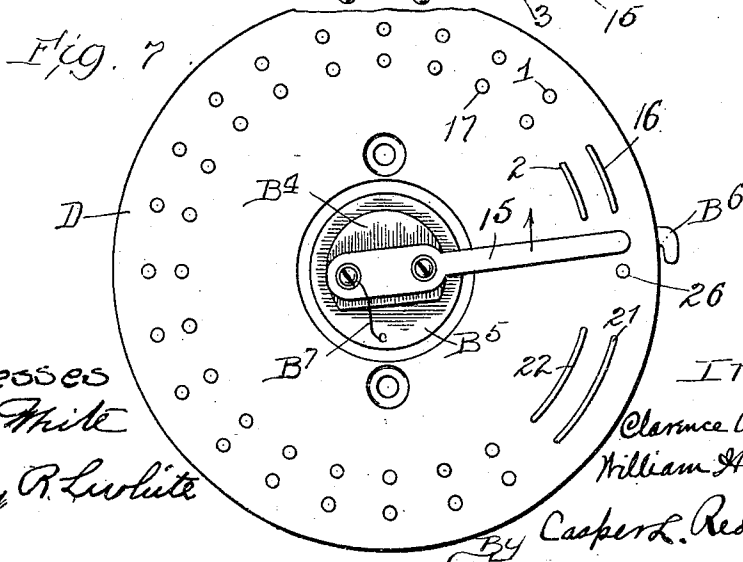
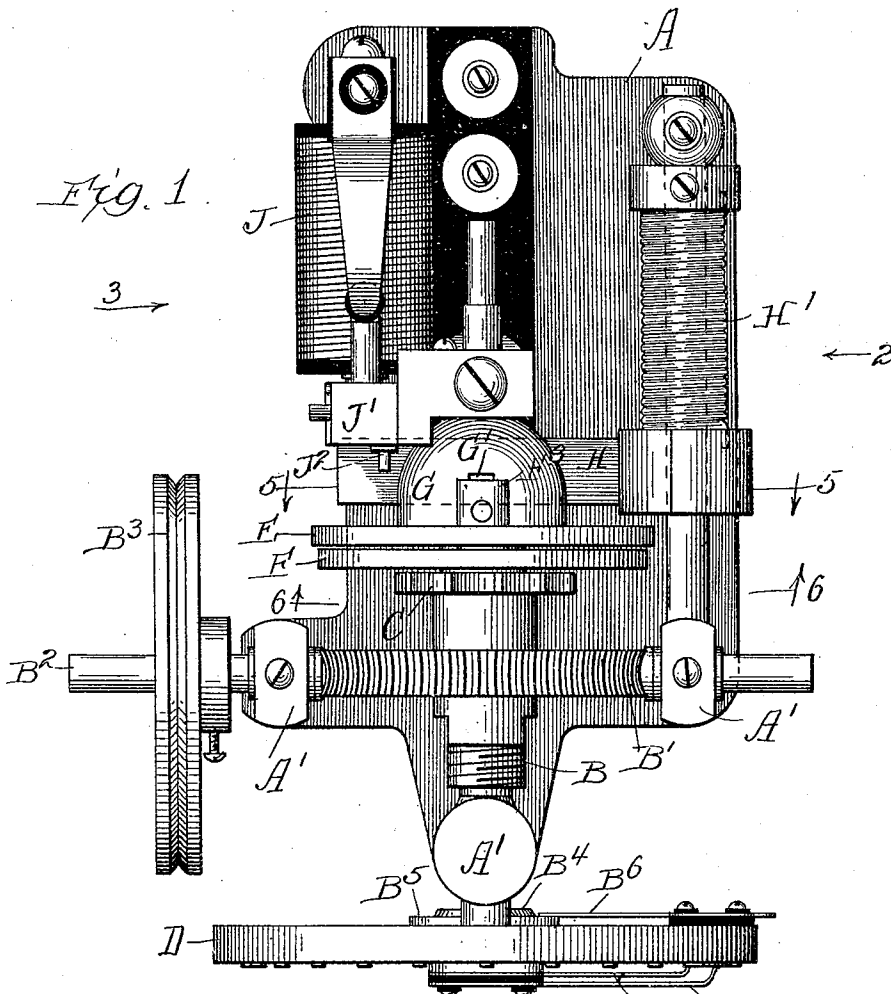


C. A. ANDERSON & W. HAGSTROM.
 CALLING DEVICE FOR TELEPHONE EXCHANGES.
 APPLICATION FILED APR. 19, 1906.

938,944.

Patented Nov. 2, 1909.
 5 SHEETS—SHEET 1.



