

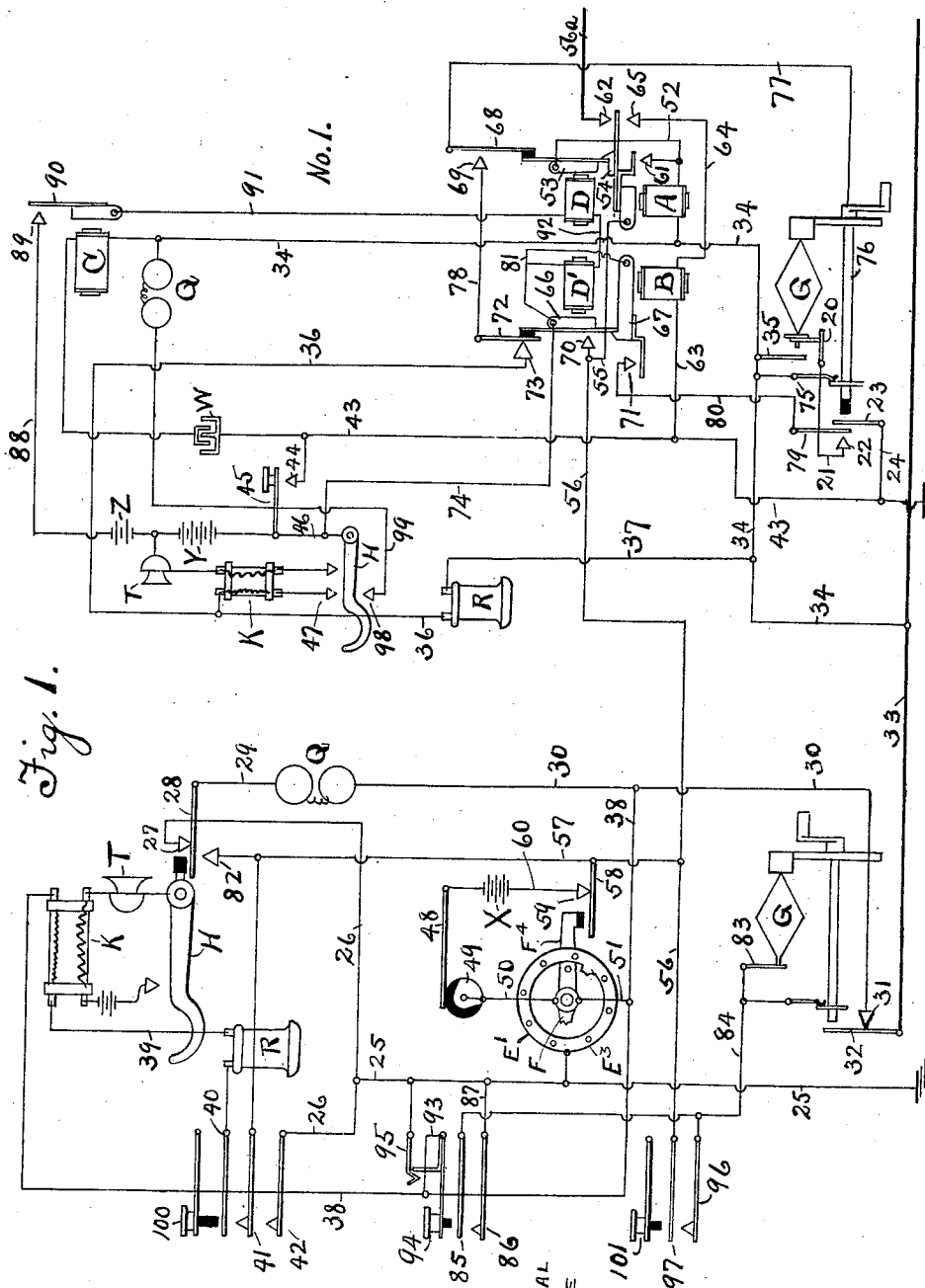
No. 877,727.

