

No. 676,955.

Patented June 25, 1901.

F. A. LUNDQUIST.  
TELEPHONE SYSTEM.

(No Model.)

(Application filed Dec. 23, 1899.)

3 Sheets—Sheet 1.

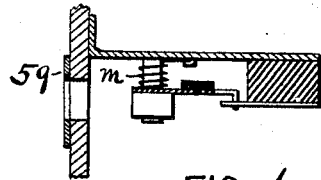
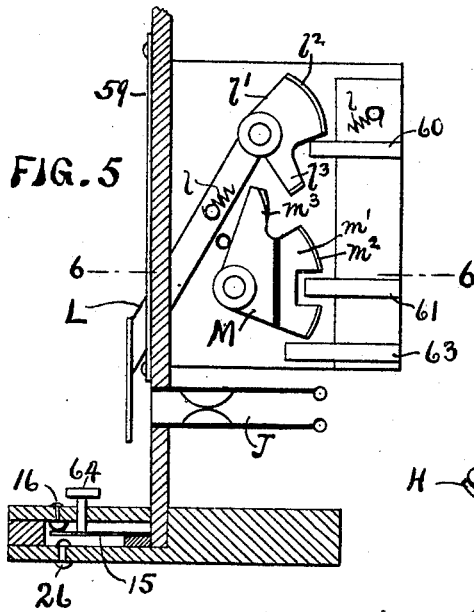
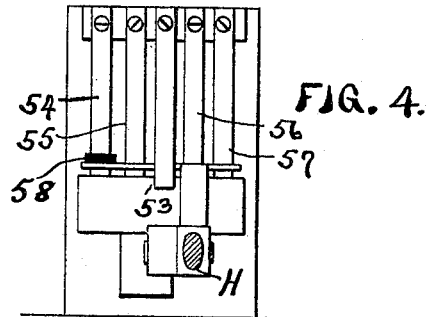
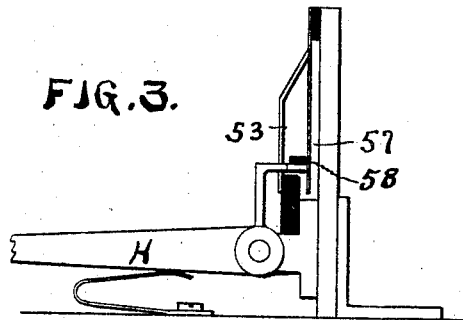
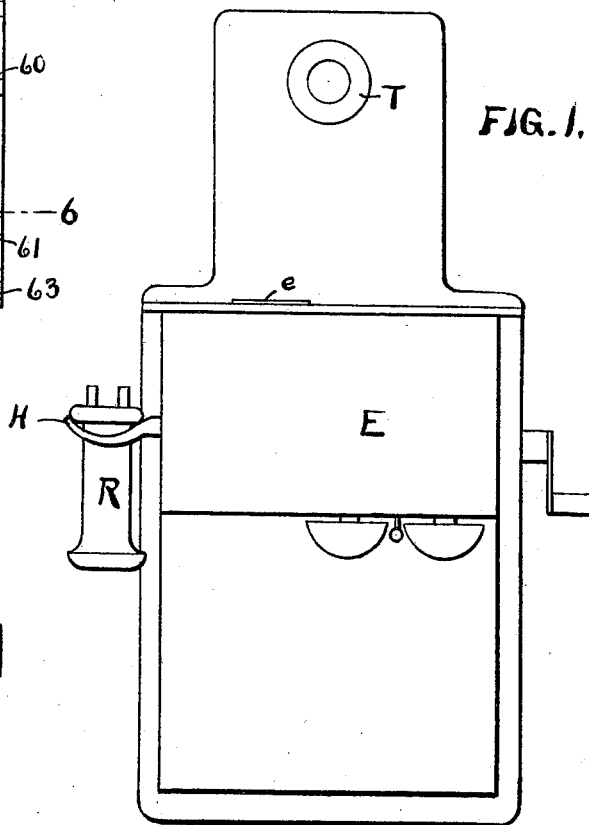


FIG. 6.