Witnesses
 Ray White
 Harry R. L. White

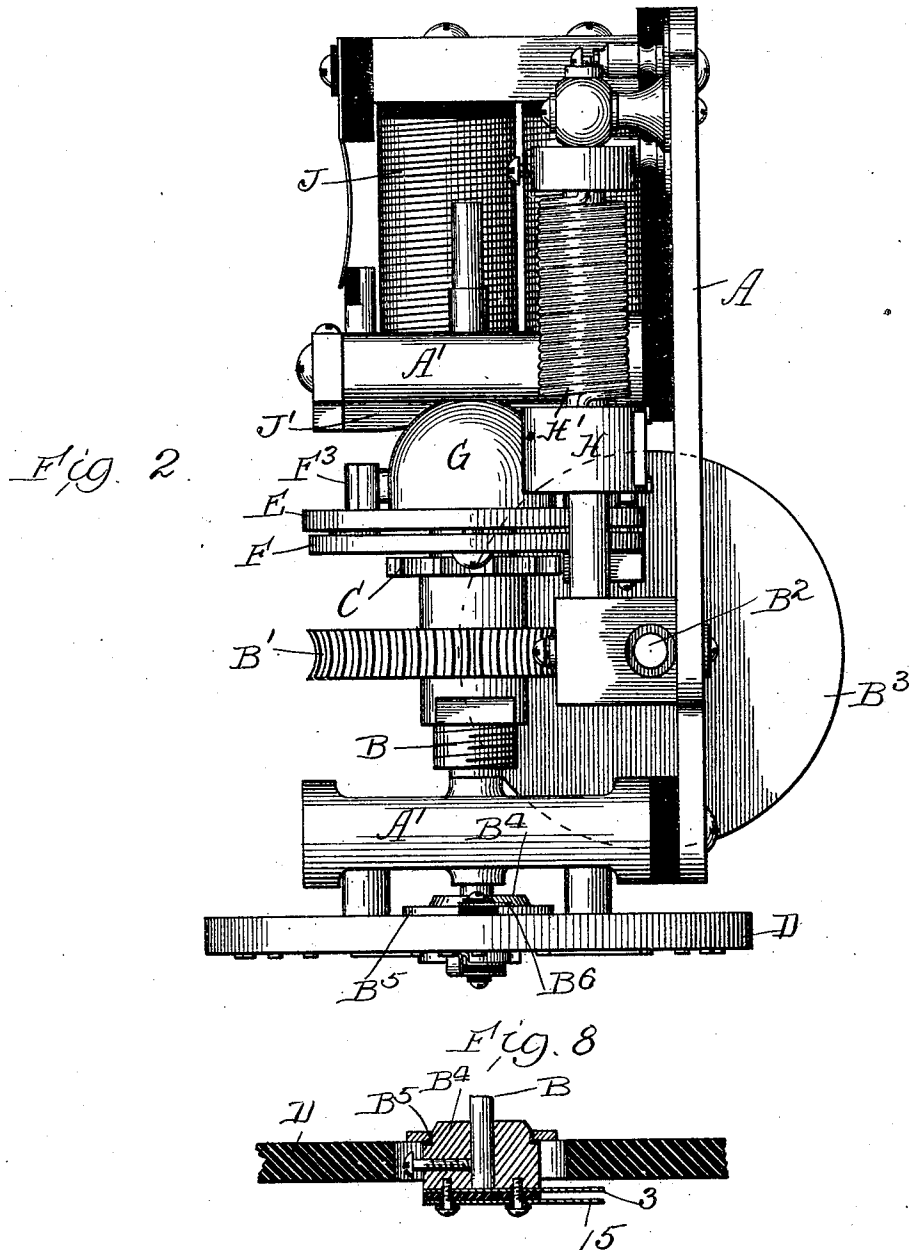
Inventors
 Clarence A. Anderson
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 By Casper L. Redfield, Atty.

