

UNITED STATES PATENT OFFICE.

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PARTY-LINE TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 685,034, dated October 22, 1901.

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To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, 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 Party-Line Telephone Systems, 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.

My invention relates to a party-line telephone system more particularly applicable to a party-line arranged for four subscribers, although certain features of my invention are applicable to a party-line supplying a different number of subscribers, my object being to provide a system wherein a plurality of substations may thus be connected with the same telephone-line, while calling-signals may be readily sent from the central station to any one of the substations.

When four substations are to be connected with a party-line, I connect the bells or calling devices of two of the substations in series with one of the limbs of the telephone-line, one of the bells being arranged to respond to a current of one polarity, while the other bell is arranged to respond to a current of opposite polarity. The bells of the other two subscribers are connected in series in the opposite limb of the telephone-line, and one is arranged to respond to a current of one polarity, while the other responds to a current of the opposite polarity. The two limbs of the telephone-line are normally connected with a third conductor, preferably ground or a common return, and calling devices are provided at the central station whereby a calling-current of either polarity may be sent over either of the limbs of the telephone-line to thereby ring any one of the four bells, as desired. Means are provided at each substation whereby the circuit through the third conductor may be opened when it is desired to talk, the third conductor being thus disconnected from the talking-circuit to prevent the shunting of the current and to prevent static disturbances. I preferably provide means whereby the removal of any one of the telephone-receivers from its hook will cut off the connec-

tion with the ground or common return, whereby a completely metallic talking-circuit is provided which will not be disturbed by inductive effects. Where only two of the subscribers are connected with the party-line, the bells may be connected in series with the same limb and arranged to respond to current of opposite polarity, or the bells may be connected in series with the respective limbs. Likewise, when three substations are connected with the party-line two of the bells of opposite polarity may be connected in series with one of the limbs, while the third bell may be connected in series with the opposite limb. For sending calling-currents from the central station two generators or sources of current of opposite polarity may be employed, with keys for properly connecting the same in circuit, or a single generator or source of current may be employed with keys for connecting one or the other of the poles thereof to line to send the currents of the desired polarity.

I have illustrated my invention in the accompanying drawing, in which I have shown the circuit arrangements diagrammatically.

The limbs 1 and 2 of the telephone-line extend from the central station throughout the several substations A B C D. At the substation A the calling-bell a is connected in series with the limb 2, and a non-inductive shunt a' is provided around the same, whereby talking-currents will find a ready path through the non-inductive shunt. The switch-hook a^2 normally rests against a back contact a^3 and carries a contact-plate a^4 , normally resting against a back contact a^5 , the contact a^3 being connected with a continuation of the limb 2, while the contact a^5 is connected with a continuation of the limb 1. When the telephone-receiver is removed from its hook, the primary circuit, including the microphone a^6 , battery a^7 , and primary a^8 of the induction-coil, is closed, and the branch circuit through the receiver a^9 and the secondary of the induction-coil is also closed. The elevation of the hook by the removal of the receiver also disconnects the portions of the limbs 1 and 2 extending beyond this substation.

The bell *b* of substation B is connected in series in the limb 2 and in shunt with the non-inductive resistance *b'* and is provided with apparatus similar to that described in connection with substation A, the several parts being indicated by the letter *b*, with exponents corresponding to those employed in connection with substation A. Likewise, the apparatus at substations C and D are indicated by the letters *c* and *d* with the proper exponents. The bell *c* at the substation C is connected in series with the limb 1, and bell *d* at substation D is connected in series with the limb 1. The contacts *d*³ and *d*⁵ at the last substation are connected with a third conductor extending to the calling-generator at the central station, which conductor may be ground or a common return. The bells at substations A and C are illustrated as responding to a current of one polarity or direction, which I will call "positive," while the bells at substations B and D are illustrated as arranged to respond to currents of opposite polarity or direction, which I will term "negative."

