

The general operation of the instrument to move the revolving index, and coincidently therewith the several traveling switches of the local-station call-boxes, is well known, and for convenience in this description it will only be necessary to enumerate and designate by letter the principal operative parts, and then particularly describe the several improvements, to convey a clear understanding of the whole.

A A' are the motor-magnets. R is the detent-magnet. L is the index, which is electri-

cally connected with the motor-circuit, and passes the motor-current back to the generator when arrested by the proper station-key G, and thereby cuts out the line and causes the coincident arrest of all the traveling switches at the local stations on that line. The station-keys G are severally pivoted upon the inner ring, H, which has an electrical connection with the ground-post Y' at h. When the station-key G is depressed, it makes electrical contact with the outer ring, J, having at h' an electrical connection by wires 13 and 12 with post H' and the frame side of the generator. Thus said generator is given a connection with the ground when contact between rings H and J is made by the depression of one of the keys G, and when depressed so as to make electrical connection between said rings the generator-current is to the line-post Y and to the line through the motor-magnets, frame, and detent-magnets, causing the index L to rotate until arrested by the spring-extension K of the key G. At the instant of contact and arrest of the index by said key the current is short-circuited through said index-key G and ring J back to the frame side of the generator, and the line being thereby cut out, all the traveling switches at the local stations coincidently come to rest; but when a call has been made by the central-office instrument it is still expedient to have a ground-connection for the line in order that the telephone of the operator may, if desired, be looped directly into the line between the calling-instrument and a "call-bar" on the switch-board, which is the custom in some exchange systems, and it is more convenient to have said ground-connection in the central-office instrument, and arranged to be broken automatically by the act required to put said instrument in use, than to have a separate switch for that purpose. I have therefore arranged a series of insulated springs, I, in the annular space between rings H and J, one of said springs being under each of the keys G, but insulated therefrom, and so adjusted that the depression of either one of said keys will break contact between said spring and the adjoining spring of the series. The electrical connections in the ground wire from Y' are such that when the central-office instrument is out of use one end

of said series I is in connection with the ground-wire at Y' and the other end is in connection with the line-post Y and with the detent-magnets R, by which means a short circuit is established between the line and ground independent of the closure of the break between H and J, whereby the resistance of the instrument is thrown into the circuit. The depression of either key G, however, opens the normal ground-circuit through the series I by breaking contact between two of the springs of said series, and by the same depression of said keys the ground-circuit of the generator is closed by contact of said key G with ring J, and the motive current passes through the instrument.

For convenience I arrange the springs I to lift off the keys G and maintain them in normal position out of the path of the index L, and to elongate them sufficiently for this purpose I make them of sheet metal in the serpentine form shown, and mount each one upon a separate insulated stud projecting from the cover-plate, which I find it desirable to make of vulcanized rubber. An insulating-button, *k*, is interposed between the key and its spring I.

For convenience I make the first of the series I elongated and attached to the cover-plate outside the ring J, as at *f*; but this is mainly for convenience of attachment of the conductor and to afford space for the post *e* at the termination of the series I, said post being also in the circuit from the motor-magnets A A' to the line-post Y.

The armature-springs of the detent and bell magnets are all set with tension too great to be overcome by a current which is sufficient to actuate the armatures of the motor-magnets and overcome the mechanical resistance of the indexes and other moving parts, and the requisite difference between the currents to actuate the motors and to ring the bells may evidently be attained by proper difference in the capacities of the generators employed to supply the currents; but I prefer to obtain both currents from a single generator arranged so that the current may be taken from a part or the whole of the generating-surfaces at will, and to increase the margin of difference in strength between the currents I insert a resistance-coil, D, in the weaker or motor current.

The normal ground-loop described above requires a modification of the contact of the switch-key M, whereby the stronger current is sent to the line. This modification essentially is in the contact-spring P, in electrical connection on the one side with the series I (at *f*) and on the other with the ground-post contact *g*. When said key is depressed to switch the stronger current to the line, the ground-connection is broken at the post *g* by the same act which opens contact in the motor line or post 4, and closes contact with the spring O and pin 17 and post *d*, whereby the

stronger or bell current is sent to the line. At this point it is proper to say that I prefer to employ the generator for which Letters Patent No. 286,497 were granted to me on the 9th of October, 1883, the stronger or bell current being taken from said generator at two commutator-brushes and united by the contact of springs O N and pins 17. If independent generators are employed for the motor and bell currents, then the contact-spring O could be dispensed with. The normal motor-current, after passing the resistance D, goes to the contact-post 4, and thence through the contact-spring N to the motor-magnets, &c. When the ground-connection of the line is broken at post *g*, the ground-connection of the generator is by the same act restored to post *d*, which is in electrical connection with the frame side of the generator by way of the key M and its supporting-standard *m*.