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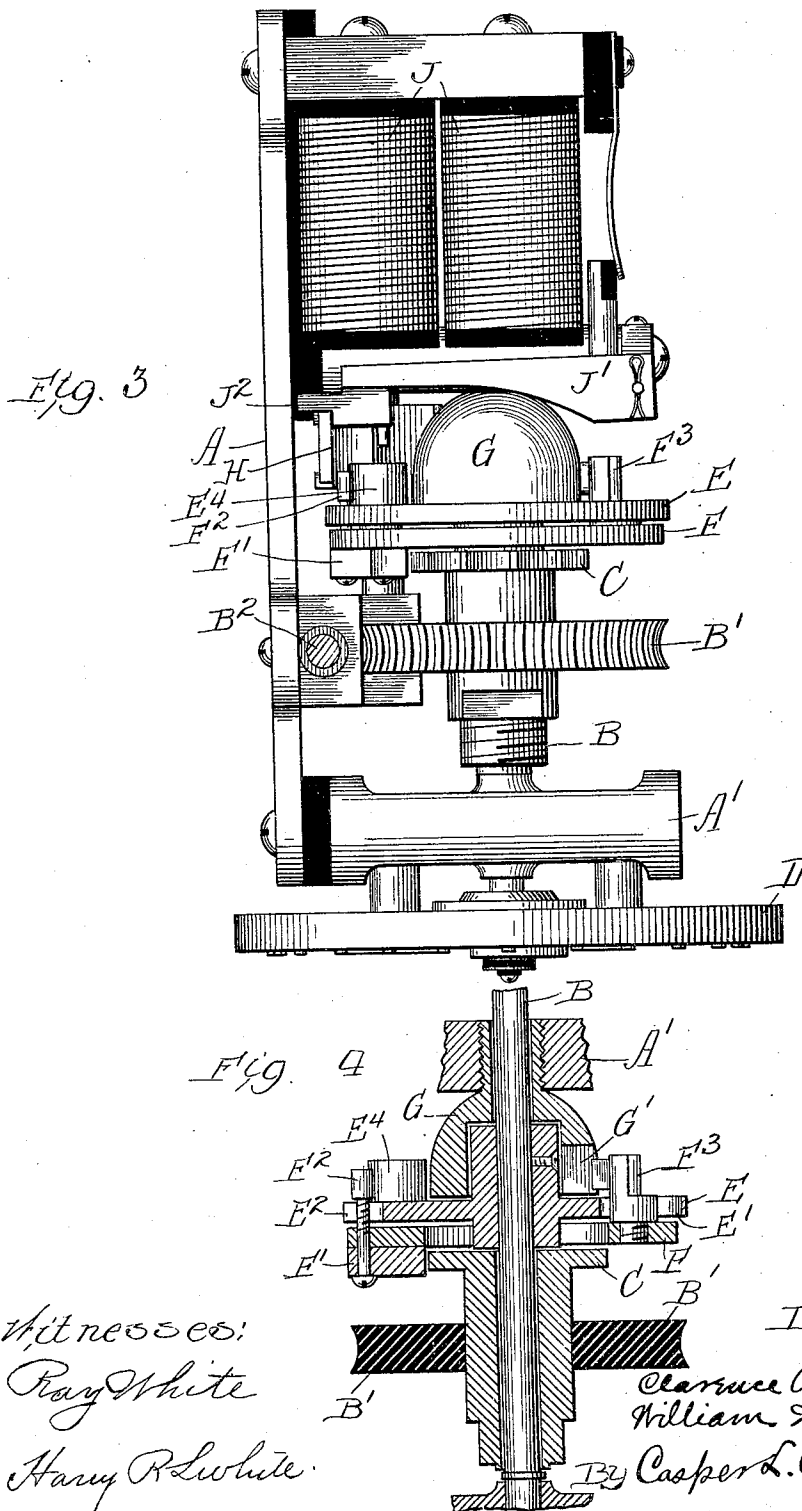
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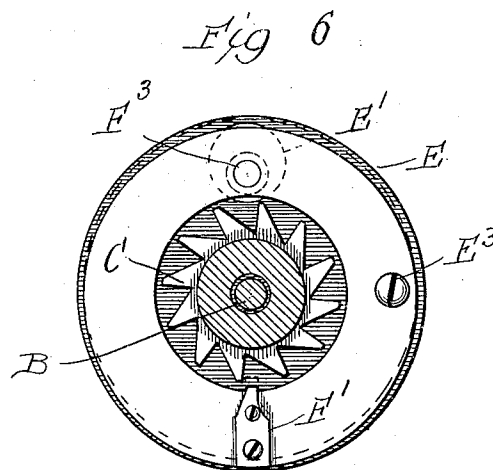
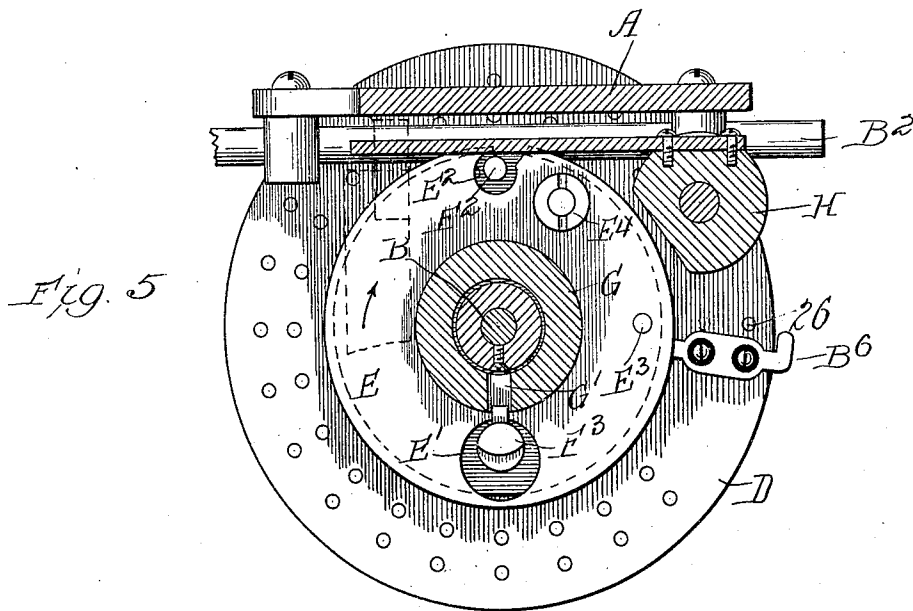
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 6 SHEETS—SHEET 3.