PATENTED JAN. 28, 1908.

N. E. NORSTROM.
TELEPHONE EXCHANGE.

APPLICATION FILED OCT. 4, 1901.

4 SHEETS—SHEET 1.



WITNESSES:

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Carlos Escobar.

CENTRAL
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BY

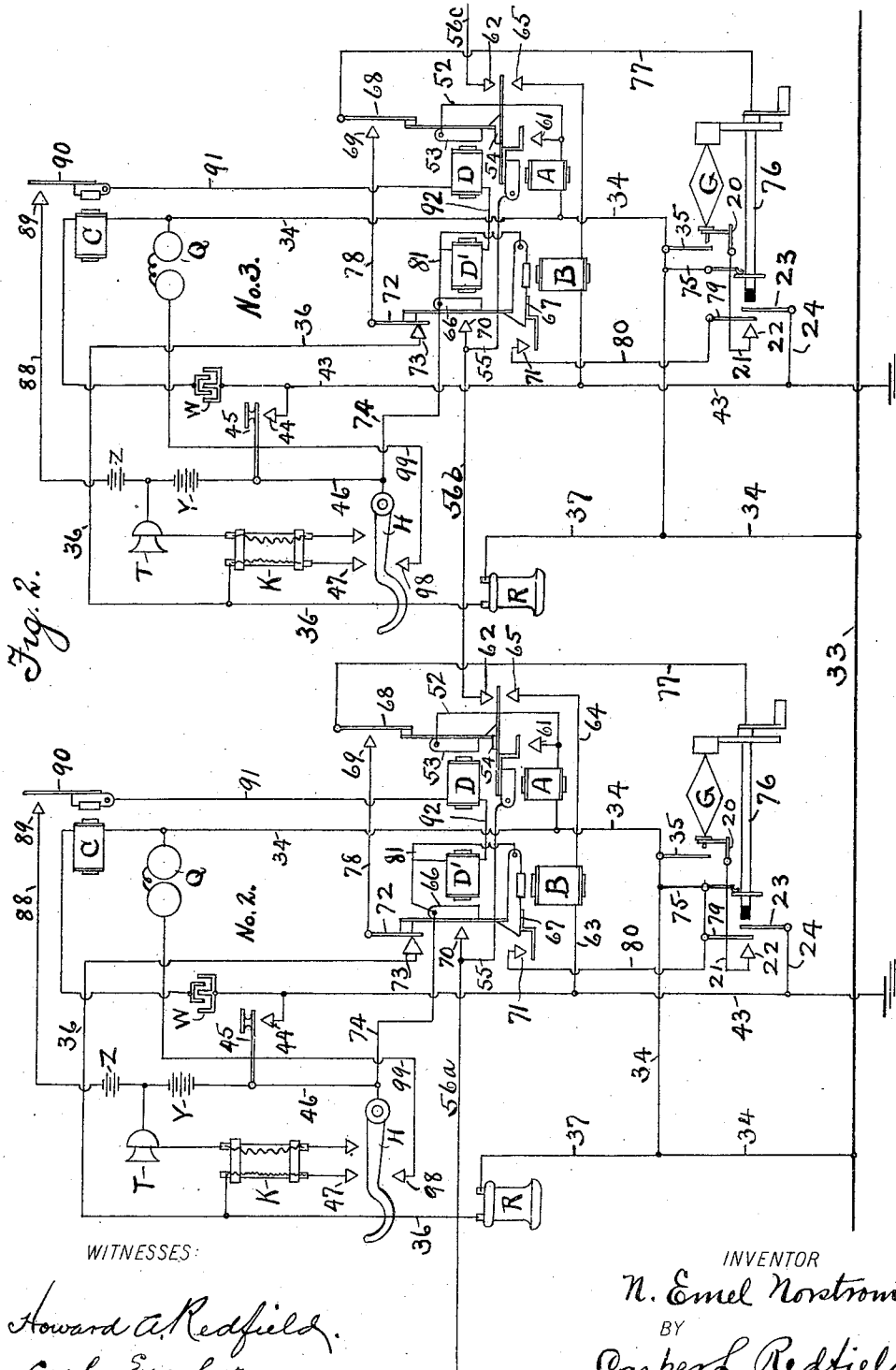
Casper L. Redfield
ATTORNEY

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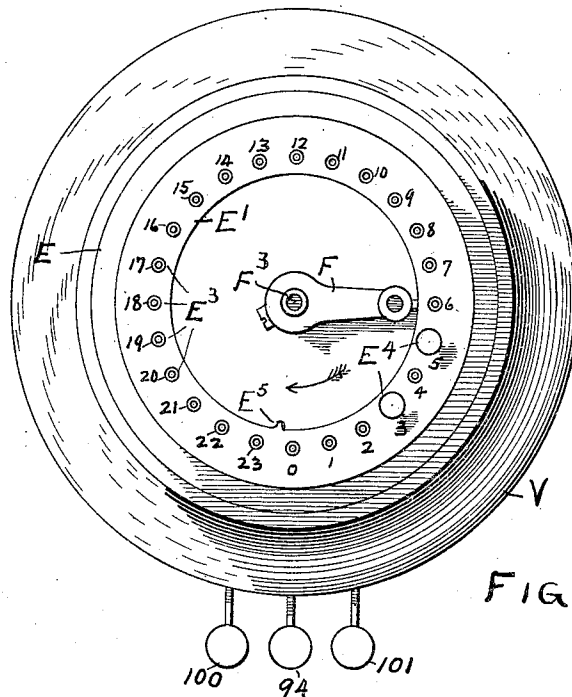


FIG. 3.

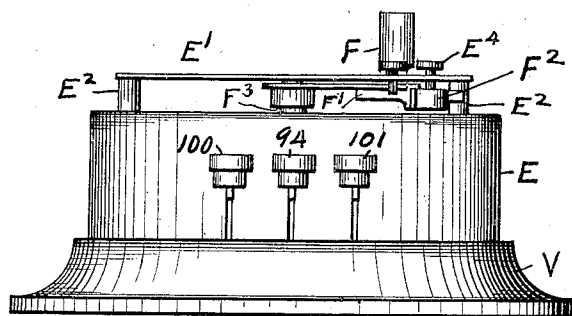


FIG. 4.

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UNITED STATES PATENT OFFICE.

NILS EMEL NORSTROM, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-THIRD TO JOHN ANDERSON, OF SALINA, KANSAS, ONE-THIRD TO M. E. RICHARDSON, OF STERLING, KANSAS, AND ONE-THIRD TO JOHN H. MARTIN AND H. KEATING.

TELEPHONE-EXCHANGE.

No. 877,727.

Specification of Letters Patent.

Patented Jan. 28, 1908.

Application filed October 4, 1901. Serial No. 77,526.

To all whom it may concern:

Be it known that I, NILS EMEL 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 Telephone-Exchanges, of which the following is a specification.

My invention relates to party line telephone exchanges, and has for its object improvement in the devices and methods of operating such exchanges.

In the accompanying drawings, Figure 1 is a diagram showing a central office at the left-hand end and one local station at the right-hand. Fig. 2 is a diagram, a continuation of Fig. 1, showing two additional local stations. Fig. 3 is a plan of the selecting device at the central office. Fig. 4 is a side elevation of the same. Fig. 5 is a plan similar to Fig. 3, partly broken away for the purpose of showing the contacting devices. Fig. 6 shows the interior of the selecting devices; and Fig. 7 is a partial plan same as Fig. 6, with the parts in slightly different position.

