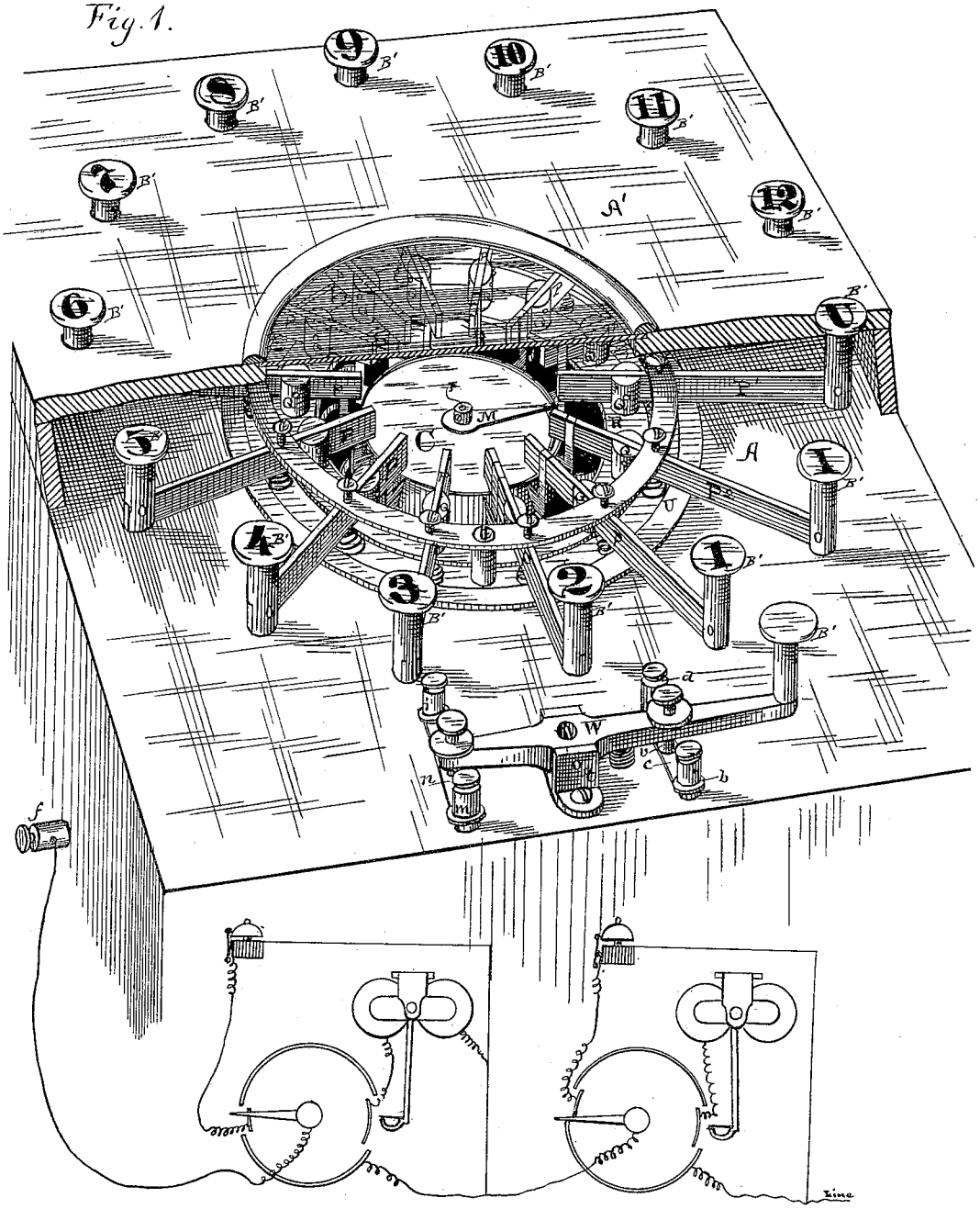
(No Model.) 3 Sheets—Sheet 1.

J. P. STABLER.

COMBINED KEY BOARD, AUTOMATIC SWITCH AND MAGNETO GENERATOR FOR TELEPHONE CALLS.

No. 265,456. Patented Oct. 3, 1882.

Fig. 1.



ATTEST:

J. C. Turner

F. A. Fouts.

INVENTOR:

James P. Stabler

By his atty R. R. Smith

(No Model.) 3 Sheets—Sheet 2.

