(No Model.) 2 Sheets—Sheet 1.

# C. E. SCRIBNER.

## SELECTIVE SIGNAL SYSTEM.

No. 574,222. Patented Dec. 29, 1896.

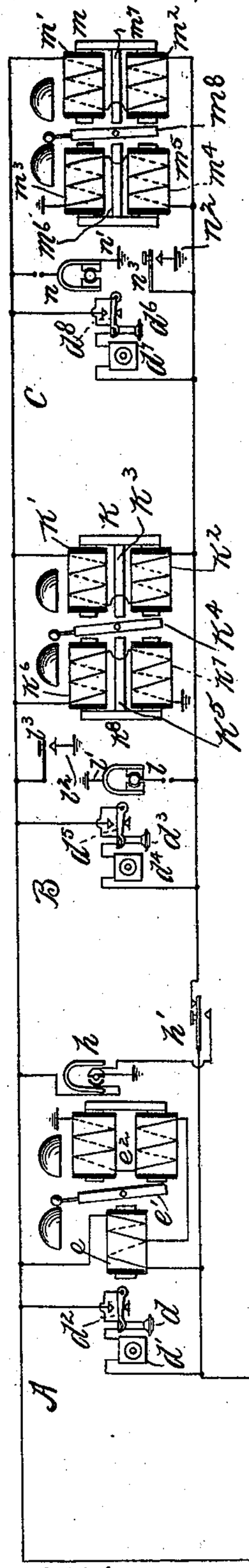


Fig. 1.

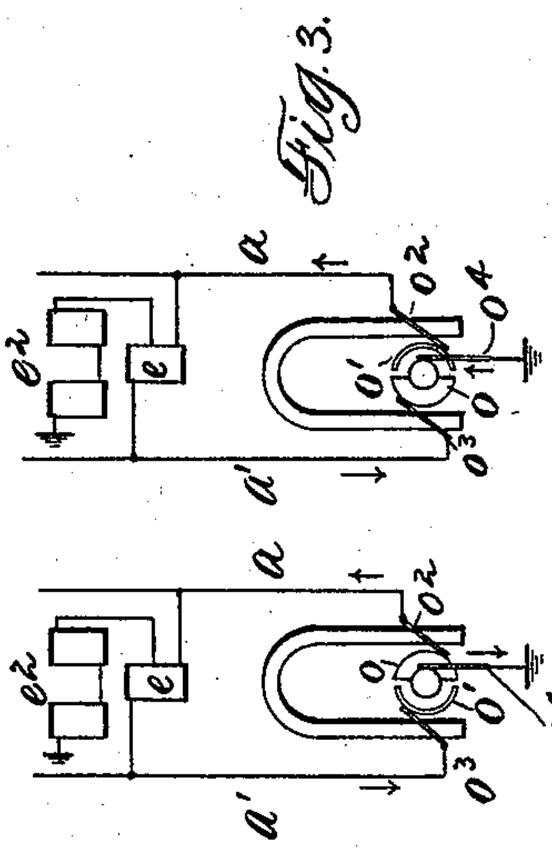
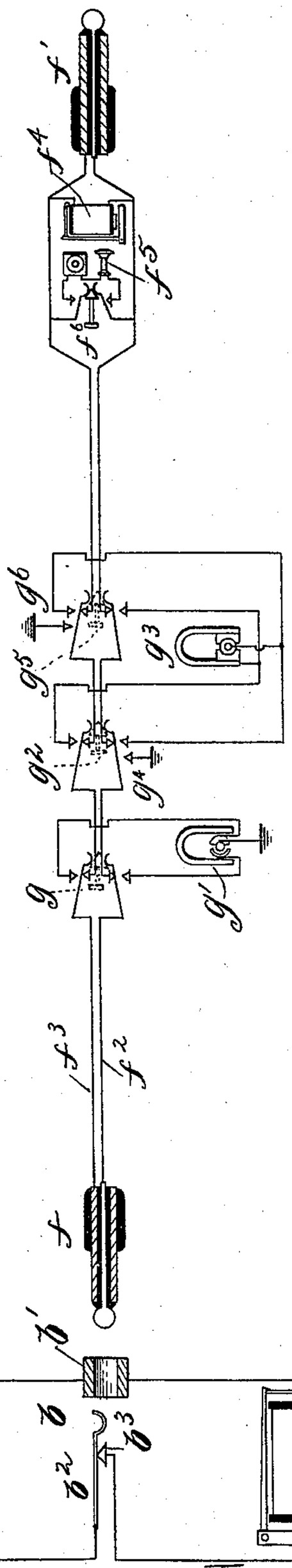


Fig. 3.

Fig. 2.