On a base V is supported a cylindrical case E, above which is supported a ring E¹, by posts E². Within the ring E¹ are a series of holes E³, which are numbered as shown in Fig. 3. In these holes may be inserted pins E⁴, which pins may be inserted in any of the desired holes. In the interior of the casing E there is a clock mechanism supported by a plate V⁴, part of which mechanism is shown by a gear V¹ and a spring V² in Fig. 7. Running through the clock mechanism and connected thereto is a post F³, upon the upper end of which is an arm F, to the end of which is secured a second arm F¹. Secured to the arm F¹ is a spring F², arranged so that when the arm F is turned the spring F² will make electrical contact with the pins E⁴ in the holes E³. The clock mechanism normally holds the arm away from a lug E⁵, on the ring E¹ and when the said arm is moved against said lug in a direction of the arrow shown in Fig. 3, the spring V² returns the arm to its normal position, in which position the said arm points at the hole marked with the number that represents the number of stations on the party line. Connected with the clock mechanism and driven thereby is a spindle L (see Figs. 6 and 7), upon which is supported an arm

L¹ carrying two loose weights L². These parts form a governing device for preventing too rapid return of the arm F by the action of the spring V². Also supported on the spindle L is a segment of a disk 49, which is adapted to come into contact with a contact spring 48 once for each revolution of said segment. The spindle L is so related in its movements to the spindle F³ that the segment 49 will make one contact with the spring 48 each time the arm F moves a distance equivalent to the distance between two of the holes E³ in the ring E¹.

The clock mechanism is so arranged that when the arm F is moved in the direction of the arrow in Fig. 3, the governing device on the spindle L is not rotated, but upon the return of the said arm to its normal position through the action of the spring V², the said governing device with the disk 49 is rotated as previously described. This operation may be through a pawl and ratchet or any equivalent means, and is not a part of the present invention. On the spindle F³ there is an arm F⁴, adapted to come in contact with an arm J, which arm is arranged to be pushed into the path of a pin L³ on one of the weights L². This position occurs only when the arm F is at its normal position and acts as a means of stopping the disk 49 out of electrical connection with the contact spring 48. Also in its movement to stop the disk 49, the arm J acting through a piece of insulation J¹ opens electrical connection between two springs 58 and 59. On the plate V⁴ is supported a shaft V³ and on the said shaft are supported three keys 94, 100 and 101. Adjacent to these keys, as shown in Fig. 6, are springs 42, 86, 95 and 96. The operation of the keys and their springs are better seen in the diagram Fig. 1 and their operation will be apparent in the subsequent description of the electrical currents. Also at the central office there is the ordinary receiver R, hook H, transmitter T, induction coil K and generator G, together with the electrical connections shown in Fig. 1. From the central office there is a line 56 and another line 33, which extend to a series of telephone stations marked respectively #1, #2 and #3. The several stations with the electrical connections and the central office form what is known as a party line system,

all of the stations being connected through the lines extending from the central office.

Assuming that the subscriber at station #2 wishes to talk with a subscriber at station #3, then he would proceed as follows: Without removing his receiver the calling subscriber turns the crank of his generator G, which generator is of the direct current type. A current will then flow as follows: G—20—21—22—23—24—ground to the central office—25—26—27—28—29—Q—30—31—32—33 to 34 of station #2—35—G. This circuit calls the operator at the central office, who removes her receiver and presses key 100. The calling subscriber also removes his receiver and presses his key 45. Then beginning at the calling station the talking circuit is as follows: K—36—R—37—34—33 to the central office—32—31—30—38—K—39—R—40—41—42—26—25—ground back to the local station—43—44—45—46—H—47—K. Through this talking circuit the subscriber at station #2 informs the operator at the central office that he wishes to talk with the subscriber at station #3. The operator then inserts pins E³ in the holes E³, which are indicated by #2 and #3, the stations with which the talking circuit is to be completed. She then moves the arm F in a direction of the arrow shown in Fig. 3 as far as it will go, and releases it. The distance which the arm may be moved is usually adjusted so as to limit it to the number of stations which happen to be connected upon the party line. Upon the release of the arm F the clock mechanism returns the said arm to its normal position, which return causes a series of rotations of the contact making disk 49. At the first contact between 48 and 49 a current flows as follows: X—48—49—50—51—38—30—31—32—33—34 of the first station—magnet A—52—53—54—55—56—57—58—59—60—X. The current through A releases 53 from 54 and breaks its own circuit at this point, but previously closes the same circuit between 54 and 61, holding it until the circuit is broken at the central office. Releasing 53 from 54 permits the spring 68 to close against the contact point 69 and breaking the circuit through A permits 54 to fall back against the contact point 62. The second rotation of the contact disk 49 sends a similar current except that it passes from 33 to 34 of the second station, thence to A—52—53—54—55—56^a to the first station—62—54 and on to central over the previous course. As #2 is one of the two stations having plugs in the indicator, there is a contact with this plug made by the spring F² which is connected with the arm F. This contact sends a current simultaneously with the one just described as follows: X—48—49—50—F—plug—the ring E¹—25—ground to second station—43—63—B—64—