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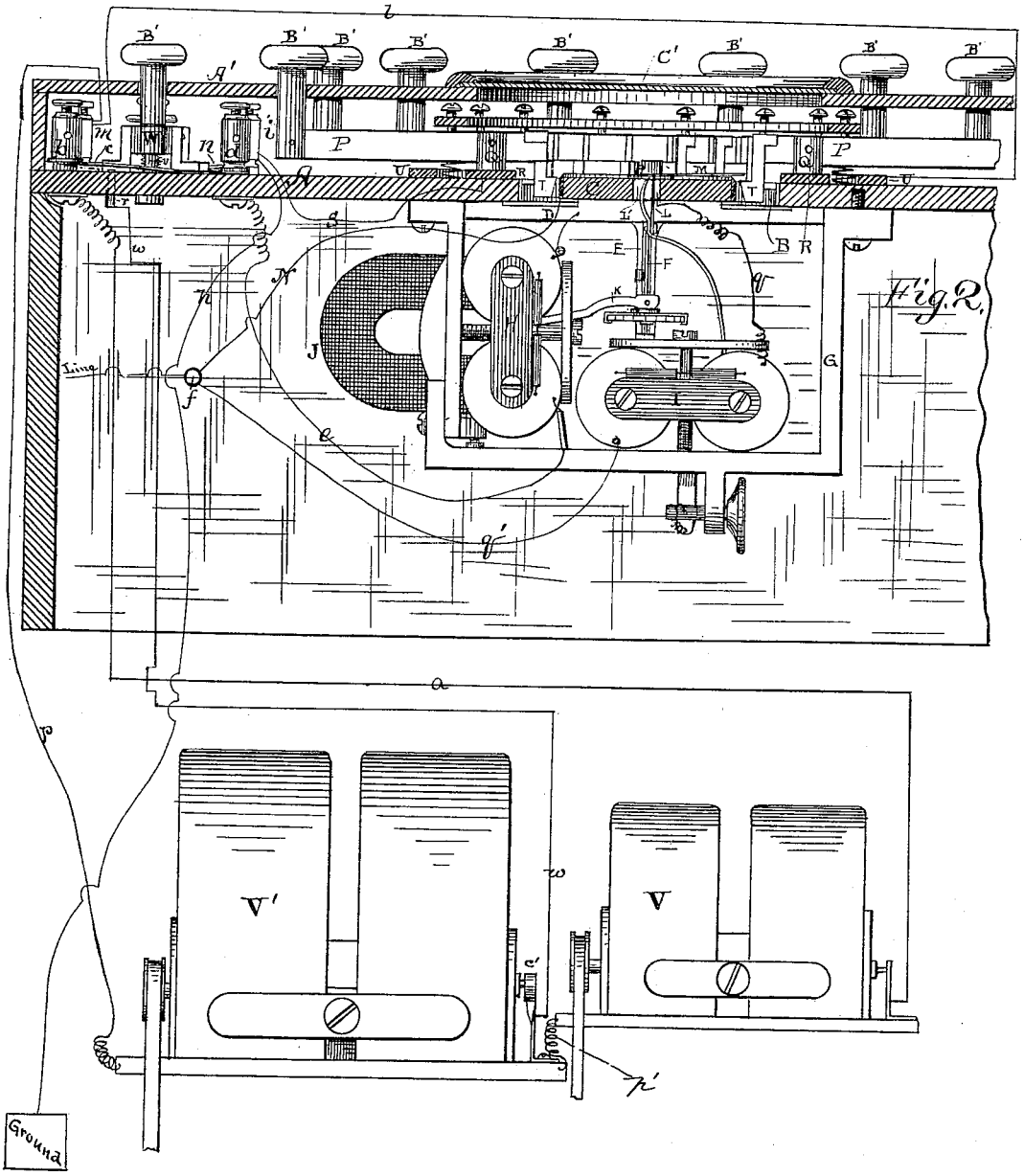

Fig. 2.

ATTEST:

J. C. Turner
F. A. Fouts

INVENTOR:

James C. Stabler
By his Atty R. D. O. Smith

(No Model.)