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Inventor:
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

# C. E. SCRIBNER.

## SELECTIVE SIGNAL SYSTEM.

No. 574,222. Patented Dec. 29, 1896.

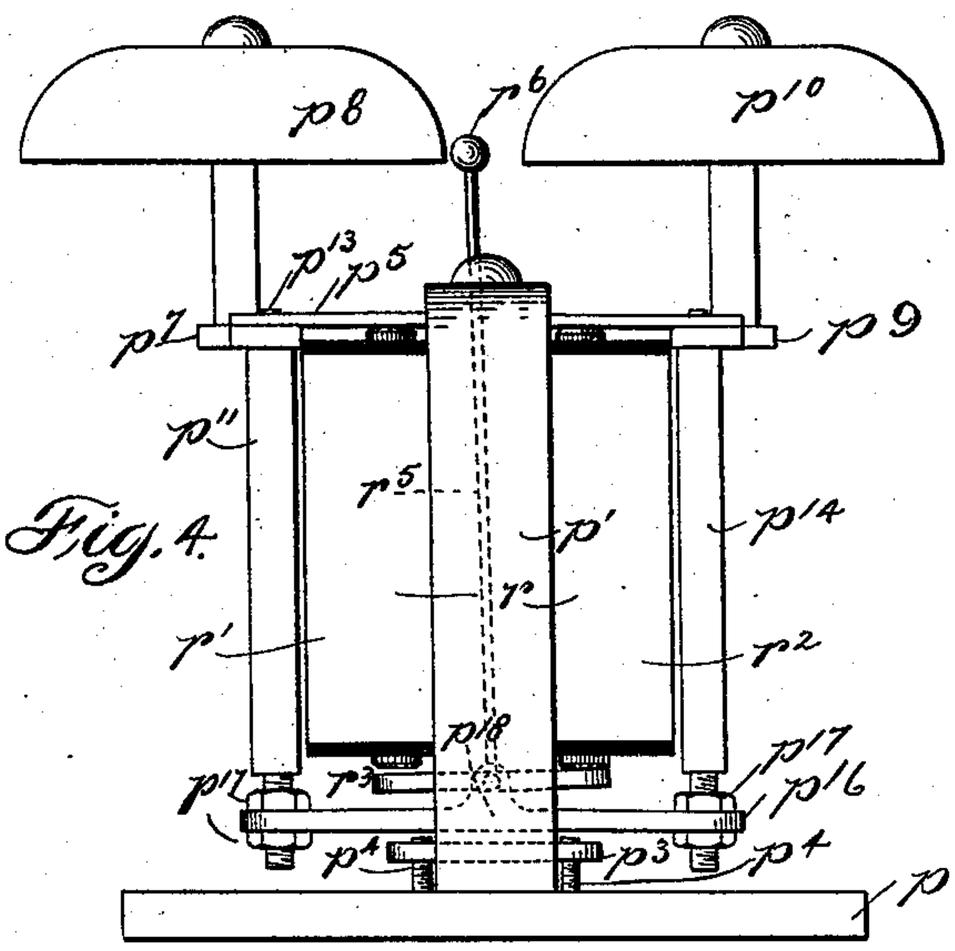


Fig. 4.