65—54 (54 being in contact with 65 by virtue of the simultaneous action of the magnet A)—55—where it joins the previous current back to the central office and continues to flow as long as A holds 54 in contact with 65. The current through B releases 66 from 67 and also 72 from 73. The same release closes 66 to 70 and breaking the circuit through B closes 67 to 71. Upon the third revolution of the disk 49 the current flows as just described except that it goes to station #3, operating in that station precisely as just described for station #2, closing 54 to 62 and through 56^b to station #2. Further rotations of the disk 49 connect in a similar manner through the other stations, the connection of which is shown at 56^c at the right of Fig. 2. As soon as the arm F has reached its normal position, the operator at the central office presses key 101 and turns generator, which is of the alternating type, when a current flows as follows: G—83—84—96—97—56—55—54—62—56^a—70 of station #2—66—74—H—98—99—Q—34—33—32—31—G—also branching from 56^a of station #2 to 55 and on through in a similar manner in station #3, returning over line 33. This current through its two branches operates the ringing devices of stations #2 and #3, calling the subscribers, who remove their receivers. The two stations #2 and #3 are then in telephonic connection and beginning at station #2 the talking circuit is as follows: K of #2—36—R—37—34—33 to station #3—34—37—R—36—K—47—H—74—66—70—56^b—62—54—55—70—66—74—H—47—K. If the talking circuit were between stations 3 and 1 the circuit would go from 70 of station #2 to 56^a, 62, etc., of station #1. In other words, 56^a, 56^b, 56^c, etc., from a line made continuous by the actions of the magnets A of each station, and the stations connected to that line are those in which the magnet B also acts to connect 66 to 70, which begins in the talking circuit for that station. In those stations in which B did not act, 68 and 69, and 72 and 73 are in connection and there is a complete circuit within the telephone station as follows: Assuming station #1, R—37—34—75—76—77—68—69—78—72—73—36—R, which circuit being complete within itself prevents induction to R from the line 33 over which the other telephones are talking. The ringing circuit is also shunted within the station as follows: G—76—77—68—69—78—72—73—36—R—37—34—35—G. This prevents the subscriber at a disconnected station from ringing up other stations or the central while two subscribers are in telephonic connection. When through talking the subscribers return their receivers and turn their generators, from one of which the circuit would be as follows: G—20—21—22—79—80—71—67—81—66—70—56—57—82—28—29—Q—30—31—32—33—34