3 Sheets—Sheet 3.

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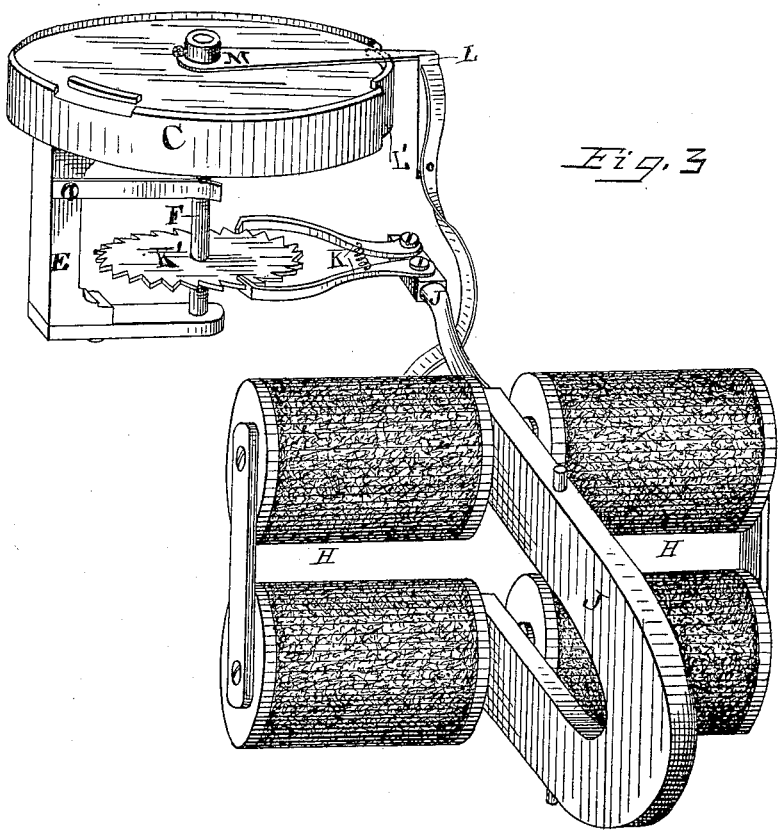

Fig. 3

WITNESSES:

J. C. Turner

Aug. Jordan

INVENTOR:

James P. Stabler

By his Atty

R. D. O. Smith

UNITED STATES PATENT OFFICE.

JAMES P. STABLER, OF SANDY SPRING, MARYLAND.

COMBINED KEY-BOARD, AUTOMATIC SWITCH, AND MAGNETO-GENERATOR FOR TELEPHONE-CALLS.

SPECIFICATION forming part of Letters Patent No. 265,456, dated October 3, 1882.

Application filed May 18, 1882. (No model.)

To all whom it may concern:

Be it known that I, JAMES P. STABLER, of Sandy Spring, Montgomery county, in the State of Maryland, have invented a new and useful Improvement in Combined Key-Board, Automatic Switch, and Magneto-Generator for Telephone-Calls; and I do hereby declare that the following is a full and accurate description of the same.

The instrument shown and described in my Patent No. 235,058 is provided with a pole-changing key, two electro-magnets of opposite polarity, a vibrating polarized armature, and a pawl and ratchet actuated thereby, whereby a revolving index in the electric line is rotated to bring it to a position corresponding with the station-shunt. Said pole-changing key is operated solely by the attendant, and therefore the index can be moved only so fast as said key can be operated. In the use of said pole-changing key the operator is required to determine the time to arrest the index by counting or observing its position, and diverted attention may result in a miscount and a necessary repetition of the operation. In that instrument the index is moved one station by one forward and one backward movement of the vibrating armature, produced by one current in each direction from the generator.

The object of the present invention is to substitute an automatic pole-changer for the manual one above mentioned, and a positive station-stop for a stop depending upon the momentary observation of the operator, so that the manual duty of the operator is limited to the depression of the proper station-key and the holding of it down until the index is automatically brought around to the proper point and automatically arrested. By this means the instrument is operated in less time and with less margin for inaccuracy; but I do not propose herein to claim broadly an apparatus capable of effecting the object above named, because I have done so in another specification heretofore filed in the Patent Office, the serial number whereof is 51,169. In this patent therefore I propose to limit myself to the device substantially as shown herein.

In connection with this improved key-board I propose to employ a series of local-station instruments, the same as or similar to that described in my patent above mentioned, and to actuate the index of each station-instrument by a ratchet-and-pawl movement, also similar to or like that described in said patent. It will therefore be unnecessary to describe herein the particular structure of any part of said instrument, except that pertaining to the key-board and the electrical connections therewith, which form the subject-matter of this patent.

In addition to the advantages as to time and accuracy set forth above, this invention makes it entirely practicable to substitute the ordinary magneto-generator for the troublesome and expensive voltaic battery used by many telephone-exchanges, and at the same time retain all the advantages of my individual-call system.