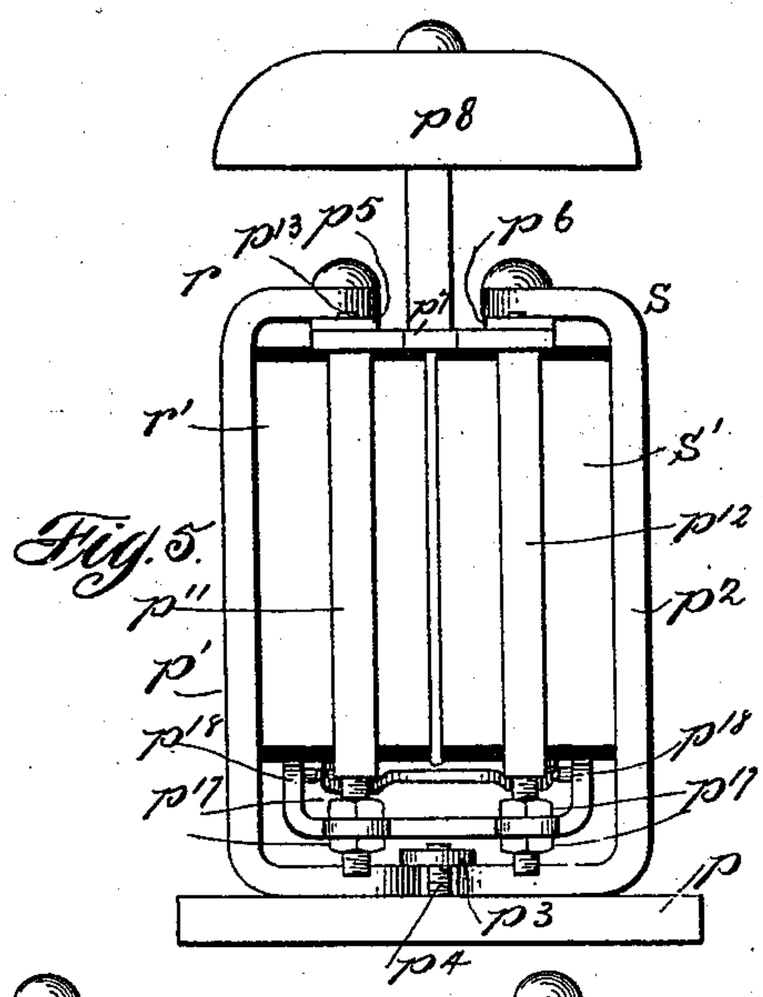


Fig. 5.




Fig. 6.

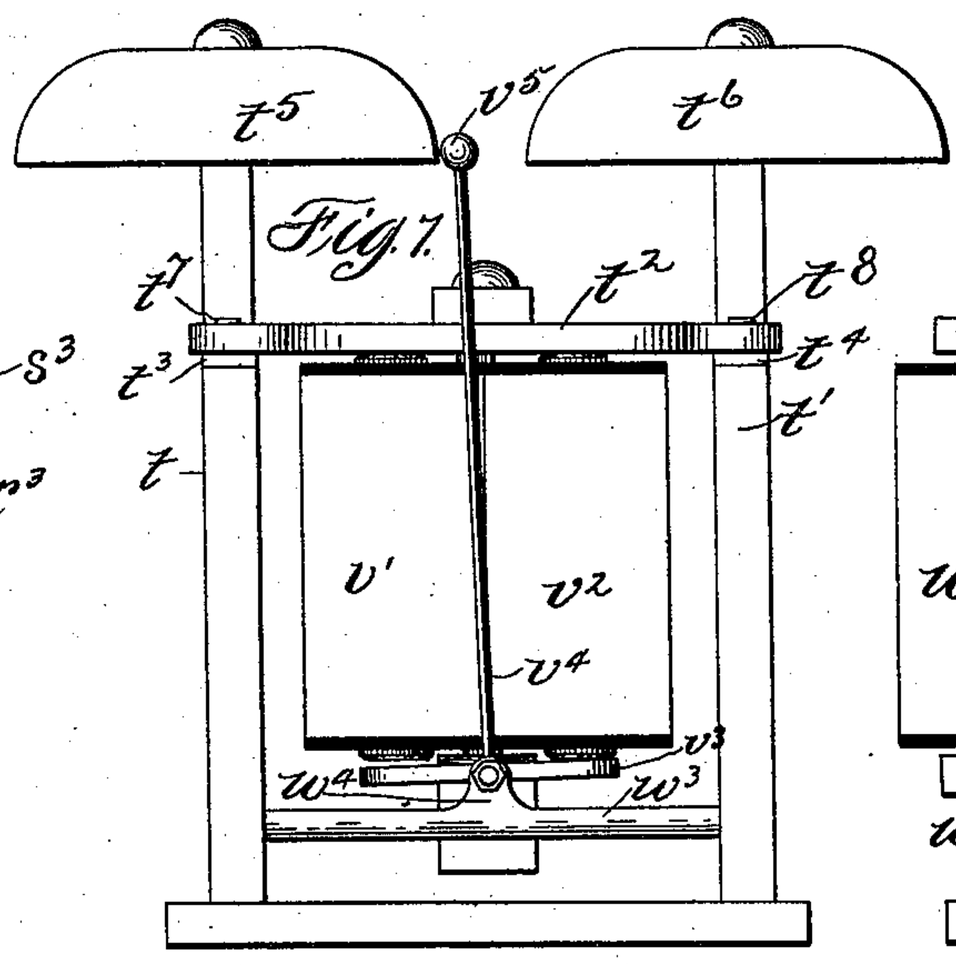


Fig. 7.