WITNESSES:  
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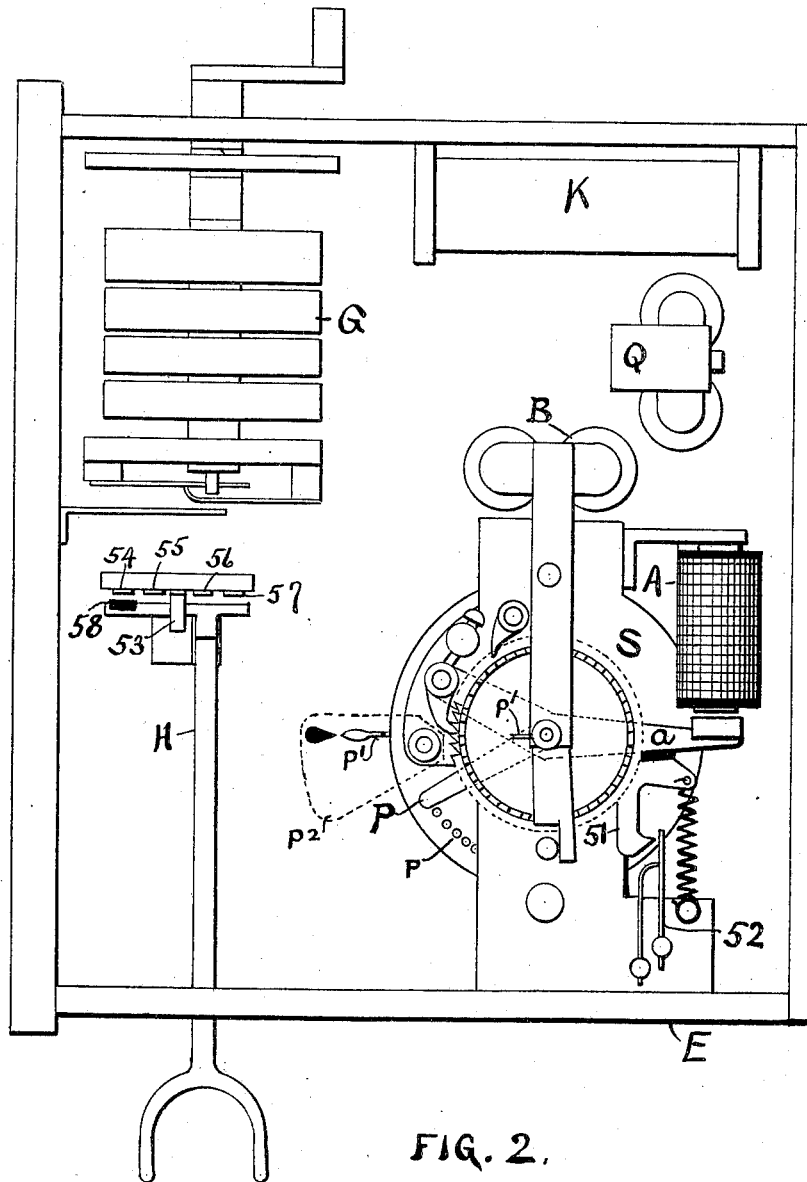
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F. A. LUNDQUIST.  
TELEPHONE SYSTEM.

(Application filed Dec. 23, 1899.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:

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INVENTOR:

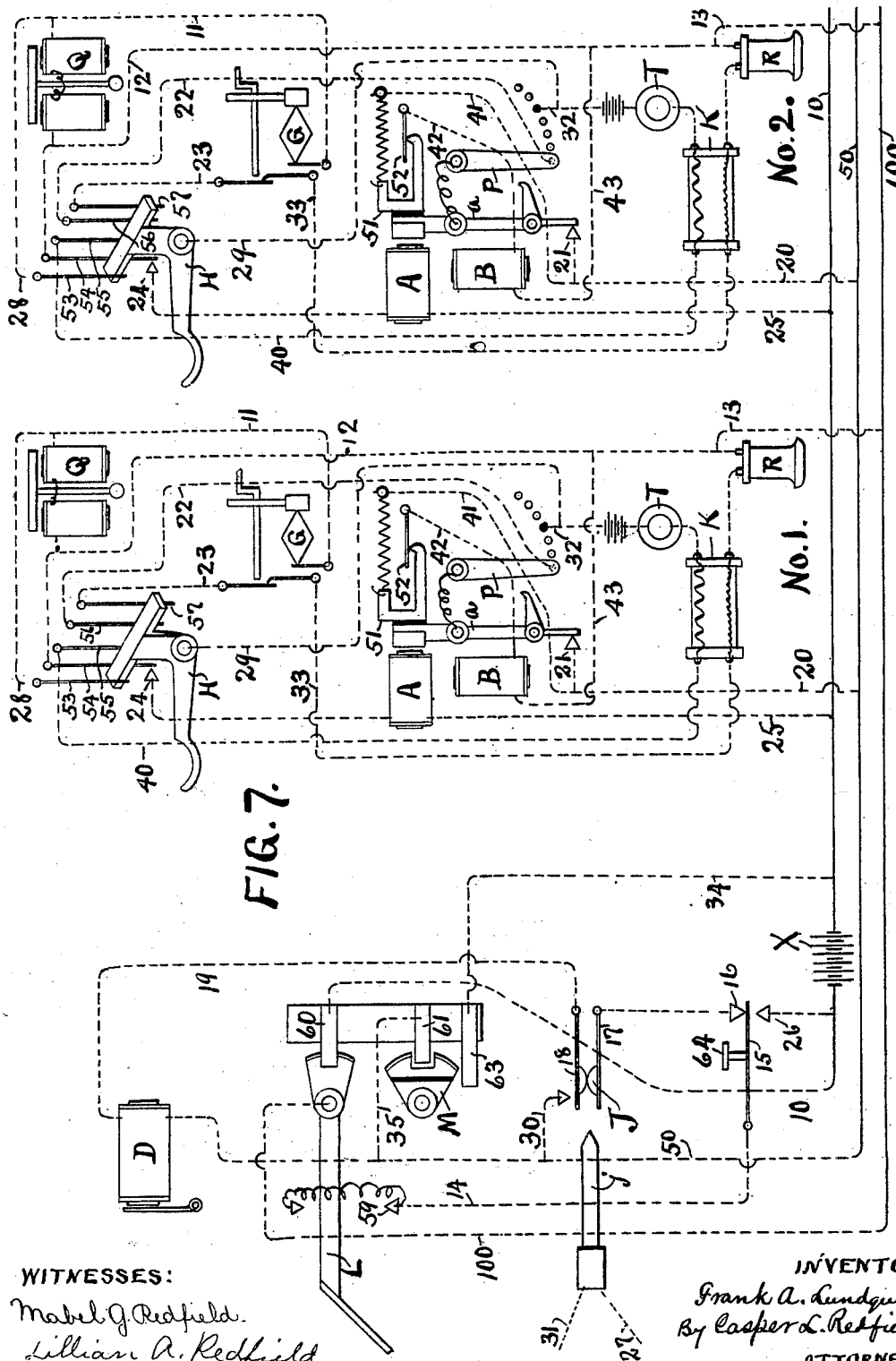
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3 Sheets—Sheet 3.



# UNITED STATES PATENT OFFICE.

FRANK A. LUNDQUIST, OF CHICAGO, ILLINOIS, ASSIGNOR TO M. E. RICHARDSON, TRUSTEE, OF STERLING, KANSAS.

## TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 676,955, dated June 25, 1901.

Application filed December 23, 1899. Serial No. 741,367. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK A. LUNDQUIST, a citizen of the United States of America, and a resident of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Telephone Systems, of which the following is a specification.

My invention relates to telephones used on party-lines, and is particularly adapted to use in a toll-line.

The object of my invention is certain improvements in the construction of the operating devices and the manner of making connections, as will be fully described herein-after.

In the accompanying drawings, Figure 1 is a front elevation of a telephone-box located at each local station. Fig. 2 is an enlarged plan of the telephone-box with the cover removed so as to show the operating devices. Fig. 3 is a partial side elevation of the receiver-hook and its contact devices. Fig. 4 is a front elevation of the devices shown in Fig. 3. Fig. 5 shows a side elevation of the connecting devices at the central office. Fig. 6 is a section on line 6 6 of Fig. 5; and Fig. 7 is a diagram showing two stations and part of the central office, together with their connections.