My invention therefore consists, first, in the application of a magneto-generator to my system of central-office and local-call instruments with motor-magnets operated by to-and-fro currents and revolving indexes in the line-circuit; second, in a central-office instrument having a revolving index in the line-circuit, motor-magnets, a magneto-generator, a ring having connection with the line, and a series of radial station-keys, each capable of making contact with said ring, and thereby closing the circuit, as set forth; third, in a magneto-generator which delivers to-and-fro currents, motor-magnets, revolving index actuated thereby, a series of radial key-levers pivoted on a ring having a ground-connection, stops on said levers to arrest said index, and thereby short-circuit the current to the ground and cut out the line; fourth, in an indicator stop and key, whereby the indexes may be moved from their normal position of rest to give visual notice that the line is in use; fifth, in a central-office instrument whose detent-magnet requires a stronger current than its motor-magnets, two magneto-generators of different strength, the weaker without a commutator and the stronger with a make-and-break commutator, whereby currents of one polarity are taken off, and a switch whereby the current from either generator may at will be passed to the line.

Having now set forth in a general way the nature of my invention, I will more particu-

larly describe the mechanism whereby I can give it effect, without, however, intending to confine myself to the details of structure, because they may be varied without changing the principle of operation, and having reference to the accompanying drawings, wherein—

Figure 1 is a perspective view of my keyboard, &c. Fig. 2 is a vertical section of the same, showing the connections. Fig. 3 is a perspective skeleton view, showing the motor-magnets, vibrating armature, ratchet and pawls, index, and dial in their relative positions.

A is the base or foundation piece, of vulcanite or other proper material, to which I find it convenient to attach all the mechanism of the instrument. A circular opening, B, incloses within it the dial C, also made of vulcanite or other proper material. A bridge plate or bar, D, extends across the opening B beneath the plate A, and supports the dial C in place. The bracket E is also attached to the bar D, and at its lower end supports the step of the index-shaft F. A frame, G, attached to the bar D, and also attached directly to the base A, supports the motor-magnets H and the detent-magnets I.

The mechanism above named, together with the vibrating polarized armature J, double pawls K, ratchet K′, detent L, and the detent-shunt L′, is similar in all things except relative arrangement to the corresponding parts described in my patent above named.

The index moves around in contact with the rim of the dial C, and thereby in direct electrical connection with the line-circuit wire N; but said index may be arrested in a position corresponding with the bell-shunt of any particular station by depressing the outer end of the proper station-key lever P, which thereby brings the elastic stop T up in the path of said index. The station-key levers P are radially mounted on posts Q, which are set on a ring, R, surrounding the opening B, and said ring has a ground-connection by means of the wire S. The inner end of each of said key-levers is provided with a projecting elastic stop, T, which is raised so as to cut the path of the index M whenever the outer end of the key-lever is depressed, and said index is thereby arrested when it has rotated that far. Each key-lever P, with its elastic stop T, is located as to the dial in a position corresponding with the last pause on its shunt of the index of one of the local-call instruments. When the index M encounters the stop T the current is immediately short-circuited through said key, and all the local-station instruments are thereby cut out. Their indexes therefore all come to rest when the index M is arrested. This has been fully explained in my specification above mentioned, wherein it is made the subject of claim. In that case there are two circuit-closers in the line; but in this invention I employ but one—viz., at contact of the key-lever P with the ring U. This I am enabled to do, because when used with the station-instruments described in another specification, which I filed in the Patent Office on May 1, 1882, the generator requires no commutator, the station-instrument shunts being made longer in relation to the pawl-movement than heretofore, so that each index in passing over its bell-shunt is required to make at least two pauses on said shunt; and as no index can lag more than one movement behind its proper position on account of insufficiency of the initial operative current it follows that at the time of coming to rest it must at least have reached the position of the first pause on the shunt. It is therefore of no practical importance whether or not the initial operative current is of full strength and duration, because the second current is sure to be so. I am therefore enabled to dispense with the commutator and to take the currents from the generator as they may come. It is this which enables me to depend upon a single circuit-closer in the line. This is fully explained and claimed in my said patent filed May 1, 1882, and for that reason allusion to it herein is merely explanatory. Each key-lever P has an extension past the post Q toward the center sufficiently long to afford an attachment for the elastic stop T, and the center space over the dial C is therefore open, and said dial is visible, so that the operator may observe the movement of the index.