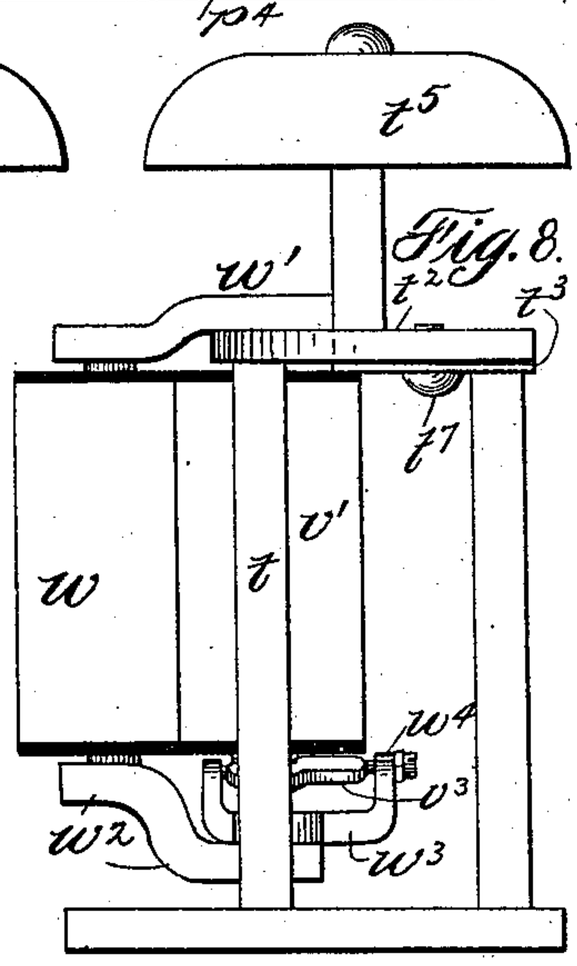


Fig. 8.

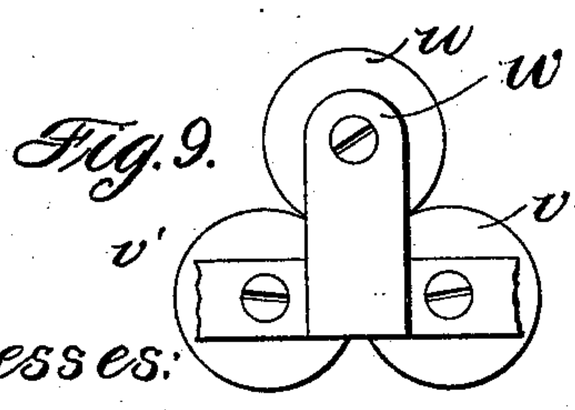


Fig. 9.

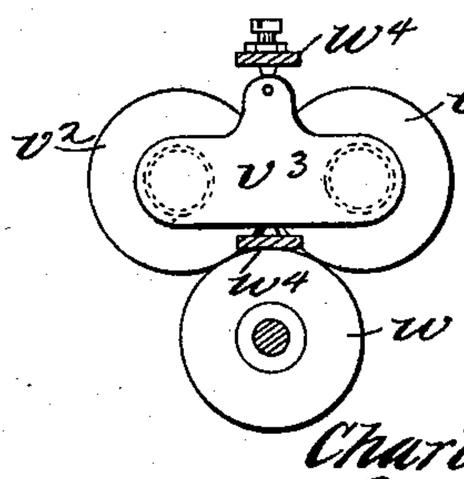


Fig. 10

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C

# UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

## SELECTIVE-SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 574,222, dated December 29, 1896.

Application filed January 8, 1895. Serial No. 534,209. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Selective-Signal Systems, (Case No. 370,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a selective-signal system more particularly adapted for telephone systems where it is desired to connect the telephone sets of a number of subscribers between the same pair of lines extending to the central station.

My object is to provide means whereby a selective signal may be sent from the central station to ring a bell of any one of the subscribers so connected without affecting the bells of the remaining subscribers, and, further, to provide means whereby each subscriber in sending a calling-current to the central station rings his own bell, but does not ring the bells of the other subscribers connected to the party line.

At one of the substations I provide a call device or bell having two electromagnets, one of which is bridged between the metallic limbs of the telephone-line, while the other is connected between one of the limbs and ground. One of the electromagnets acts upon an armature carrying the bell-hammer or equivalent portion of the signaling mechanism, while the other electromagnet is adapted to prevent the actuation of the armature of the first magnet. In a preferred form both electromagnets may act upon a common armature or upon armatures rigidly connected together, the magnets being so wound that when both are simultaneously excited the armature remains unmoved. At a second substation is provided a similar call device, but the grounded electromagnet is connected between the opposite limb of the line and ground. At the central station the operator is provided with keys by means of which she may loop a source of calling-current into circuit. One of these keys is adapted, when depressed, to loop the source of current into circuit and at the same time throw a ground upon one limb of the line. The ground thus formed completes the circuit through the grounded electromagnet of one of the call devices—the one whose grounded electromagnet is connected to ground from the opposite limb to that grounded—and that call device remains irresponsive to the calling-current while the other call device responds. A second key is provided which, when depressed, throws a ground upon the other limb of the line, and this causes the ringing of the other bell.