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 5 SHEETS—SHEET 4.



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Fig. 9.

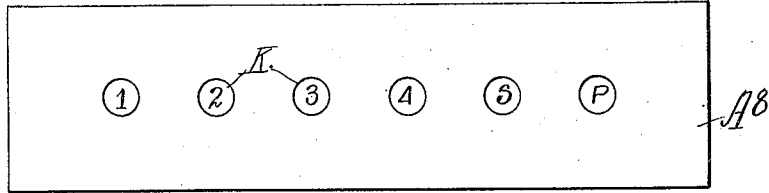


Fig. 10.

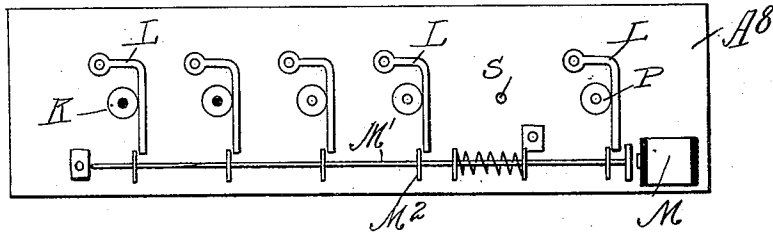
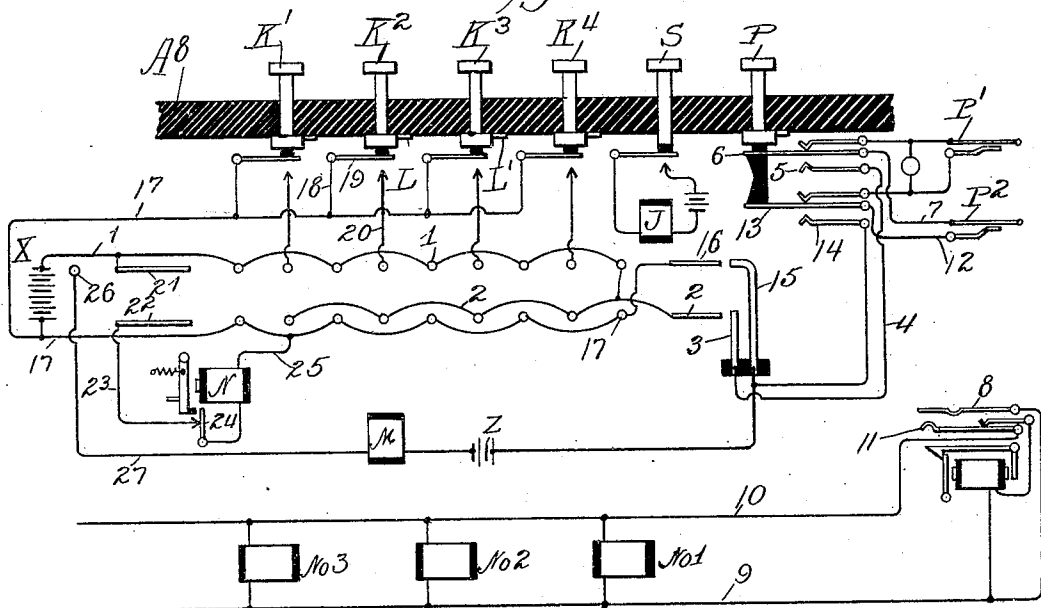


Fig. 11.



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 Clarence A. Anderson
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UNITED STATES PATENT OFFICE.

CLARENCE A. ANDERSON, OF SALINA, AND WILLIAM HAGSTROM, OF LINDSBORG, KANSAS, ASSIGNORS TO THE ANDERSON ELECTRIC AND MANUFACTURING COMPANY, OF McPHERSON, KANSAS, A CORPORATION OF KANSAS, AND HAGSTROM BROTHERS MANUFACTURING COMPANY, OF LINDSBORG, KANSAS, A CORPORATION OF KANSAS.

CALLING DEVICE FOR TELEPHONE-EXCHANGES.

938,944.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed April 19, 1906. Serial No. 312,579.

To all whom it may concern:

Be it known that we, CLARENCE A. ANDERSON and WILLIAM HAGSTROM, citizens of the United States of America, and residents of Salina, Saline county, Kansas, and of Lindsborg, McPherson county, Kansas, respectively, have invented certain new and useful Improvements in Calling Devices for Telephone-Exchanges, of which the following is a specification.