of the ringing station 35—G. This notifies the operator at the central office that the subscribers are through, when she presses key 94 and turns her generator, the current flowing as follows: G—83—84—85—86—87—25—ground to each station—43—C—34—33—32—G. The circuit through the magnet C closes 90 to 89, then there is formed a local circuit within each station which unites the batteries Y and Z in series as follows: Y—Z—88—89—90—91—D—92—D¹—81—74—46—Y. This operates the magnets D and D¹ to connect 53 to 54, 66 to 67 and 72 to 73, and to disconnect 68 from 69, 54 from 62, 66 from 70 and 67 from 71. These parts are then in their normal position and are ready for another call from the central office. In the line 43 of each station there is a condenser W; the generator at central office being of the alternating type, the stoppage of the generator leaves a charge in the condenser. When the key 94 is released there is a momentary contact between 94 and 95, when the static charge remaining in the condenser W is discharged as follows: W—C—34—33—32—31—30—38—93—94—95—25—ground to local stations—43—W. This discharges the condenser with a current flowing in a direction opposite to the current from the alternating generator at central office, and releases the armature at C in case the armature should stick in attracted position.

It will be observed from the general description that device shown in Figs. 3 and 4 forms a selecting device which may be set for any stations required by the simple insertion of pins E⁴ in the holes E³ of the ring E¹. The rotation of the shaft F³ acts to connect the series of stations together, and at the time when it strikes a pin it acts to connect the particular station which corresponds to that hole in the index ring into the telephonic circuit by a simultaneous and branch circuit through the magnet B of that station. It will be obvious that 2, 3, 4 or any number of stations might be simultaneously connected into the talking circuit by simply inserting 2, 3, 4 or more pins in corresponding holes in the index ring E¹.

What I claim is:

1. The combination with a central station, a series of local stations, and a discontinuous line consisting of sections of wire extending from station to station, of devices located at each local station for electrically connecting the ends of sections terminating thereat, other devices at the same stations for connecting them telephonically to the united line, and a selecting device located at the central station and arranged to be set so that upon being operated said selecting device will automatically cause one or both of the devices at successive local stations to be operated.

2. The combination with a central station

and a series of local stations, of a continuous party line wire provided with branches extending to the different local stations, a discontinuous line made up of sections extending from station to station, a telephone set located at each local station, means for connecting said sections into a continuous line additional means for connecting the telephone sets of selected stations to the two continuous lines, and a selecting device located at the central station and arranged to be set so that upon its operation it will cause a desired combination of operations at the different local stations.

3. The combination with a movable contact maker, and a power mechanism for causing a forward movement thereof, of a rotating device connected to said contact maker, a ratchet mechanism in the connection between said contact maker and said rotating device, a stopping device normally engaging said rotating device to prevent a forward movement of said contact maker, and means by which, upon a backward movement of said contact maker, said stopping device will be freed from said rotating device to permit a subsequent forward movement of said contact maker.

4. The combination with a movable contact maker, and a power device for giving it a forward movement, of an adjustable locking device adapted to stop the forward movement of said contact maker at any desired point, and means by which, upon a backward movement of said contact maker, said locking device will be released so as to permit a subsequent forward movement thereof.

5. The combination with a contact maker adapted to be moved forward and backward, a governor, connections between said governor and said contact maker so arranged that said governor will be operated by a forward movement of said contact maker but will be unaffected by its backward movement, a locking device normally engaging said governor so as to prevent a forward movement of said contact maker, and means by which said locking device will be released from said governor when said contact maker is given a backward movement.

6. In a device of the class described, the combination with a rotatably mounted shaft, of a crank adjustably secured thereto, a switch arm mounted on said crank, spring mechanism tending to cause a forward rotation of said shaft, locking mechanism adapted upon actuation upon the forward rotation of said shaft to stop the forward rotation of said shaft at a certain point, said locking mechanism being adjustable to vary the position of the point at which the rotation of said shaft is stopped, a ring containing equally spaced holes, and a pin adapted for insertion in any one of said holes.

7. The combination with a contact maker and means for moving it, of a governor for regulating the speed of such movement, and a locking device for said governor operated by the movement of said contact maker.

8. The combination with a contact maker and means for moving it, of a governor for regulating the speed of such movement, a locking device for said governor, and a contact closing device operated by said locking device.