When it is desired to connect a third substation with the line, the two call devices above described are constructed so that they respond to alternating currents, but do not respond to intermittent currents. At the third substation I provide a call device adapted to respond to intermittent currents, but to remain irresponsive to alternating currents. This call device is provided with two electromagnets, one of which is a polarizing-electromagnet, and serves to impart polarity to the armature, while the second electromagnet is the motor-magnet adapted to vibrate the armature. The former magnet is connected in a bridge between the metallic limbs, while the second magnet is connected in a ground branch. At the central station is provided a key which, when depressed, loops into circuit an intermittent-current generator, which in its operation alternately grounds the two limbs of the line. Thus an intermittent current traverses the polarizing-magnet in a common direction, while an alternating current traverses the motor-magnet, due to the alternate grounding of the limbs. The call device thus responds.

At each substation is provided a generator for sending calling-currents to the central station. I preferably place the call device responding to intermittent currents nearest the central station and provide a key—which may be automatically closed in operating the generator—for opening the line-circuit back of the first substation. At each of the other substations the generator is included in a ground branch from the limb opposite that to which the grounded magnet of the call device is connected, and means are provided for closing a ground from the opposite limb of the line to short-circuit said grounded mag-

net and thus cause the bell to ring. Thus only the bell of the subscriber sending the calling-current is actuated.

Referring to the accompanying drawings, Figure 1 is a diagrammatic view of my invention, illustrating three subscribers connected to a party line. Figs. 2 and 3 are views of the intermittent-current generator and circuit connections, illustrating the means for alternately grounding the opposite limbs of the line. Fig. 4 is a side view of one of the call devices of my invention. Fig. 5 is an end view thereof. Fig. 6 is a detail view of the double armature employed therein. Fig. 7 is a side view of the form of call device adapted to be actuated by an intermittent current. Fig. 8 is an end view thereof. Fig. 9 is a top view thereof. Fig. 10 is a view thereof from beneath.

Like letters refer to like parts throughout the different figures.

The limbs $a\,a'$ of the telephone-line extend from the substations A B C to the central station, where they terminate, respectively, in sleeve $b'$ and line-spring $b^2$ of the spring-jack switch $b$. The individual annunciator $c$ is included in circuit between the contact-anvil $b^3$ and the sleeve $b'$ and is cut from circuit by the insertion of a plug in the spring-jack. At the central station is provided a cord-set comprising plugs $f\,f'$, the tips and sleeves of which are respectively united by a tip-strand $f^2$ and a sleeve-strand $f^3$. Between the strands is included a clearing-out annunciator $f^4$ and the usual operator's telephone set $f^5$, which may be bridged into circuit by key $f^6$. A key $g$ is provided which, when depressed, opens the cord-strands and loops a generator $g'$ into circuit with plug $f$. Generator $g'$, when actuated, sends an intermittent current over the line and alternately grounds the opposite limbs of the line. A second key $g^2$ is provided which, when depressed, opens the cord-strands and loops an alternating-current generator $g^3$ into circuit. At the same time a ground branch $g^4$ is thrown on the tip-strand. A third key $g^5$ is provided which, when depressed, loops generator $g^3$ into circuit and throws a ground branch $g^6$ on the opposite or sleeve strand.

At station A is provided the usual telephone set, comprising a receiver $d$ and transmitter $d'$, automatically cut into and out of circuit by telephone-hook $d^2$. The call device comprises an electromagnet $e$, connected between the opposite limbs of the line and situated with its pole opposite the middle of a pivoted armature $e'$, which upon the passage of a direct current through magnet $e$ assumes a fixed polarity at its ends. Connected in a ground branch from the middle of the helix of magnet $e$ is an electromagnet $e^2$, the poles of which rest opposite the poles of armature $e'$. The magnet $e^2$ may be connected in a ground branch from any other point, but by connecting it from the middle of the helix of magnet $e$ an electrostatic balance of the line is secured, and the current traversing magnet $e^2$ meets the same resistance regardless of its direction.

At station A a generator $h$ is included in a normally open bridge between the opposite limbs of the line, a key $h'$ being provided for closing the generator in circuit and at the same time opening one of the limbs $a$ back of station A. The generator $h$ is of the same type as generator $g'$, sending an intermittent current over the line and alternately grounding the opposite limbs of the line.