Our invention relates to calling devices for party line exchanges and has for its object improvements in such devices.

In the accompanying drawings, Figure 1 is a front elevation; Figs. 2 and 3 are side elevations in the directions of the arrows 2 and 3 respectively of Fig. 1, the drive pulley being omitted in Fig. 3. Fig. 4 is a partial vertical longitudinal section corresponding to Fig. 3; Fig. 5 is a section on line 5—5 of Fig. 1; Fig. 6 is a partial section on line 6—6 of Fig. 1; Fig. 7 is a bottom view of Fig. 1; Fig. 8 is a partial section of the same; Fig. 9 is a face view of the key-board associated with and forming a part of the calling device; Fig. 10 is a rear view of Fig. 9; and Fig. 11 is a diagram of the circuits involved in using the calling device.

In party line exchanges for which this calling device is particularly applicable, there are telephone stations each of which has one or more electrically operated devices bridged between the line limbs as shown at No. 1, No. 2 and No. 3 in the lower part of Fig. 11. For the proper operation of these devices it is desirable that impulses of short or long duration be sent over the line, sometimes in one direction and sometimes in the other. The calling device is designed for the purpose of sending such impulses in any order desired, and for the purposes of illustration an arrangement is shown which is applicable to a particular form of substation apparatus.

The mechanism shown in Figs. 1 to 8 inclusive is preferably inclosed, for protection, in a wooden casing (not shown), and the key-board of Figs. 9 and 10 may conveniently form a part of or be attached to such casing. Or the key-board may be located

at a separate place and be connected to the operating parts by wires only.

In the said drawings A is a metal plate to which the various parts are secured and by which they are held in their proper relationship to each other. Supported in brackets A¹ is a vertical shaft B about which normally rotates a worm gear B¹ secured to the hub of the ratchet wheel C.

A transverse shaft B² has a worm (not shown) which engages the rear of the worm gear B¹ and serves to drive it. A pulley B³ serves to convey power to the shaft B², and thence through the worm and gear to the shaft B.

Supported from the lower bracket A¹ is a dial D of insulating material, which dial has a series of contacts arranged as shown in Fig. 7. The shaft B projects through the dial D and on its lower end has a head B⁴ which carries the contact makers 3 and 15. The contact maker 3 is in electrical connection with the shaft B and hence with the base of the device, while the contact maker 15 is insulated therefrom. The contact maker 15 is provided with a suitable electrical connection B⁷ (Fig. 7) to an insulated ring B⁵ carried on the head B⁴, and a brush B⁶, (Fig. 1) carried by the dial D and bearing on the ring B⁵, serves to make connection to the contact maker 15. In normal position these contact makers are located as shown in Fig. 7, and when the device is operated they move in the direction of the arrow.

Secured to the gear B¹ is a ratchet wheel C. Loosely secured on the shaft B is a disk E having openings E¹ and E². Pivoted at E³ on the disk E is a plate F which is provided with a pawl F¹ arranged to engage the teeth of the ratchet wheel C when the plate is swung in one direction on its pivot and to clear said teeth when swung in the other direction. A pin F² projecting through the opening E² limits the movement of the plate F in one direction, and a pin F³ projecting through the opening E¹ and engaging the cylindrical or dome-like part G limits it in the other direction. The part G is secured to the upper bracket A¹ and has a slot or

opening G^1 into which a projection on the side of pin F^3 may enter when said pin is in proper position to do so. Also on the disk E is a pin E^4 which, when the disk E is rotated, is adapted to engage and push back a lever H which is normally pressed toward the shaft B by the spring H^1 , Figs. 1 and 2. Supported at a convenient place on the plate or frame A is a magnet J whose armature J^1 is provided with a catch J^2 adapted to engage and hold the lever H in its retracted position against the action of the spring H^1 .

Power is delivered to the pulley B^3 and the parts C , B^1 , B^2 and B^3 run continuously while the other parts are normally stationary or idle. In the idle or normal position the pin F^2 is adjacent to the lever H and this lever is held in its retracted position by the catch on the armature J . If now an impulse be sent through the magnet J so that its armature J^1 will be attracted to release the lever H , the spring H^1 will move said lever to engage the pin F^2 and cause the plate F to swing on its pivot E^3 . When this occurs the pawl F^1 , which before was clear from the ratchet wheel C , will be caused to engage that wheel and be driven thereby. The same movement which caused the pawl F^1 to engage the ratchet wheel C also moved the pin F^3 so that the projection thereon cleared the slot G^1 . The movement of the plate E and the connected parts is in the direction of the arrow of Fig. 5. This rotary movement of the disk E continues until after the pin E^4 arrives at and pushes back the lever H until it is caught and held by the catch J^2 .

