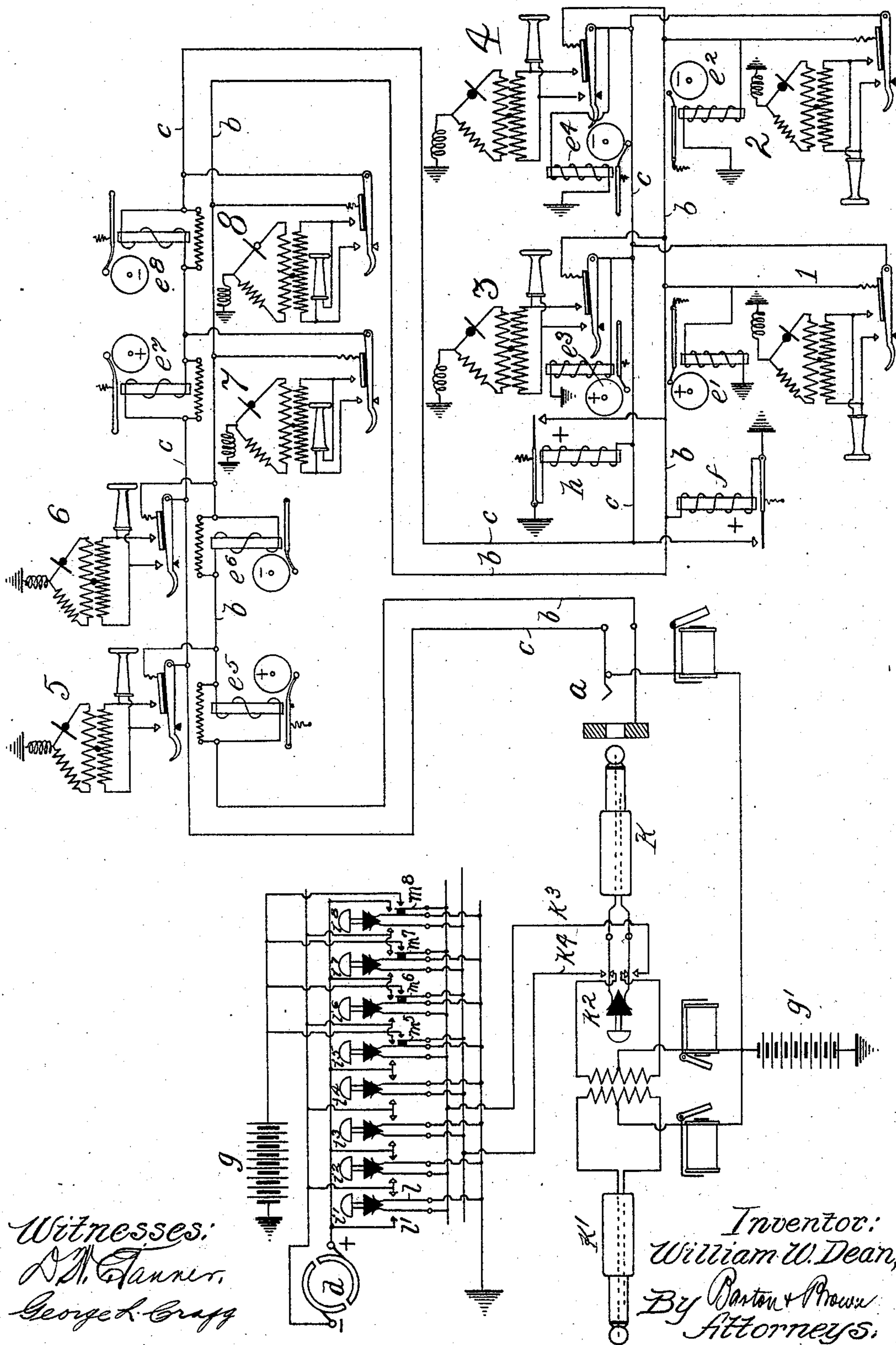


(No Model.)

W. W. DEAN.
PARTY LINE TELEPHONE SYSTEM.

No. 577,102.

Patented Feb. 16, 1897.



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UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE BELL TELEPHONE COMPANY OF MISSOURI, OF SAME PLACE.

PARTY-LINE TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 577,102, dated February 16, 1897.

Application filed September 19, 1896. Serial No. 606,345. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have
5 invented a certain new and useful Improvement in Party-Line Telephone Systems, (Case No. 18,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

For economical reasons it is often desirable to connect several subscribers' stations with the same telephone-line circuit. Lines having more than one station thereon are generally termed "party" lines. It is especially
15 desirable when party lines are made use of that selective signals should be provided, so that when a particular subscriber of a line is to be summoned his bell or signal device alone
20 will be operated. Heretofore it has been found convenient and practicable to provide selective or individual signals for four stations upon the same metallic circuit. Systems have also been devised and patented,
25 but, so far as I know, have not gone into use, in which an indefinite number of subscribers upon the same line may be individually signaled.