In the said drawings, E is a telephone-box in which is a switch S, provided with a pointer P, and a series of contact-points *p*. A magnet A operates the switch so as to move the pointer P step by step over the contact-points *p*. Another pointer *p'* (shown broken away in Fig. 2) is secured to the same spindle with P, and a cardboard *p*<sup>2</sup> (shown by dotted lines, Fig. 2) with a suitable mark on it shows when the pointer *p'*, and consequently P, is in its normal position. An opening in the top of the box E covered by a glass plate *e* serves as a means for permitting the subscriber to see when the line is in use. On the armature-lever *a* is an insulated contact device 51, adapted to make connection to the spring 52 each time the magnet A operates. A second magnet B serves to release the pointer P from its propelling magnetism and permit it to return to its normal position. The switch S is substantially the same as that shown in my Patent No. 606,764, issued July 5, 1898. In

its operation the magnet A, acting through its armature-lever *a*, rotates a ratchet-wheel loosely mounted upon a central spindle. On the upper end of the spindle is an arm adapted to engage crown-teeth on the ratchet-wheel, so that the spindle, and consequently the pointer P secured thereto, will be turned when the magnet A operates. The armature-lever for the magnet B engages a collar on the central spindle, so that when the magnet B is energized it will lift the spindle and free the arm from the crown-teeth of the ratchet-wheel. When this occurs, the spindle and its pointer P are returned to their normal position by means of a spring coiled around the central spindle. The receiver-hook H has a T-shaped projection on it, and adjacent to this projection are the contact-strips 53, 54, 55, 56, and 57. When the hook H is down, the projection is in electrical connection with 53, and when it is up it is in electrical connection with 55, 56, and 57. When the hook is up, 54 is in electrical connection with a contact-point 24; but when the hook rises a piece of insulation 58 on the said projection of hook H pushes it away and breaks the connection between 24 and 54. In the box E are also a generator G, a ringer Q, and an induction-coil K.

For each party-line there is at the central station a lever L, which is held at either an upper or lower position by a spring *l*. At either position it is in electrical connection with a slotted plate 59, through which said lever projects. On the rear end *l'* of the lever L is a lip *l*<sup>2</sup>, which is adapted to make an electrical contact with a strip 60 when the lever passes from one position to another, but is not in such connection at either extreme position. Adjacent to L is a segment of a disk M, which is normally held in the position shown by the spring *m*. A part *m'* of the segment of the disk M is insulated and provided with a lip *m*<sup>2</sup> and a notch, as shown. The section of disk M also has an arm *m*<sup>3</sup>, one edge of which is slightly turned up, so as to permit an arm *l*<sup>3</sup> on the lever L to slide under it by bending it outward when the lever L is raised to its upper position. When the lever L is again lowered, the lip on the arm *l*<sup>3</sup> catches behind the arm *m*<sup>3</sup>, so as to push M downward