I will now trace the electrical connections under the several conditions of the use of the central-office instrument.

First. Out of use: The normal ground-connection is as follows: line-post Y to post *e*, through springs I to terminal at *f*, thence by wire 20 to spring P, post *g*, wire 21 to post *d*, wire 22 to connection *h*, wire 14 to binding-post Y', wire to ground.

Second. To call a station: Key G is depressed. Ground-connection is thereby broken in series I and closed on generator by closing connection between rings H and J. The electrical connection then is from ground by wires to post Y', wire 14 to connections *h* on ring H, by key G to ring J, by wires 13 and 12 to frame side of generator, by wires 1 and 2 to resistance D, wire 3 to post 4, spring N, wire 5 to motor-magnets A A', wire 7 to frame and detent R, wire 10 to post *e*, and wire 11 to post Y and line.

Third. When index L is arrested by contact with the key G, the current is short-circuited back through said index and key to ring J, wire 13 to frame side of generator, and the line is cut out. The key G is then released, and the normal ground-connection is then restored.

Fourth. Then, to send the stronger current to ring the local station-bell, the key M is depressed, opening contact at *g* and 4 and closing contacts at *d* and between N O and pin 17. The circuit will then be from ground by wire 14 to connection *h* on ring H, by wire 22 to post *d*, key M, standard *m*, wire 13 12 to frame side of generator, wires 15, 16, 18, and 19, from bell-brushes of said generator to spring O and pin 17, respectively, spring N, wire 5, motor-magnets A A', wire 7, detent-magnet wire 10, post *e*, wire 11, post Y, and line. Upon releasing the key G the normal ground-connection is again restored, the key M is insulated from springs N and P, unison shunt dispensed with, and the detent-magnets placed in the direct line-circuit, resulting in simplified structure, and, still more important, the

detent-armature is actuated by the stronger or re-enforce current whenever a subscriber's bell is rung, and acts as a sounder, and thus indicates to the operator that the current is flowing, and aids him in determining the length of the signal which he is making at the distant station.

Having described my improvement, I claim as new—

1. In a central-office instrument, in combination, a generator of electricity, motor-magnets, a revolving index, a series of radial station-keys provided with stops to arrest said index, a ring with which said keys severally make contact to close circuit with the generator, and a normal ground-loop for the line, arranged to be broken automatically by the depression of either one of said keys.

2. In a central-office instrument, the motor-magnets, a revolving index, detent-magnets, a series of radial station-keys provided with stops to arrest said index, a ring with which said keys severally make contact to close the ground-connection of the generator, and a series of contact-springs, I, in electrical connection with the ground and with the line, to constitute a normal ground-connection for the line, said springs being arranged so as to open said ground-connection automatically under depression of one of said keys.

3. In a central-office instrument, the motor-magnets, revolving index, and series of radial keys, whereof the depression of either one closes the ground-connection of the generator, combined with a series of springs, I, insulated from said keys by buttons *k*, arranged to lift said keys and maintain them in normal position, and at the same time form a series of contacts and a normal ground-connection for the line, subject to be opened by depression of either one of said keys, as set forth.

4. In combination in the central-office instrument and with a generator of electricity from which at will currents of different strength may be sent to the line motor-magnets, a re-

volving index and detent the magnets whereof are in the motor-circuit line, whereby when said detent is actuated by the stronger or re-enforce current the detent-armature will act as a sounder to indicate to the operator that the instrument has acted properly.

5. The combination, in a central-office instrument, and with a generator of electricity from which at will currents of different strength may be sent to the line motor-magnets, a revolving index, detent, detent-magnets, and a resistance-coil in the weaker of said circuits, whereby the margin of difference between the weaker and stronger current is increased independent of the generator, as and for the purpose set forth.

6. In combination in the central-office instrument, the rings H and J, the keys G, pivoted upon the ring H and arranged to make contact with the ring J, the ground-loop springs I, the ground-wire 14 in contact with the ring H and with the ground-loop spring I and line, wires 12 and 13 from ring J to one terminal of the generator, and a conductor from the other terminal of the generator to the motor-magnets and line, whereby there is secured a normal ground-connection for the line through the instrument, and upon depression of one of said keys the generator and motor parts of said instruments are put into line, as set forth.

7. In the central-office instrument, the motor-magnets, revolving index, detent, and detent-magnet, the ground-loop spring I, combined with the key M, with its associated contacts *d* 4 17 N O *g* P, whereby when said key is depressed said normal ground-loop connection is broken at *g*, ground-connection for the generator is closed at *d*, and the re-enforce currents sent to said magnets and the line, as set forth.

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Witnesses:

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