My invention herein is intended to provide
30 selective signals for eight separate subscribers' stations placed upon a single metallic circuit; and my invention primarily relates to the special apparatus whereby a four-party-line system such as has been heretofore employed may be adapted for use as a party
35 line having five, six, seven, or eight stations thereon.

In Letters Patent No. 555,725, granted August S. Hibbard March 3, 1896, for party-telephone-line apparatus, is disclosed a system whereby selective signals may be transmitted
40 over a metallic-circuit telephone-line to the four subscribers' stations provided thereon. By the use of my invention one, two, three, or four more subscribers' stations may be added to such a party line in such manner that any one of the five or more subscribers may be summoned or called from the central office without disturbing any other of the subscribers. In my system herein the four outer
50 stations may be provided each with high-re-

sistance signal-receiving bells, for example, "thousand-ohm ringers," and connected with the two limbs of the metallic circuit according to the system disclosed in the said Hibbard patent. The additional subscribers' stations which I provide upon such a party line are distributed thereon between the central office and the station having the high-resistance ringers, the ringers of the added stations having only a moderate number of turns or coils upon their magnets, so that they will not respond to currents of such small volume as may be sent over the line to operate the
60 thousand-ohm ringers.

When it is desired to ring the low-resistance bell of any one of the added stations, in order that the current may be of sufficient volume I provide means for grounding the limb of the circuit over which such signal-current of larger volume is required to be sent, such limb being grounded at a point between the station to be signaled and the stations provided with the high-resistance ringers—that is to say, the circuit of the limb is
75 directed to ground, thus forming a circuit of low resistance, thereby producing from the given electromotive force of the source of signaling-current the required volume. Such grounding is effected by means of relays connected with the different limbs and adapted to be operated by a special source of current located at the central office and preferably automatically brought into circuit to operate
80 the relay when the operator presses the proper ringing-key. The relays are so connected and arranged that when current is sent over one limb the relay of that limb will be operated to ground the other limb—that is to say, the limb on which is located the limb with
90 which is connected the low-resistance signal-bell of the station to be called.

I will describe my invention as embodied in a system having party lines each provided with eight stations. Each limb of a telephone-circuit will accordingly have the signal-bells
95 of four different stations connected therewith, the first two in order from the central office being of low resistance and the outer two being of high resistance. With each limb
100 a relay or electromagnetic circuit grounding or closing device will be connected, these re-

lays being located in the limbs between the high-resistance and the low-resistance bells, and the relay connected with one limb being adapted when operated to ground the circuit of the other limb.

In the accompanying drawing I have illustrated diagrammatically a party telephone-line in connection with a signaling apparatus embodying my invention.

Referring to the said diagram, the telephone-line is connected at the central office with a spring-jack switch a , one limb b being connected with the body or frame of the jack and the other limb c of the metallic circuit being connected with the spring or movable lever thereof. The generator or source of electrical energy d at the central office is adapted to send current of a given polarity, and by means of suitable switches or ringing-keys adapted to connect the generator in one direction or the other with the different limbs b c current of the direction desired may be sent at will over either of the said limbs, as the proper pole of the generator d is closed to ground and the other pole closed to the limb of the circuit over which the signaling-current is to be sent.

Connected in the manner heretofore employed in the art I have shown subscribers' stations 1 2 3 4. At each of these stations is provided the usual subscribers' apparatus—that is, a telephone-switch, a telephone-transmitter, and a signal-bell. The signal-bells or ringers e^1 e^2 e^3 e^4 of said stations are provided with electromagnets having a large number of turns of fine wire, so as to be adapted to respond to current of small volume. Bell e^1 of station 1 is connected in a branch leading from limb b to ground and is adapted to respond to current of a positive or $+$ direction, as indicated. Bell e^2 is connected in a similar way with the limb b and is adapted to respond to current of the opposite or $-$ direction. In like manner bell e^3 is connected with limb c and is adapted to respond to $+$ current or impulses, while bell or ringer e^4 of station 4 also connects with limb c and is adapted to respond to electrical impulses of the negative or $-$ direction. Upon this telephone-line I have added four stations 5 6 and 7 8. The bells e^5 e^6 are included in limb b , while the bells e^7 e^8 of stations 7 and 8 are included in limb c . Bell e^5 is polarized to respond to current of $+$ direction, while bell e^6 is polarized to respond to current of $-$ direction, and the same may be said of bell e^7 and bell e^8 . I preferably place about the coil of each of these bells a shunt the resistance of which will be non-inductive, and since the coil of each bell consists of only a moderate number of turns of wire they respond only to current of considerable volume. Therefore as long as the high resistance of the bells e^1 e^2 and e^3 e^4 remain in circuit the circuit will be of such high resistance that the electromotive force of the generator d will not produce current of sufficient volume when

directed over either limb in either direction to ring either of the bells of stations 5, 6, 7, and 8. Thus while stations 5, 6, 7, and 8 have been added the selective signals as heretofore employed may be sent as desired to stations 1, 2, 3, and 4 without ringing the bell of any of the added stations 5, 6, 7, and 8.