The pawl F^1 , as shown in Fig. 6, has the face which is engaged by the teeth of the ratchet wheel beveled so that the force required to drive it tends to push it outward to disengage the connection between the wheel and pawl. But during the turning movement of the disk E the projection on the pin F^3 bears against the cylindrical surface of G and prevents such disengagement. Immediately after the pin E^4 has pushed back the lever H , the projection on the pin F^3 comes opposite the opening G^1 , whereupon, there being nothing further to keep the pawl F^1 in engagement with the wheel C , it is disengaged and the parts come to a stop in normal position. Another impulse through the magnet J will repeat the operation causing another revolution of the parts, and it will be observed that upon each operation the contact makers 3 and 15 make a complete revolution sweeping over the contact points shown in Fig. 7.

As thus described it will be seen that the central operating parts are in effect a clutch mechanism set into operation by a magnet, and that when set into operation the contact makers make one complete revolution and then come to a stop at normal position.

There is also an automatic locking mechanism

which prevents the clutching mechanism from becoming disengaged during operation and which also stops the contact makers positively at a definite point.

Referring to Figs. 9 to 11, K represents a series of keys numbered to represent different stations on the line. In Fig. 9 these numbers are placed on the faces of the keys as they would be in the device itself, but in Fig. 11 these keys are marked K^1 , K^2 etc., so as to distinguish them. There are as many keys K as there are stations on the line, there being one such key for each station. There is also a starting key S and a plug operating key P .

The keys K and P are normally held in an elevated position by contact springs 19 and 6 located on the inside of the board A^8 through which these keys pass. The inner ends of the key rods have collars on them which limit their outward movement by the contact springs 19 and 6.

Pivoted on the inside of the board A^8 , a little above and to one side of the keys K and P , are loose levers L . Normally the levers L pass around and rest against the inner heads of said keys. Located at a convenient place is a magnet M whose armature operates a rod M^1 provided with collars M^2 adjacent to the ends of the levers L . When a key K is depressed so that the inner collar leaves the inner face of the board A^8 , the adjacent lever L swings by gravity between the collar and the board and prevents the actuated contact spring from returning the key to its normal position.

If now an impulse is sent through the magnet M the movement of the rod M^1 will cause the adjacent collar M^2 to push the interposed lever L from behind the collar on the depressed key and thus permit the key to be returned to normal position by its contact spring. As the keys K and P , their levers L , and their contact springs 19 and 6 are independent of each other, it will be evident that two or more keys may be depressed separately and that they may be simultaneously in the depressed condition. It will also be evident that an operation of the magnet M will simultaneously release all of the keys that may at the time be depressed.

The key S has no lever L and is not held in its depressed condition. Its object is to close a circuit through the starting magnet J , and the manner in which that result is accomplished will be clearly seen from Fig. 11 without further description. The key P operates contact springs leading to the plugs P^1 and P^2 . In the normal position of key P connections are closed to P^1 and open to P^2 . In the depressed position these connections are reversed. These plugs are adapted to be inserted in a spring jack having springs 8 and 11 which are terminals of the line limbs 9 and 10, and which are associated with a suitable

line drop as shown in Fig. 11. The contact springs operated by the keys K are connected as shown to one side of a battery X, while the points which they engage are connected to certain contact points located on the dial D. Fig. 11 shows these contact points spread out in a straight line and the manner in which connections are made to them. This diagram shows contacts enough for four stations but usually the calling device has contacts enough for twenty stations on the party line. The particular manner in which the contact points and the associated devices are wired up will depend upon the particular mechanism employed at the local stations, No. 1, No. 2 etc. In the present case the mechanism at the local stations is assumed to be of a kind which will be operated or advanced by impulses in one direction and will be released by an impulse in the opposite direction. Also that this mechanism is so constructed that impulses in the release direction will not be effective to produce release until after a predetermined number of operating impulses have been sent. It follows from this that impulses in the release direction sent before this predetermined number of operating impulses have been sent may be used for another purpose. In the present case they are used to operate the mechanisms of the local stations in such a way as to place selected ones of the stations in telephonic connection with the line.

In the normal position of the device the contact makers 3 and 15 are not in connection with any contact points but rest adjacent to the long contact strips 2 and 16 which they first engage upon the device starting into operation.