One of the key-levers, which I indicate by P′, I call the "unison-key." It is unprovided with an elastic stop T, because at that point there is arranged a detent, L, which arrests the index upon a shunt, L′, which is connected with the line by way of the detent-magnets; but the motor-current is insufficient to overcome the resistance of the armature-spring of the detent-magnet to withdraw the detent L and liberate the index. A stronger current must therefore be sent over the line when said magnet I is to be sufficiently charged to withdraw said detent. This stronger current may be derived from an augmenting auxiliary source of electric energy of some kind, or from an independent stronger source. I prefer the latter, and therefore provide a second but stronger magneto-generator, V′. As I have explained in my specification filed January 24, 1882, No. 51,169, another one of the key-levers is devoted to a local-station shunt, the position of which is common to all the station-instruments on the line, said station-shunts being connected with the line-circuit, as described in another specification of mine, filed May 1, 1882. When subscribers on the same line desire to communicate with each other after the call has been made the index is moved around to this additional shunt, away from its normal position of rest on the unison-shunt, and the displaced position of the index then gives visual notice to all other subscribers that the line is in use. I find it convenient to locate said shunt adjoining the unison-shunt connecting with the line by way of the detent-magnets,

and to appropriate the key-lever P^2, next adjoining the unison key-lever P′, to the purposes of the indicator.

The magneto-generator V, which is of any proper construction, is without a commutator and delivers to-and-fro currents, as is well known. The organization of the motor-magnets H is such that to-and-fro currents are required to operate the polarized armature. These have been described in my specification before alluded to, filed January 24, 1882.

Having preferred to employ a magneto-generator to operate my call, I find it preferable to employ a separate generator, V′, to produce the stronger current required to operate the detent and bell magnets, as heretofore explained. The generator V′ is provided with a make-and-break commutator, c', and delivers currents of one polarity only through wire w to the contact-pin r. Separate generators being employed, it is necessary to adapt the electrical connections so as to switch the weaker current off and the stronger current on the line at will. As has been heretofore explained, when the index is arrested by the stop T the current is short-circuited and the line cut out, and it is therefore necessary to break the contact between said index and the stop before the stronger current is switched on, and said contact is broken by releasing the key-lever P and opening the circuit at the ring U. It thereby becomes necessary to close the circuit again elsewhere when the stronger current is switched on, and I find it convenient to do this by an arrangement of contacts with the key W, which is pivoted on a post, t.

For convenience I connect the frames of the generators V V′ by wire p', and thus make the frame of said generator V′ a part of the ground-circuit of generator V. The generator-frames are connected by means of the wire p with the binding-post m, and thence by wire l to the ring U, these connections forming part of the ground-circuit common to both generators. This circuit is open when the key-lever P is not depressed, so that it is not available when the stronger current is switched on.

The wire a, post b, contact-switch spring c, post d, and wire e form the electrical connection between the weaker generator, the motor-magnets, and the line.

The key W toward one end is provided with an insulated button, u, which rests on the spring c, and when said key is depressed said contact-switch spring c is caused to break contact with post b and make contact with pin r, whereby the stronger current is switched on the line, and by the same movement the contact-spring n is suffered to make contact with the ground-post i, completing the ground-circuit by way of wire p, post m, spring n, ground-post i to the ground.

For convenience the ground-post i is interposed in the ground-connection of the ring R. Therefore when the stronger current is switched onto the line by contact of switch-spring c with the pin r the circuit is at the same moment closed at post i, and said stronger current is enabled to pass over the line to the detent or bell magnets, as the case may be. The generator V delivers to-and-fro currents, and the vibrating armature is always moved in the same direction by a current of given polarity. The elastic stops on the key-levers are so arranged as to make contact with the index at or near the completion of a movement of said armature, due to a current in one and the same direction, and it follows that the make-and-break commutator of the generator V′ must be adjusted so as to give its current of that polarity; also, in order that its passage over the line shall not move the indexes and throw the bell upon which the call is to be made out of circuit. This arrangement permits the call to be prolonged or repeated.