I will now describe the circuits and apparatus whereby current of the required volume and direction may be sent from the generator d , preferably of pulsating currents, to operate the bell at station 5, 6, 7, or 8. A relay f , having its coil of high resistance, is connected with limb b and adapted to be operated by current from battery g at the central office. When relay f is thus operated, the limb c is closed to ground, thus shunting the resistance of bells of stations 3 and 4. In a similar manner relay h is connected with limb c and adapted to be operated in a similar manner to close limb b to ground to shunt the bells of stations 1 and 2. Thus when current from battery g is directed over either of the limbs b c the relay of the limb over which the battery-current is sent will be operated, and thereby the other limb will be given a path of low resistance to ground—that is, the resistance of the limb over which it is desired to send a signal-current will be diminished. In this manner the limb over which the signaling-current is to be sent to any one of the stations 5, 6, 7, or 8 will be put into such condition as to cause the generator d , when connected to the limb thus intermediately grounded, to produce current of the volume required to ring the bell at the desired station. The relays f and h are not responsive to the pulsating currents from generator d .

I preferably arrange the ringing-keys at the central office so that by one motion the operator may do all the work necessary to signal any one of the eight stations on the line. The ringing-keys i^1 i^2 i^3 i^4 i^5 i^6 i^7 i^8 correspond, respectively, with stations 1, 2, 3, 4, 5, 6, 7, and 8. I have found it convenient to provide each operator, in addition to her usual telephone outfit, with twelve pairs of conducting-cords, in each of which is a key for connecting with one set of eight keys belonging particularly to that operator. I have shown in the drawing one such pair of connecting-cords, provided with terminal plugs k k' and having a key k^2 . When plug k is inserted in the spring-jack, by depressing key k^2 limb b will be connected to wire k^3 of the set of eight keys, while limb c will be connected to wire k^4 of the said set of keys. An ordinary cam-lever key I have found well suited to be used as key k^2 .

By depressing key i^1 grounded spring l is connected with the negative pole of the generator d , while spring l' of key i^1 is connected with the $+$ pole of the generator. Positive pulsations from the generator d are thus directed to wire k^3 and thence, by the connections shown, or any suitable connections,

over limb *b* to ring the bell at station 1. When key *i*² is depressed, it is evident that pulsations of a negative direction will be directed over said limb, thus operating the bell at station 2. By depressing key *i*³ positive pulsations will be sent over limb *c* to ring the bell at station 3, and by depressing key *i*⁴ negative pulsations will be sent over said limb *c* to operate the bell at station 4.

Coming now to keys *i*⁵, *i*⁶, *i*⁷, and *i*⁸ it will be seen that they respectively contain parts corresponding to keys *i*¹, *i*², *i*³, and *i*⁴. Said keys are provided with special battery-contacts *m*⁵ *m*⁶ *m*⁷ *m*⁸, which contacts are connected with battery *g* as the keys are depressed. Thus when key *i*⁵ is depressed impulses of a positive direction are thrown upon limb *b*, while at the same time current from battery *g*, by means of connection *m*⁵, is thrown upon the other limb *c*. This battery-current is adapted to flow through the coil of relay *h*, thus bringing said relay into operation and causing its lever to close upon contact *n*, connected with limb *b*. Thus by depressing key *i*⁵ positive signaling-pulsations are sent over limb *b*, while at the same time said limb *b* is closed to ground at contact *n* of the relay by the action of the battery-current, which by the same movement of the key *i*⁵ is directed through relay *h*. Key *i*⁶ serves to send negative pulsations over limb *b*, the battery *g* being at the same time closed to limb *c* to operate the relay *h*. By depressing key *i*⁷ positive pulsations are sent over limb *c*, while battery-current is closed at contact *m*⁷ and directed over limb *b* to operate relay *f* and thus ground limb *c* at *o*. Key *i*⁸ operates in a similar manner when depressed, sending negative signaling-pulsations over limb *c*, current from battery *g* being directed at contact *m*⁸ over limb *b* to close limb *c* to ground at contact *o* of the relay, as described with respect to key *i*⁷. Thus by means of key *i*⁵ pulsations of the required volume and direction may be directed over limb *b* to operate the bell at station 5. In like manner by depressing key *i*⁶ the bell at station 6 will be rung, while key *i*⁷ will ring the bell at station 7, and key *i*⁸ will ring the bell at station 8.