Assuming that the operator at the central office wishes to call the subscriber at station No. 2 she will proceed as follows:—She inserts the calling plug P² in the spring jack, presses keys K² and P, both of which stay in their depressed position by reason of their levers L dropping by gravity between the board A^s and the collars on said keys, and then presses key S. Pressing key S closes a circuit through the magnet J the result of which is to start the calling device into operation as before described. As soon as the contact makers 3 and 15 reach strips 2 and 16 a current flows:—X—1—2—3—4—5—6—7—8—9— through the devices of the different stations on the line—10—11—12—13—14—15—16—17—X. This is an initial impulse in the release direction the object of which is to make certain that all of the local station devices are in their normal positions before the beginning of the operating impulses. Immediately after the contact makers 3 and 15 leave these strips they engage a pair of contact points which are connected in the reverse way to the poles of the bat-

tery X. When this occurs a current flows: X—1—15—in the reverse direction through the course previously described to 3—17—X. This is an impulse in the operating direction and is repeated each time that the contact makers reach contact points connected in the same way to the battery X. In the diagram this is shown as occurring for each alternate pair of contact points. For the intermediate points no impulses are sent until the contact makers reach the points which correspond to the key K² which we have assumed was depressed. A current then flows:—X—1—2—3—then as in the first instance back to 15—20—19—18—17—X. This is an impulse in the release direction but as the entire series of impulses have not yet been sent it is non-effective for release and is used, by means of appropriate mechanism, for connecting station No. 2 telephonically to the line. The same thing would be repeated for any other keys K that might have been depressed.

After the contact makers have passed the last contact points connected as before described to the battery X, they come to the long strips 21 and 22. A current then flows:—X—1—21—15—as before described to 3—22—23—24—magnet N—25—17—X. This is a current in the operating direction which is used for signaling. To make this current effective for signaling purposes the signaling connection for the desired station or stations is supposed to have been made at the same time that the telephonic connection was made, and the mechanism at the local station has come to the limit of its movement by striking an abutment or by any other means. This current through the magnet N serves to break its own circuit by attracting its armature, after which the armature falls back and completes it again. As a result of this the long impulse that would otherwise flow over the line while the contact makers are passing over the strips 21 and 22 is broken up into a series of short impulses for signaling the desired station.

After the contact makers leave the strips 21 and 22, the contact maker 15 engages the point 26 which closes a circuit from the battery Z through the magnet M and line 27. As before described, the magnet M is used to withdraw the levers L from the keys K and P so as to release them and permit them to return to their normal position under the action of their adjacent contact springs 19 and 6. Immediately after leaving contact 26 the device comes to a stop as before described.

What we claim is:—

1. The combination with a series of contact points, a pair of contact makers, and a drive shaft normally disconnected from said contact makers, of a clutch mechanism arranged to connect the contact makers to the

shaft, and means by which upon operating the clutch mechanism said contact makers will make one complete cycle of operations and come to rest in their normal position.

5 2. The combination with a series of contact points, a pair of contact makers, and a drive shaft normally disconnected from said contact makers, of a clutch mechanism arranged to connect said contact makers to
10 the drive shaft, a magnet for operating said clutch, means by which upon operating said clutch said contact makers will be moved over said contact points, and means by which upon the contact makers having completed
15 connection to all of said contact points the contact makers will be automatically released from the source of power.

3. The combination with a pair of contact makers, a drive shaft for moving them, and
20 a double series of contact points over which they are moved, of a battery, connections from the opposite poles of said battery to alternate contact points in each series so that upon a movement of said contact makers
25 over said contact points an impulse will be sent in a given direction upon engagement with every other contact point, open connections from the intermediate contact points of each series to the opposite poles of said battery, and a separate key for each open
30 connection and so arranged that by closing selected keys said contact makers will send impulses in an opposite direction through the contact points corresponding to the keys
35 closed.

4. The combination with a party line, and a device for sending impulses in an operating and in a releasing direction over said line, of means by which upon operating
40 said device it will begin by sending one long impulse in the release direction over the line and will follow it by a series of ordinary impulses in an operating direction, and additional means by which one ordinary
45 impulse in the release direction may be caused to flow over the line between any desired two of the impulses in the operating direction.

5. The combination with a party line, and
50 a calling device provided with contact points and contact makers by which impulses are sent over the line, of two strips in the path of said contact makers by means of which a long impulse would be normally sent over
55 the line, and a vibrating circuit breaker located in the connection to said strips and so arranged as to break the otherwise long impulse into a series of short impulses suitable for signaling local stations on the party line.

6. In a calling device for party lines, the combination with a pair of contact makers, and a power device for moving them through a cycle of operations, of a series of contact connections in the path of said
60 contact makers in their cycle and consisting of

a pair of strips engaged in the initial part of the movement followed by a series of pairs of contact points, then a second pair of strips and finally a single contact in the path of one only of said contact makers. 70

7. The combination with a party line, cord and plug connections therefor, and contact making devices for sending impulses over the line, of a series of keys each arranged to control the sending of an impulse in a
75 reverse direction between some particular pair of impulses normally sent, an additional key for controlling the cord and plug connections to said line, locking devices for holding said keys in their moved position,
80 and means controlled by the contact devices for releasing said keys upon the completion of one operation of said devices.

8. The combination with a party line, cord and plug connections therefor, and contact
85 making devices for sending impulses over the line, of a drive shaft, means for connecting the contact making devices to the shaft, a series of keys each arranged to control the sending of an impulse in a reverse direction
90 between some particular pair of impulses normally sent, an additional key for controlling the cord and plug connections to said line, and a second additional key for controlling the connection of the power to
95 the contact making devices.