At station B are provided the usual telephone-receiver $d^3$, transmitter $d^4$, and switch-hook $d^5$. The call device comprises an electromagnet $k$, comprising two helices $k'\,k^2$, connected between the limbs $a\,a'$. Between the helices $k'\,k^2$ is provided a permanent magnet $k^3$, the pole of which rests opposite the middle of a centrally-pivoted armature $k^4$, which thus assumes fixed poles at its ends. A second permanent magnet $k^5$ also influences armature $k^4$ and is placed between helices $k^6$ $k^7$ of electromagnet $k^8$, which is connected between limb $a'$ and ground. The generator $l$ is connected in a normally open branch $l'$ between limb $a$ and ground, while a ground branch $l^2$ is adapted to be closed between limb $a'$ and ground by a key $l^3$. The ground branches $l'$ and $l^2$ may be automatically closed by the operation of the generator.

At station C are provided the usual telephone-receiver $d^6$, transmitter $d^7$, and switch-hook $d^8$. Between the limbs $a$ and $a'$ are included the helices $m'\,m^2$ of electromagnet $m$, while the helices $m^3\,m^4$ of electromagnet $m^5$ are included between limb $a$ and ground. Permanent magnets $m^6$ and $m^7$ are placed with their poles opposite the middle of armature $m^8$, whereby the same assumes a fixed polarity. The generator $n$ is included in a ground branch $n'$ from the limb $a'$, while a ground branch $n^2$ from limb $a$ is adapted to be closed by a key $n^3$.

The operation of the system, as above described, is as follows: The operator, having received a call for one of the subscribers A B C, inserts plug $f$ in spring-jack $b$, the plug $f'$ having been previously inserted in the spring-jack of the calling subscriber. If she wishes to call subscriber A, she depresses key $g$, thus looping generator $g'$ into circuit with limbs $a\,a'$. As shown in Figs. 2 and 3, the generator is provided with a commutator of two segments $o\,o'$, upon which bear the brushes $o^2\,o^3$, which, when key $g$ is depressed, are connected, respectively, with limbs $a\,a'$ of the telephone-line. Upon an extended rounded portion of segment $o$ rests a brush $o^4$, connected to ground, the segment $o$ being thus continuously grounded. When the segments $o\,o'$ make contact with the brushes, as shown in Fig. 2, limb $a$ is grounded at the generator, while when they make contact as shown in Fig. 3 limb $a'$ is grounded. If it be assumed that current from generator $g'$ passes out by limb $a$ and returns by limb $a'$, it will be ob-

served that, as shown in Fig. 2, current passes by brush $o^4$ to ground through electromagnet $e^2$ of the call device at station A to limb $a'$ and back to the generator, the current thus traversing electromagnet $e^2$ in one direction. When the segments assume the position shown in Fig. 3, current from the generator passes by limb $a$ through electromagnet $e^2$ to ground, thence back to the generator by brush $o^4$, the current thus traversing electromagnet $e^2$ in the opposite direction. Thus during the operation of generator $g'$ current traverses electromagnet $e$ in a uniform direction to produce fixed poles in armature $e'$, while an alternating current traverses electromagnet $e^2$ to cause vibration of said armature. As the bells at stations B and C respond only to alternating currents sent over the line, generator $g'$ does not affect said bells.

If the operator desires to call subscriber B, she depresses key $g^2$, thus looping generator $g^3$ into circuit. Current traverses magnet $k$, but not magnet $k^8$, since the latter is short-circuited by ground branch $g^4$, thrown on the tip-strand by key $g^2$. Magnet $k$ alone being actuated, the bell responds to the passage of the current. The bell at station C does not respond, since current traverses both magnets $m$ and $m^5$, circuit through magnet $m^5$ being completed by ground branch $g^4$ thrown upon the tip-strand. The bell at station A does not respond to the alternating currents.

If it be desired to call subscriber C, key $g^5$ is depressed, thus looping generator $g^3$ into circuit and throwing a ground branch $g^6$ on the sleeve-strand. Current now traverses magnets $k$, $k^8$, and $m$ and the bell at station C alone responds.

If subscriber A desires to send a signal to the central office, either as the originator of a call to actuate individual annuciator $c$ or to clear out by actuating annunciator $f^4$, he operates generator $h$, thus throwing upon the line an intermittent current which actuates the annunciator at the central station. The alternate grounding of the limbs of the line also rings the bell at substation A. The bells at stations B and C are disconnected from circuit by key $h'$; hence do not respond.

When subscriber B sends a calling-current over the line, the ground branches $l'$ and $l^2$ are closed and magnet $k^8$ is shunted, the bell at station B thus responding. Both magnets of the bell at station C are in circuit, and hence said bell does not respond. When subscriber C sends a calling-current over the line, the ground branches $n'$ and $n^2$ are closed and magnet $m^5$ is shunted, the bell at station C thus responding, while the bell at station B is irresponsive, both of the magnets $k$ and $k^8$ being included in circuit. The bell at station A does not respond to currents sent from stations B and C, since it is irresponsive to alternating currents.