The action will be fully understood by following out the connections from the generator, as follows: First, as to the currents from the generator V which actuate the indexes of the central-office and local-station instruments. Supposing one of the key-levers P, P, P′, or P^2 to be depressed, and thereby the circuit be closed at the ring U, the connection will be from the frame of the generator which is in electrical connection with one terminal of the revolving armature-helix by wire p to the post m, thence by the wire l to ring U through one of the keys to ring R, and thence by wire S to post i and wire h to the ground. The interruption of this circuit at ring U prevents the passage of any currents. From the opposite terminal of the revolving armature-helix of the generator V the current passes by wire a to post b, contact-switch spring c to post d, thence by wire e to the motor-magnets H, frame G, index M, rim of dial C, wire N to line-post f, and thereby, the current being to and fro, the index M (and all the local-station indexes in circuit) is actuated and moves along the dial-rim until arrested by one of the stops T or the detent L, and if by the latter at that moment said index will have left the dial-rim and will be resting on the detent-shunt L′, whence the current is diverted to the wire q, detent-magnets I, wire q', and line-post f; but the regular operative current is not sufficiently strong to overcome the resistance of the detent-armature spring, and the stronger or re-enforced current is then thrown on the line by depressing the key W, which effects a change of contacts, so as to break contact with the post b and make contact with the pin r, as hereinbefore described.

The key-board of the central-office instrument herein described and claimed is horizontal in position, and therefore exposed to accumulations of dust between and under the keys and in the internal mechanism, unless protected, and I therefore place over the whole a cover, A′, provided with holes through which the finger-knobs B′ of the keys may protrude. The cover A′ may be made of any suitable ma-

terial, and if opaque a central section, C′, over the dial may be glazed with transparent glass, so that the operator may see the index as it moves.

The knobs B′ may be detached from the levers, being kept in position by guides or by the sides of their holes; but I prefer to joint the lower ends of said knobs to their respective keys, and thus insure their proper position.

In Fig. 1 the keys are represented as corresponding with stations 1 to 12; but it will be understood that it is not necessary that there shall be twelve stations on any one line. One or more of said keys may remain out of use, or the central-office instrument may be provided with any desired number of keys greater or less than twelve. The key P′ has upon its knob the letter "U," which denotes "unison-detent," and the key P^2 has upon its knob the letter "I," which denotes "indicator."

Having described my invention, what I claim as new is—

1. In a telephone-line, a series of call-instruments with moving index-switches and motor-magnets, all in the line, and local shunt-circuits, combined with a magneto-generator of electricity, and a circuit-closer for the operation of the same.

2. In a telephone local-call central-office instrument, the combination essentially as follows: a magneto-generator, motor-magnets, revolving index in the line-circuit, series of radial station-keys, levers, stops severally controlled by said keys to arrest said index, a ring against which said keys severally make contact to close circuit, and a ground-connection for said ring.

3. In a telephone local call central-office instrument, the combination of a magneto-generator without a commutator, motor-magnets actuated by to-and-fro currents therefrom, a revolving index in the line-circuit, a series of radial key-levers severally mounted on a ring having a ground-connection, and stops severally attached to said keys to arrest said index, a ring against which said keys make contact to close circuit, whereby circuit is closed by depressing one of said key-levers, and contact of the index with the stop of said depressed lever will short-circuit the current to the ground and cut out the line.

4. In a telephone local-call central-office instrument, a source of electric energy, motor-magnets, and a revolving index in the line-circuit, actuated by said magnets, unison-detent shunt, and a series of radial station stop-key levers, whereby said index may be arrested, combined with an indicator stop-key, P^2, whereby the index may be moved to a position aside from its normal position of rest, as and for the purpose set forth.

5. In a telephone local-call central-office instrument, a revolving index in the line-circuit, a dial-rim for contact of the same, a detent or unison shunt interposed in said rim, and motor-magnets to actuate said index detent-magnets, the armature-spring whereof will not yield to the currents which actuate the motor-magnets, combined with two magneto-generators of different generative powers and a suitable key-switch, whereby the weaker or stronger current may be passed to the line at will.

6. A telephone local-call central-office instrument comprising motor-magnets, a dial, revolving index, and series of radial station-keys, combined with a projecting cover, A′, provided with perforations to admit the protrusion of the finger-buttons B′, and a transparent center over the dial, as set forth.

7. The secondary circuit-closing and switch key W, which does not form a part of the circuit-conductor, combined with the contact-switch spring *c* and contact-closing spring *n*, and the line and return circuit connections, substantially as set forth.

8. In a telephone local-call central-office instrument, motor-magnets, a vibrating armature, and a revolving index actuated thereby, combined with a series of radial key-levers provided with elastic stops, said key-levers and stops being arranged with reference to the movements of said armature so as to arrest said index at or near the conclusion of a movement of said armature in the same direction, whereby a stronger current of same polarity as the last operative current may be sent over the line to operate the local bell or detent magnets without moving the vibrating armature or indexes from their position.

JAMES P. STABLER.

Witnesses:
WM. NICHOLS,
R. D. O. SMITH.