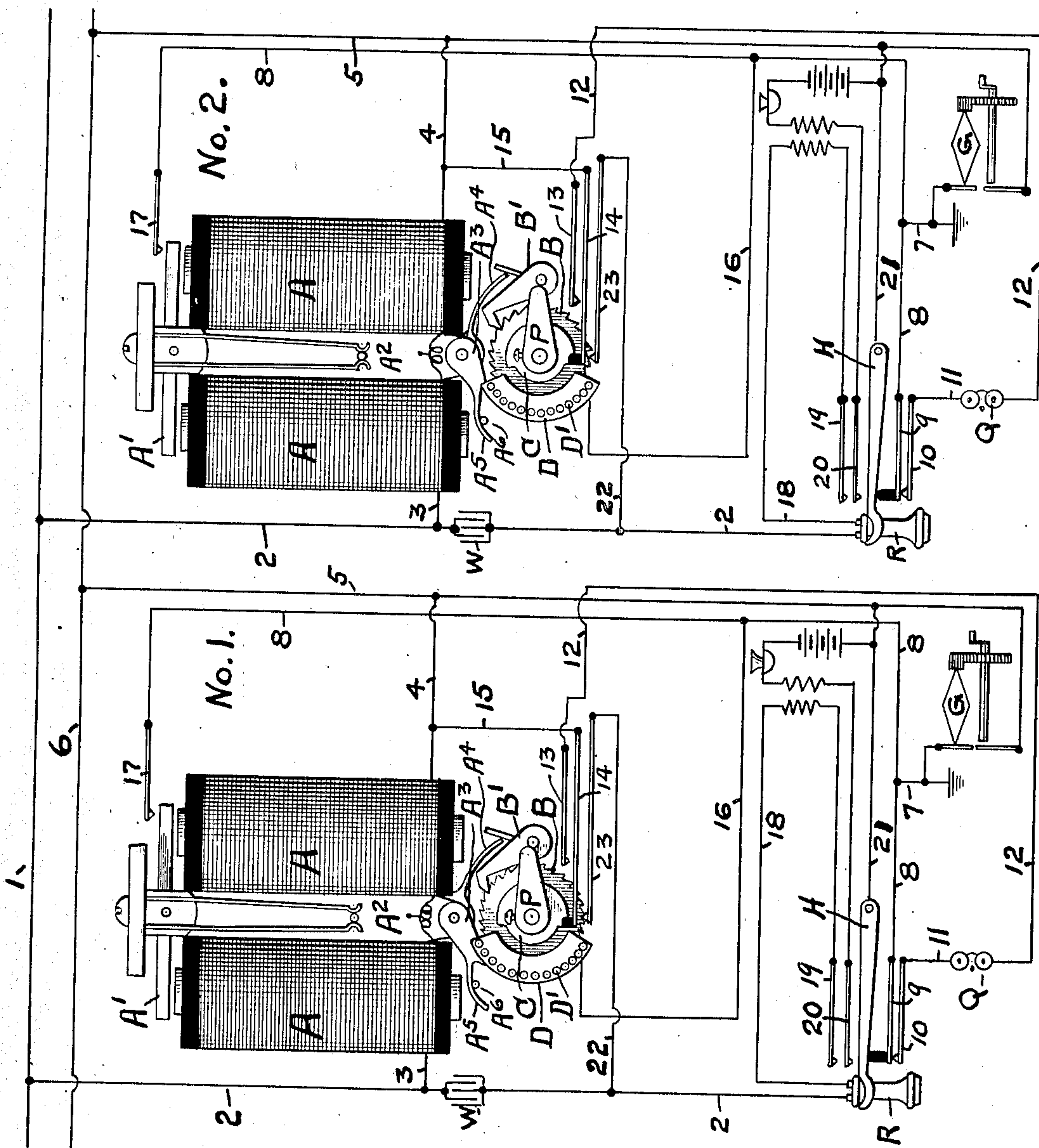


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S. A. NORSTROM.
PARTY LINE TELEPHONE EXCHANGE.

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UNITED STATES PATENT OFFICE.

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PARTY-LINE TELEPHONE-EXCHANGE.

No. 871,519.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed July 14, 1905. Serial No. 269,599.

To all whom it may concern:

Be it known that I, SAMUEL A. NORSTROM, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Party-Line Telephone-Exchanges, of which the following is a specification.

My invention relates to party line telephone exchanges and has for its object improvements in the arrangement and operation of the devices at the local station.