The electromagnets of the call devices may be made of high resistance to prevent the passage of voice-currents, and they may be left permanently in circuit, or switch-contacts may be provided for cutting the electromagnets out of circuit when the telephone-receiver is removed from its hook in a well-known manner.

In Figs. 4, 5, and 6 I have illustrated in detail the form of call device preferably employed at stations B and C. To the base-board $p$ are secured the permanent magnets $p'$ $p^2$, being held upon the base-board by a plate $p^3$, resting upon the ends of the magnets, through which plate and the base-board pass screws $p^4$. To the upper end of magnet $p'$ is secured a bar $p^5$, and to the upper end of magnet $p^2$ is secured a bar $p^6$. From bar $p^5$ are suspended the coils $r'$ $r^2$ of electromagnet $r$, while from bar $p^6$ are suspended coils $s'$ $s^2$ of electromagnet $s$, the coils being secured to the bars by means of screws passing through the bars and into the cores of the coils. On the under sides of bars $p^5$ $p^6$ at one end is secured a plate $p^7$, upon which is mounted one of the gongs $p^8$ of the bell. At the opposite ends of the bars is mounted a second plate $p^9$, upon which is mounted the gong $p^{10}$. Abutting against the under face of plate $p^7$ are rods $p^{11}$ $p^{12}$, said rods and plate being secured to bar $p^5$ by a screw $p^{13}$. Likewise rods $p^{14}$ $p^{15}$ extend downward from plate $p^9$. The ends of the rods are threaded, and a plate $p^{16}$, supporting the armatures, is provided with holes adapted to fit over the threaded ends of said rods, nuts $p^{17}$ being provided, adapted to screw upon the threaded ends of said rods and against said plate $p^{16}$ to maintain the same in any adjusted position. The plate $p^{16}$ carries upon its sides upward extensions $p^{18}$, between which the armatures are pivoted. The armatures $r^3$ and $s^3$ are joined by a cross-piece $r^4$ and provided with pivotal points adapted to rest between the extensions $p^{18}$. Upon the cross-piece $r^4$ is mounted a rod $r^5$, carrying upon its upper end the bell-hammer $r^6$, adapted when the armatures are vibrated to alternately strike the gongs and convey the signal. The permanent magnets $p'$ $p^2$ impart a fixed polarity to the armatures $r^3$ $s^3$. Thus if the north poles of the magnets be those opposite the armatures south poles will be induced in the armatures at the middle and north poles at the ends. The coils $r'$ and $r^2$, acting upon armature $r^3$, are so wound relatively to coils $s'$ $s^2$, acting upon armature $s^3$, that when currents traverse both sets of coils simultaneously the sets act upon their armatures with opposite effect, one set tending to produce rotation in one direction, while the other set tends to produce rotation in the opposite direction. In consequence the connected armatures remain at rest when both sets of coils are energized and the call device is irresponsive. If current be sent through but one of the sets of coils, the armature will be vibrated as the polarity of the current changes, thus ringing the bell.

In Figs. 7, 8, 9, and 10 I have illustrated the

form of call device preferably employed at station A. Two upright posts $t\,t'$ are mounted upon the base-board, and a bar $t^2$ is mounted upon their upper ends, the plates $t^3\,t^4$ supporting the gongs $t^5\,t^6$ of the bell being clamped between said bar and the ends of said posts $t\,t'$, respectively, by means of screws $t^7\,t^8$. To the under side of bar $t^2$ are secured the coils $v'\,v^2$ of the electromagnet, screws being passed through said bar $t^2$ and into the cores of the magnet-coils. Back of the coils $v'\,v^2$ and parallel thereto is provided the coil $w$, said coil being mounted between the extended pole-pieces $w'\,w^2$, one of said pole-pieces, $w'$, being secured to the upper surface of the bar $t^2$, while the other, $w^2$, rests beneath the magnet-coils $v\,v'$. Upon the pole-piece $w^2$ is mounted a plate $w^3$, carrying upward extensions $w^4\,w^4$, between which is pivoted the armature $v^3$. Upon armature $v^3$ is mounted rod $v^4$, carrying upon its end the hammer $v^5$, adapted, as the armature is vibrated, to alternately strike the gongs of the bell. The electromagnet $w$ serves as the polarizing-magnet, as in the operation of the bell it is always traversed by a current of uniform direction, the pole-piece $w^2$ thus assuming a definite polarity and inducing in the armature $v^3$ definite polarities. The coils $v'\,v^2$ are wound to present opposite poles to the armature, so that as the current alternates through said coils the armature is alternately attracted and repelled, thus causing vibration of hammer $v^5$.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a call device the combination with an electromagnet and an armature polarized by said electromagnet, said magnet having two helices, of a second motor-electromagnet adapted to vibrate said armature when excited by an alternating current, an electric circuit including said motor-electromagnet and divided into branches including the different helices of said polarizing-magnet, and means for transmitting alternate pulsations of current through the said branches, substantially as described.