9. The combination with a party line, cord and plug connections therefor, and contact making devices for sending impulses over the line, of a drive shaft, means for connecting
100 the contact makers to the shaft, a key for making such connection, a series of other keys arranged to control the sending of other impulses in a reverse direction at predetermined times in the operation of said contact
105 making devices, locking devices for the series of keys, a magnet for causing the release of said locking devices, and an electrical connection for said magnet controlled by said contact making devices. 110

10. The combination with a party line, cord and plug connections therefor, contact making devices for sending impulses over the line, and a key controlling the connection of the cord and plug to the contact making
115 devices, of a drive shaft, a clutch mechanism for connecting the contact making devices to the shaft, automatic means for releasing the contact making devices from the power immediately upon the completion of
120 one cycle of operations by said contact making devices, and automatic means for releasing the cord and plug connections simultaneously with the release of the contact making devices from the power. 125

11. The combination with a party line, cord and plug connections therefor, contact making devices and a key controlling the connection of the cord and plug to the contact making devices, of a power driven shaft, 130

a clutch mechanism for connecting the contact making devices to the power, electrically operated devices for actuating the clutch mechanism to make such connection, means
 5 by which the movement of the contact making devices sends a series of impulses over the line adapted to operate devices at local stations on the line, a series of keys arranged to be individually operated and each adapted
 10 to cause an extra impulse to be sent over the line in an opposite direction to the impulses before mentioned, locking devices for holding the keys of said series in an operated position when operated, and electrically operated means for releasing said keys upon
 15 the completion of sending a series of impulses over the line.

12. The combination with a double row of insulated contact points, and an insulated
 20 contact maker for each row of points, of a power driven shaft, a clutch mechanism adapted to connect said contact makers to the power shaft, electrically operated devices for actuating said clutch mechanism to make such connection, and automatically operating means for releasing said contact
 25 makers from said power shaft as soon as the contact makers have passed once over their rows of contact points.

30 13. The combination with a double row of insulated contact points, and an insulated contact maker for each row of contact points, of a power driven shaft, a clutch mechanism for connecting said contact makers
 35 to the shaft, a spring actuated lever for operating the clutch mechanism so as to make such connection, a magnet for releasing the lever so that it may operate the clutch mechanism, and a projection carried
 40 by the clutch mechanism, for restoring the lever to its normal position so that the contact makers may be released from the driving shaft.

14. The combination with a series of insulated contact points, and a contact maker
 45 therefor, of a power driven shaft, a clutch mechanism constructed so as to normally release itself, electrically operated devices for operating said clutch mechanism so as to connect the contact maker to the shaft, and
 50 a locking device arranged to hold such connection during one movement of the contact maker over its contact points.

15. The combination with a series of contact points, a contact maker, a power driven
 55 shaft, and means by which said contact maker is temporarily connected to the shaft so as to cause it to make one electrical connection to each of the contact points, of a
 60 party line, means by which an impulse is

sent over the line upon engagement of the contact maker with alternate contact points, and additional means by which other impulses may be caused to flow over the line upon engagement of the contact maker with
 65 one or more of the intermediate contact points.

16. The combination with a series of contact points located in a dial, a contact maker, and means for causing the contact maker to
 70 sweep once over the points on the dial and stop, of a party line, means by which an impulse is sent over the line for each alternate contact made by said contact maker in sweeping over the dial, and additional means
 75 for causing an additional impulse to flow over the line upon the contact maker making a contact with any one of the intermediate contact points.

17. The combination with a double series
 80 of contact points located in a dial, a contact maker for each series, a power driven shaft, and means for connecting said contact makers to said shaft so as to cause them to sweep once over their contact points and
 85 then stop, of a party line, means by which an impulse in a given direction is sent over the party line for each alternate pair of contacts engaged by said contact makers, and additional means by which an additional im-
 90 pulse in the opposite direction is caused to flow over the line for any intermediate pair of contacts engaged by said contact makers.

18. The combination with a device for sending impulses over a party line, and
 95 means for operating said device, of keys adapted to be moved by hand and arranged to control such impulses so as to cause the selection of desired stations, and an electrical connection provided with a magnet for
 100 causing moved keys to be automatically returned to normal position upon the completion of the operation of said device.

19. The combination with a party line, and a device for sending operating and re-
 105 leasing impulses over the line, of means for setting said device into operation so that it will make one revolution so as to send a series of such impulses, and electrical connections so arranged that the first impulse of
 110 such series will be a releasing impulse which releasing impulse will be followed by a plurality of operating impulses.

Signed at Elkhart, Ind., this 11th day of April, 1906.

CLARENCE A. ANDERSON.
 WILLIAM HAGSTROM.

Witnesses:

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 CHARLES H. FIELDHOUSE.