The accompanying drawing illustrates the devices at two local stations, said devices being in their normal position. These stations are connected to a central office by means of the wires 1 and 6. The devices at the central are the ordinary ones among which are a battery, a contact making device for sending impulses from the battery over the line or over one side of the line and ground, and means for reversing the direction of the current. These central office devices may be of any of the well known kinds and form no part of the present invention.

At each local station there is a switching mechanism operated by the magnet AA, which magnet has a polarized armature A¹. Adjacent to this magnet is a ratchet wheel B which is adapted to be advanced from its normal position in the ordinary manner. The advance of the ratchet wheel B is by means of a pawl A³ on a lever A² connected to the armature A¹. A holding pawl B¹ prevents a return of the wheel until released. On the lever A² is a projection A⁴ adapted to strike and lift the pawl B¹ when the lever A² is moved toward the right. On the pawl A³ is a curved projection A⁵ which rests on a pin A⁶ and is adapted to raise pawl A³ from the ratchet wheel B when the lever A² is moved to the right. The result of this construction is that when impulses are sent through the magnet AA in one direction it moves the lever A² to the left and causes the ratchet wheel to advance step by step. When an impulse is sent in the opposite direction it moves the lever A² to the right causing a release of the ratchet wheel so as to permit it to return to its normal position.

On the spindle which supports the ratchet wheel B is a contact maker P and a cam C which move with the wheel. Adjacent to the wheel B is a plate D provided with a series of holes D in the path of the contact

maker P. At the first station on the line a contact pin is placed in the first hole D¹, at the second station a pin is placed in the second hole, and so on. When the contact maker P is advanced it will touch in passing its contact pin and thus make an electrical connection with the plate D¹ which is insulated from the other parts.

The drawing shows the switching mechanism with enough holes to be suitable for thirteen stations on the line. In such a case the contact maker P is set back so that it does not reach the position of the first hole D¹ until the fourteenth forward step of the ratchet wheel. At the fourteenth step the contact maker P for the first station will strike its pin, at the fifteenth step the contact maker for the second station will strike its pin, and so on.

Adjacent to the cam C are three springs 13, 14 and 23, the center one of which engages the cam. This cam has three steps, and when in its normal position the spring 14 rests on the center step and is not in contact with either of the other springs. When the switching mechanism advances one step the spring 14 rests on the lower step of the cam and then engages the inner spring 13. This position is maintained until the fourteenth step when the cam pushes the center spring 14 out into contact with the outer spring 23. This outer position is then held during any further advance of the wheel B.

At each local station there are a receiver R, a hook H with adjacent contact springs, a ringer Q, a generator G, a condenser W, and electrical connections as shown.

When the operator at the central office wishes to place two stations on the line in telephonic connection with each other, she begins by connecting the two lines 1 and 6 to her battery when a current flows from the battery as follows: —1—2— of each station —3—AA—4—5—6— battery. This is an impulse in the direction which will advance the ratchet wheels B and is repeated a required number of times. At the first step the cams C move so that the center springs 14 engage the inner springs 13. In this position, by connecting her signaling device between ground and the line 6, the operator may simultaneously signal all stations on the line as follows:—from ground at the central to ground at each station —7—8—9—10—11—Q—12—13—14—15—4—5—6—back

to central. This is not what is ordinarily done but is possible at any time during the first thirteen steps of the switching mechanism. At the fourteenth step the cams C
5 break the connections between springs 13 and 14, thus breaking the signaling connections for all stations. At this step the first station has its contact maker P on its contact pin located in the first hole D¹, but as no
10 other station has a pin in its first hole, no other station has this kind of a connection.

The wire connecting the spools of the magnet AA is electrically connected to the lever A², and through this lever, its pawl A³, and
15 the wheel B is in electrical connection with the contact maker P.

If it is the first station that is wanted then, at the fourteenth forward step of the ratchet wheel B, the operator connects her battery
20 between line 1 and ground sending an impulse from ground at central to ground at the first station — 7—8—16—D— contact pin in first hole D¹—P—B—A³—A²—A—3—2—1— battery. This is an impulse in the opposite
25 direction to the original operating impulse and occurs only at the first station because that is the only one which has its contact maker P in contact with a pin in the plate D. The result is to release the first switch and
30 permit it to return to normal position. In returning the contact maker P breaks this circuit as soon as it starts to return, but a branch is closed by the armature A¹ engaging the spring 17, so that the current flows from
35 8 through A¹—A²—A— etc., as before. This holds the release circuit for this particular station until the operator breaks it at the central office. The operator then advances the switching mechanisms as before, and
40 when she comes to the second station wanted, she releases the switching mechanisms for that station in the same way as just described for the first station. She may then advance all of the switches one step more or
45 move them to the end of their forward movements. In either case all of the switches, except the two which were returned to their normal positions after having been advanced fourteen or more steps, have their contact
50 makers over the plate D and as a consequence have their cams C moved far enough to break their ringing circuits as before explained. In the case of the two stations which had their switching mechanisms re-
55 leased, the contact makers lie between their normal positions and the first part of the plate D, and as a consequence their cams are in a position to leave their ringing circuits closed at 13 and 14. Having arrived at this
60 point, the central office operator signals these two stations in the same manner as explained as possible for all stations, whereupon the called subscribers remove their receivers. If the stations called are those
65 shown in the drawing, then the talking cir-