2. The combination with an intermittent or direct current generator, of means for alternately grounding the opposite limbs of the metallic circuit, and a call device comprising a polarizing-electromagnet connected between the metallic limbs of the circuit, an armature polarized by said polarizing-electromagnet, and a second or motor electromagnet connected between said metallic circuit and ground; whereby a current of uniform direction traverses the polarizing-electromagnet to polarize the armature, while an alternating current traverses the motor-electromagnet to vibrate the armature, substantially as described.

3. The combination with a metallic circuit, of a call device comprising an electromagnet bridged between the limbs of the circuit, a second electromagnet connected between one of the limbs and ground, and an armature responding to a current traversing one of said electromagnets but irresponsive to current traversing both, a generator or source of current adapted to be connected between the limbs of the circuit, and a key for grounding the limb of the line opposite that to which said second electromagnet is connected, whereby when said key is depressed both electromagnets are energized and the call device remains irresponsive.

4. The combination with a metallic circuit, of two call devices, each comprising two electromagnets, one electromagnet of each of said call devices being bridged between the limbs of the circuit, the other electromagnets of said call devices being connected respectively between the opposite limbs of the circuit and ground, an armature provided in connection with each of said call devices responding to currents traversing one of the electromagnets, but irresponsive to currents traversing both, a generator or source of current adapted to be bridged between the limbs, and keys for grounding one or the other of the limbs of the circuit to actuate one or the other of the call devices, substantially as described.

5. The combination with a metallic circuit, of two call devices, each comprising two electromagnets, one electromagnet of each of said call devices being bridged between the limbs of the circuit, the other electromagnets of said call devices being connected respectively between the opposite limbs of the circuit and ground, an armature provided in connection with each of said call devices responding to an alternating current traversing one of the electromagnets, but irresponsive to currents of uniform direction, or to alternating currents traversing both of the electromagnets, an alternating-current generator adapted to be bridged between the limbs of the circuit, keys for grounding one or the other of the limbs of the circuit to actuate one or the other of the call devices, a third call device comprising a polarizing-electromagnet bridged between the limbs of the circuit, and a motor-electromagnet connected between the metallic circuit and ground, a generator of direct currents adapted to be connected between the limbs of the circuit, and means for alternately grounding the opposite limbs of the circuit during the operation of said generator, substantially as described.

6. In a system of selective signals, the combination with a metallic-circuit telephone-line, of several call devices connected therewith, each of said call devices being provided with two electromagnets adapted to act upon the same armature, the magnets being arranged to actuate the armature when separately excited, like magnets of the different call devices being differently connected with the line-circuit, and means for sending current in the line conductors adapted to actuate any

one of said call devices, substantially as described.

7. The combination with two electromagnets, each comprising two coils arranged in parallel positions, of a centrally-pivoted armature provided in connection with each of said electromagnets, the ends of the armatures being disposed opposite the poles of their respective electromagnets, said armatures being rigidly connected together, the coils of said electromagnets being wound to act with opposite effect upon their respective armatures when both electromagnets are simultaneously energized, substantially as described.

8. The combination with the permanent magnets $p'$, $p^2$, of the bars $p^5$ $p^6$ supported upon the upper ends thereof, the bell-gongs supported upon said bars, the coils of the electromagnets $r$ and $s$ suspended respectively from said bars, the rods $p^{12}$, $p^{13}$, $p^{14}$, $p^{15}$ suspended from said bars and provided with threaded ends, the armature-supporting plate $p^{16}$ adjustably secured to the ends of said rods by nuts $p^{17}$, and the centrally-pivoted armatures $r^3$ and $s^3$ connected by a cross-piece $r^4$, and mounted upon said plate $p^{16}$, substantially as described.

9. The combination with the upright posts $t$ $t'$, the bell-gongs and the bar $t^2$ supported thereby, the coils of the motor-electromagnet suspended from said bar, the polarizing-electromagnet provided with extended pole-pieces, one of said pole-pieces being secured to said bar $t^2$ and the other extended beneath the coils of said motor-electromagnet, and a centrally-pivoted armature having its ends disposed opposite the poles of said motor-electromagnet coils, the middle of said armature being situated opposite the lower pole-piece of said polarizing-electromagnet, substantially as described.

In witness whereof I hereunto subscribe my name this 10th day of December, A. D. 1894.

CHARLES E. SCRIBNER.

Witnesses:
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PEARL B. CLENDENING.