I do not deem it necessary to further describe in detail the system to which my invention appertains, nor do I consider it necessary to illustrate in detail the construction of the apparatus.

The high-resistance signal-bells *e*¹, *e*², *e*³, and *e*⁴ of stations 1, 2, 3, and 4 may be considered as constituting the outer group or high-resistance group of bells, and by "outer" group or "high-resistance" group of bells I mean to designate signal-receiving devices, though the number might be less than four, included in high-resistance branches connected with one or both of the limbs *b* *c*, but ordinarily it will be found best when my invention is applied to telephone-exchange systems to provide four such bells, two for each limb, adapted each to respond to pulsations of different di-

rection. In like manner the bells *e*⁵, *e*⁶, *e*⁷, and *e*⁸ of stations 5, 6, 7, and 8 may be designated as the "low-resistance" group of bells, and as I shall use the term "low-resistance" group in the claims I shall mean magneto-bells or electromagnetic signal devices, though the number may be less than four, connected in a circuit extending to a group of high-resistance signal-receiving devices.

It should be observed that the auxiliary battery *g* is of opposite polarity to the battery *g*'. Otherwise the two relays *f* and *h* would be held down during the conversation by current from the talking-battery *g*'. Relays *f* and *h* are polarized so as to respond to battery *g* only. This arrangement is necessary when my party-line system herein described is applied to the common battery system illustrated herein, which is similar to that shown in my Patent No. 541,077, issued June 18, 1895.

Though I have shown my invention as used in connection with a centralized battery system it is evident that it admits of wide and varied application wherever it is desired to make use of party lines.

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

1. The combination with an electric circuit consisting of two limbs or sides adapted to be formed into a metallic circuit, of a group of high-resistance signal-bells connected with the outer portion of said circuit, an inner group of low-resistance signal-bells included in said circuit, relays, one for each limb, connected between said groups and each when operated acting to diminish the resistance of the other limb, means for sending pulsating current of either polarity over either of said limbs, and means for at the same time directing battery-current over the limb corresponding to that over which the signaling or pulsating current is being sent, to operate the proper relay, whereby either bell of the low-resistance group may be operated without ringing any other bell of either of the groups.

2. In a party telephone-line, the combination with two metallic limbs extending from the telephone-exchange through five substations, four of said substations being provided with low-resistance signal devices, two of said low-resistance devices of opposite polarity being connected with each limb of the metallic circuit, while the fifth substation is provided with a high-resistance signal device connected with said line, a source of signaling-current adapted to be included in circuit with said signal devices, relay switching mechanism adapted to shunt or exclude said high-resistance signal device from the path of said current, a source of electricity and switching mechanism at the exchange for including said source of electricity in circuit with the afore-said relay switching mechanism and for directing signaling-current of the proper polarity over either of the metallic limbs of said

line to actuate the selected low-resistance signal device, substantially as described.

3. In a party telephone-line, the combination with two metallic limbs adapted to be formed
5 into a metallic circuit, of a high-resistance bell connected with the outer portion of said circuit, an inner group of low-resistance positively and negatively polarized bells associated with the limbs of said circuit, a source
10 of signaling-current adapted to be included in circuit with said bells, relays, one for each line, adapted to exclude or shunt said high-resistance bell from the path of said current, a source of electricity adapted to be included
15 in circuit with said relays, means for sending current of the proper polarity over said lines to ring the bell of the selected station, and means for closing circuit through the relay connected to the limb companion to the limb
20 over which signaling-current is being sent to remove or shunt the high-resistance bell from the path of said signaling-current, substantially as described.

4. In a telephone system, the combination
25 with a party telephone-line extending from the central office through five substations, four of said substations being provided with low-resistance signal devices, two of said low-resistance signal devices being of one polarity,
30 while the other two are of an opposite polarity, the fifth substation being provided with a high-resistance signal device, a source of sig-

naling-current adapted to be included in circuit with said signal devices, means for shunting or excluding said high-resistance signaling device controlled at the central office and
35 switching mechanism adapted to direct current of the proper polarity over said line to actuate the selected low-resistance signal device, substantially as described.

5. In a telephone system, the combination of a party telephone-line extending from a central office to two substations, with an indicating device located at one substation, an indicating device of comparatively high resistance located at the other substation, said
40 signaling devices being normally included in series with the telephone-line, a source of signaling-current, means at the central office for including said signaling-current in series
50 with said telephone-line and signaling devices, a relay connected with said line adapted to establish a shunt about said high-resistance signal device, a source of current, and means at the central office adapted to
55 include the same in circuit with said relay, substantially as described.

In witness whereof I hereunto subscribe my name this 16th day of September, A. D. 1896.

WILLIAM W. DEAN.

Witnesses:

GEORGE P. BARTON,
GEORGE L. CRAGG.