- and cause the insulated section to complete electrical connection between the contact-strips 61 and 63. Just before the lever L reaches its lowest position the arm  $m^3$  slips off of the end of the arm  $m^2$  and permits the section of disk M to be returned to its normal position by the spring  $m$ . A spring-jack J is located close below the lever L, so that the said lever must be raised to insert the plug  $j$ , Fig. 7, in said spring-jack. Also adjacent to the lever L is a contact-strip 15, normally in contact with a point 16, but which may be pushed to contact with a point 26 by means of the button 64.
- 15 In applying my invention I provide a central station at which is located an operator, and from this station run three wires 10, 50, and 100. A series of telephones are connected to these wires by branches 25, 20, and 13.
- 20 Two such telephones (marked No. 1 and No. 2) are shown in Fig. 7, together with their connections to a central station. There is also shown as much of the connections in the central exchange as is essential to the present application. In connecting up the several telephones on a party-line telephone No. 1 would have an electrical connection 32 made to the third contact-point  $p$  from the normal contact-point, which is provided with a connection 22 in all cases. In telephone No. 2 the connection 32 would be to the fourth point  $p$  from normal. In telephone No. 3 it would be at the fifth point, in telephone No. 4 at the sixth point, and so on.
- 35 All telephonic connections are made through the central office. When a subscriber on one line wants to talk to a subscriber on another line, the connections at central may be made in the ordinary manner; but when a subscriber wants to talk to another on the same line the operation is as follows: He first glances through the glass plate  $e$  and observes the position of the pointer  $p'$ . If it rests at the mark on the card-board  $p^2$ , he knows that the line is not in use, while if it is moved away from said mark it will indicate that some one else is using the line. The reason for this is that when the operator gives the line to a person who
- 40 has his receiver off she moves the pointers at all other stations on the line away from their normal points, as will be hereinafter explained. Observing that the line is not in use, he removes his receiver and turns the crank of his generator. The current then flows: G, 11, Q, 12, 13, 100, L, 14, 15, 16, 17, 18, 19, D, (drop,) 50, 20 of the calling-switch, 21,  $a$ , P, 22, 56, 57, 23, G. This operates the drop for that line. The operator then raises
- 50 the lever L and inserts the plug. Raising the lever makes connection between L and 60, when a current flows from battery X, 10, 60, L, 100, 13 of all of the switches on the line, except the one which has its receiver off, 12, 54, 24, (when receiver is off connection is broken between 54 and 24,) A, 25, 10, X.
- This moves all pointers P except the one belonging to the telephone which has its receiver off and indicates by the pointers  $p'$  to all other subscribers that the line is in use, as previously mentioned. After inserting the plug she asks who is wanted. Upon receiving the desired information she pushes button 64, when the current flows: X, 26, 15, 14, L, 100, 13 of all switches, except one with receiver off, 12, 54, 24, A, 25, X. This moves the pointers P, and she repeats until the points all stand at the particular point  $p$  from which the desired telephone has a connection 32. As no two telephones have connections 32 at the same distance from the normal point it will be obvious that all telephones but the one wanted will have electrical connections broken at pointer P. When the proper position is reached, she rings, when a current flows from her generator 27, 17, 16, 15, 14, L, 100, 13 of the called switch, 12, Q, 28, 53 H, (hook being down,) 29, 32, P,  $a$ , 21, 20, 50, 30, 18, 31 back to operator's generator. This calls the subscriber, who removes his receiver and is in talking connection with the calling subscriber. The primary circuit is battery, transmitter, K, 40, 55, H, 29, battery. Assuming that No. 1 is the calling-station and No. 2 the called, with its pointer P in connection with 32, then beginning at the secondary in No. 1 the talking-circuit is: K, R, 13, 100 to 13 of No. 2, R, K, 33, 23, 57, H, 29, 32, P,  $a$ , 21, 20, 50, back to 20 of No. 1, 21,  $a$ , P, 22, 56, 57, 23, 33. Also to operator on 50, 30, 18, 31, through operator's instrument back to 27, 17, 16, 15, 14, L, 100, 13, &c. When through talking the subscriber rings off, when the operator removes the plug and throws the lever L down. The movement of the lever L causes a current to flow through A, as described in the previous movement of it. The downward movement of L, however, moves the section M, which connects 61 and 63 when a current flows: X, 34, 63, 61, 35, 50, 20 of each switch on the line, 41, 51, 52, 42, B, 43, 13, 100, L, 60, 10 X. This operates the release-magnets of each switch and returns all of the pointers to their normal positions.
- What I claim is—
1. A central telephone-station, a group of wires leading therefrom, a series of telephones each of which is similarly connected to the same wires, a switching mechanism at each telephone, a spring-jack at the central station through which the operator makes connections to said telephone, a lever so located that it must be moved before a plug can be inserted in said spring-jack, and means whereby a movement of said lever will cause an operation of each switch.
  2. The combination with a central telephone-station, a series of telephones, and connections from the central station to the telephones, of a spring-jack, a device for covering the opening to said spring-jack, and

means whereby the removal of said covering will cause an automatic operation at each telephone of the series.

5 3. The combination with a central telephone-station, a series of telephones, and connections from the central station to the telephones, a spring-jack, a lever movable to two extreme positions, one of which covers the opening to said spring-jack, and a spring arranged to hold said lever at either extreme position.

10 4. A series of telephones each of which is provided with a movable switching mechanism,

a central station provided with connections to said telephones, a spring-jack located at said central station, a device for covering the opening to said spring-jack, and means whereby the movement of said device to cover said opening will cause all moved mechanisms to be returned to their normal position. 15 20

Signed by me at Chicago, Illinois, this 15th day of December, 1899.

FRANK A. LUNDQUIST.

Witnesses:

MARY BUTTS,  
LOUISE PETERSEN.