cuit between subscribers is as follows:—Beginning at the receiver of station No. 1, R—2—1—2 of station No. 2 —R—18—19—20—H—21—5—6—5— of station No. 1
70 —21—20—19—18—R. All of those stations not called have their cams C advanced so that the springs 14 are pushed out into connection with springs 23. In case a subscriber at one of these stations should re-
75 move his receiver, he would be unable to listen because he would find it shunted as follows: —R²—22—23—14—15—4—5—21—H—20—19—18—R. When through talk-
80 ing, one of the subscribers turns the crank of his generator G. This sends a signal through ground to the central office, the return being through 6 and 5. When this signal is received, the operator sends an im-
85 pulse over the line precisely as described for advancing the switching mechanisms, except that she reverses the direction of the current. The result is to release all of the switching mechanisms in the same manner as previously described for one of them.

With its switching mechanism in its nor-
90 mal position, each station is in telephonic connection with the line and the subscriber may talk to the central office by removing his receiver and turning his generator crank to send a signal.
95

As the subscriber has no control over the movements of his switching mechanism, each is cut out at the fourteenth forward step and is not again in telephonic connection with the line unless the operator releases his switch
100 so that it may return to its normal position. In exchanges of smaller capacity, there would be a less number of steps before the cut-out came, and in exchanges of larger capacity, a greater number of steps.
105

What I claim is:—

1. The combination with the switching mechanisms of a series of stations on a party line, of means by which said switching mechanisms may be simultaneously advanced from
110 their normal positions, means by which selected ones of said switching mechanisms are moved so as to be out of step with those not selected, and means by which the stations at which the switching mechanisms are out of
115 step will be placed in telephonic connection with the line while other stations are excluded from such telephonic connection.

2. The combination with a series of switching mechanisms, and means for giving
120 them a simultaneous advance step by step from normal position, of means by which selected ones of said switching mechanisms may be moved so as to displace them from being in step with the other switching mech-
125 anisms, and telephonic connections controlled by the positions into which said switching mechanisms are moved.

3. The combination with a party line hav-
130 ing a series of local stations thereon, and

means controlled from a central office for causing the simultaneous advance of all switching mechanisms, of means also controlled from the central office for causing selected ones only of said switching mechanisms to return to normal position.

4. The combination with a party line, a series of switching mechanisms connected thereto, and means for causing the simultaneous advance of all of said switching mechanisms, of electrical connections closed by the different switching mechanisms in succession, and means by which upon an electrical impulse being sent through a closed connection, the switching mechanism which closed it will be automatically returned to its normal position.

5. The combination with a series of switching mechanisms, and means for advancing them simultaneously step by step from normal position, of means controlled from a central office for displacing a selected one of said switching mechanisms so that it will not be in step with the other switching mechanisms.

6. The combination with a party line, and a series of switching mechanisms adapted to be advanced by impulses flowing in one direction over the line and to be released by impulses flowing in the opposite direction, of means by which an impulse in the release di-

rection is made effective upon a selected one only of said switching mechanisms.

7. The combination with a party line, and a series of switching mechanisms arranged to be advanced or released according to the direction in which impulses flow over the line, of means by which an impulse in the release direction is made effective upon all switching mechanisms simultaneously, and additional means by which an impulse in the release direction is made effective upon a selected one only of said switching mechanisms.

8. The combination with a series of electromagnetic switching mechanisms connected to a party line, and means by which said switching mechanisms are advanced or released according to the direction of impulses flowing therethrough, of means by which upon sending impulses through said mechanisms so as to cause their simultaneous advance electrical connections will be completed thereby in succession so that impulses in the release direction may be sent there- through individually.

Signed at Chicago, Ill. this 7th day of July 1905.

SAMUEL A. NORSTROM.

Witnesses:

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