The limbs 1 and 2 are illustrated as terminating at the central station in springs *e e'*, with which the contacts *e*² *e*³ of the connecting-plug *e*⁴ are adapted to respectively engage. In one of the strands *f* keys *f'* *f*² are provided, while in the other strand *f*³ keys *f*⁴ *f*⁵ are provided. When key *f*² is depressed, a generator *g* of positive polarity is connected with the strand *f* to send current over limb 2, and when key *f*⁵ is depressed generator *g* is connected with strand *f*³ and limb 1. Likewise, when key *f'* is depressed generator *g'* of negative polarity is connected with the strand *f* and limb 2, while the depression of key *f*⁴ connects said generator with strand *f*³ and limb 1. Key *f*² is thus adapted to send current of positive polarity over strand *f* and limb 2 through bell *a* and ground to thus ring the bell at substation A. The key *f'* when depressed sends a current of negative polarity over strand *f* and limb 2 through bell *b* to thus ring the bell at substation B. Key *f*³ when depressed sends a current of positive polarity over strand *f*³ and limb 1 through bell *c* to thus ring the bell at substation C. Key *f*⁴ when depressed sends a current of negative polarity over strand *f*³, limb 1 through bell *d*, thus ringing the bell at substation D. In this manner calling-currents may be sent from the central station to ring the bell of any one of the four substations.

For clearness I have omitted the signaling apparatus for sending signals from the substations to the central station, since this will be of the ordinary type heretofore employed in party-line systems.

It will be noted that normally—that is, when none of the substation-telephones are connected in circuit—the two limbs of the telephone-line are connected with ground or the third conductor, whereby the signaling-cur-

rents may be sent over either limb and the third conductor. When any of the subscribers removes his telephone from the hook, the connection with the telephone-line beyond such substation is severed and the ground is thus removed from the talking-circuit, and the talking-circuit becomes wholly metallic, whereby disturbances from inductive effects, due to the presence of a ground on the talking-circuit, are obviated.

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

1. The combination with a party telephone-line having a talking-circuit comprising two limbs, of a third conductor normally connected therewith at the last substation, a bell or call device at one of the substations in series in one limb, a bell or call device at another of the substations in series in the other limb, means at the central station for sending current over either limb and the third conductor and means at each substation for disconnecting said third conductor from the talking-circuit, substantially as described.

2. The combination with a party telephone-line, and a return-conductor for the calling-currents normally in circuit therewith at the last substation, of a pair of bells or call devices at the substations connected in series in the talking-circuit of the line and arranged to respond to currents of opposite polarity, means at the central station for sending current of either polarity over the line and means at each substation for opening the circuit through said return-conductor, substantially as described.

3. The combination with a party telephone-line having a talking-circuit comprising two limbs, of a third conductor normally connected therewith at the last substation, a pair of bells or call devices at the substations connected in series in one of the limbs and arranged to respond to currents of opposite polarity, a pair of bells or call devices at the substations connected in series in the other limb and arranged to respond to currents of opposite polarity, means at the central station for sending currents of either polarity over either limb and the third conductor and means at each substation for disconnecting said third conductor from the talking-circuit, substantially as described.

4. The combination with a party telephone-line having a metallic talking-circuit comprising two limbs normally connected at the last substation with a third conductor, of telephone sets at the several substations adapted to be bridged between the two limbs of the line, a pair of bells or call devices of relatively opposite polarity connected in series in one limb, a pair of bells or call devices of relatively opposite polarity connected in series in the other limb, means at the central station for sending current of either polarity over either limb and the third conductor and means at each substation for disconnecting said third con-

ductor from the talking-circuit, substantially as described.

5 5. The combination with a party telephone-line having a metallic talking-circuit comprising two limbs normally connected at the last substation with a third conductor, of telephone sets at the several substations adapted to be bridged between the two limbs of the line, a pair of bells or call devices of relatively opposite polarity connected in series in one of
10 said limbs, a pair of bells or call devices of relatively opposite polarity connected in series in the other limb and means at each substation for opening the circuit through said
15 third conductor by the act of connecting the telephone set thereat into the talking-circuit, substantially as described.

6. The combination with a party telephone-line having a talking-circuit comprising two
20 limbs, of a third conductor normally connected therewith at the last substation, a bell or call device at one of the substations in series in one limb, a bell or call device at another of the substations in series in the other limb,
25 a non-inductive shunt around each bell or call

device and means at each substation for disconnecting said third conductor from the talking-circuit, substantially as described.

7. The combination with a party telephone-line having a talking-circuit comprising two
30 limbs, a third conductor normally connected therewith at the last substation, a pair of bells or call devices at the substation connected in series with one of the limbs and arranged to respond to currents of opposite polarity, a
35 pair of bells or call devices at the substations connected in series with the other limb and arranged to respond to currents of opposite polarity, a non-inductive shunt around each
40 bell or call device and means at each substation for disconnecting said third conductor from the talking-circuit, substantially as described.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses. 45

WILLIAM W. DEAN.

Witnesses:

W. CLYDE JONES,
PERCY C. GILL.