9. The combination with a movable contact maker, and a power device for giving it a forward movement, of means by which a contact pin or point may be placed at any one of a series of predetermined points in the path of the forward movement of said contact maker, a governor mechanism associated with said contact maker to regulate the speed of its forward movement, a locking device arranged to engage said governor so as to stop the forward movement of said contact maker after it has passed the different points at which a contact pin may be placed, and means for operating said locking device by the movement of said contact maker.

10. In the switching mechanism of a party line exchange, a magnet arranged to be operated by impulses sent therethrough, a condenser associated with said magnet and arranged to receive a charge when the magnet is operated, and means for discharging said condenser, said discharge operating to destroy residual magnetism in said magnet due to the impulse which operated the magnet and charged the condenser.

11. The combination with a central office, a series of local stations, and a party line, of means controlled from the central office for shunting the telephonic connections of the different stations successively, and means also controlled from the central office for breaking the shunt of any desired station so as to place that station in telephonic connection with the party line.

12. The combination with a central office, a series of local telephone stations, and a party line, of a selecting device at the central office arranged to make an electrical contact for each station in succession and also to make a second contact for a selected station, means by which each single contact for a station shunts the telephonic connection of that station, and means by which a second contact for any station breaks its shunt and places the station in telephonic connection with the line.

13. The combination with a central office, a series of local stations, and a party line, of telephonic devices at each station, means controlled from the central office and operating over one circuit for shunting the telephonic devices of the different stations, and additional means also controlled from the

central office and operating over a second circuit for breaking the shunt at a selected station.

14. The combination with a central office, a series of local stations, and a party line, of a telephone receiver at each station; a shunt circuit for each receiver, each shunt circuit having two points at which it may be broken, and means operated from the central office for controlling the open and closed condition of said points.

15. In a multi-party line telephone system, the combination with a central exchange, of a telephone-line leading thereto, a plurality of substations connected with said line, receiving apparatus at each substation, a shunt-circuit for said receiving apparatus, means at each substation operable from the central exchange over one circuit for closing said shunt-circuit at one point, and additional means at each substation operable from the central exchange over another circuit for subsequently opening said shunt-circuit at another point.

16. In a multiparty-line telephone system, the combination with a central exchange, of a telephone-line leading thereto, a plurality of substations connected with said line, receiving apparatus at each substation, a shunt-circuit about said receiving apparatus, a switch included in said shunt-circuit, said switch serving normally to open the shunt-circuit, an additional normally closed switch for said shunt-circuit, means operable from the central exchange for closing said normally open switch whereby said receiving apparatus is short-circuited, and additional means operable from the central exchange for opening said additional switch whereby said shunt-circuit is opened.

17. In a multiparty-line telephone system, the combination with a central exchange, of a bimetallic telephone-line leading therefrom, a plurality of substations connected with said line, receiving apparatus at each substation, a shunt-circuit for said receiving apparatus, means at each substation operable from the central exchange over a circuit serially including the metallic limbs of the line for closing said shunt-circuit at one point, and additional means at each substation operable from the central exchange over a circuit including one line-limb and a third conductor for subsequently opening said shunt-circuit at another point.

18. In a multiparty-line telephone system, the combination with a central exchange, of a bimetallic telephone-line leading therefrom, a plurality of substations connected with said line, telephonic apparatus at each substation connected in bridge of the metallic line-limbs, a shunt circuit for said telephonic apparatus, means at each substation operable from the central exchange over a circuit including only the metallic line-limbs for

closing said shunt at one point to prevent effective use of said telephonic apparatus, and additional means at each substation operable from the central exchange over a circuit including one line-limb and a third conductor for subsequently opening said shunt-circuit at another point to restore the telephonic apparatus to service.

19. The combination with a party telephone-line having parallel branches extending therefrom to the telephone-receivers and switchhooks, one having normal connection with the telephone-receiver and the other an open connection with the switch-hook, of switching mechanism at each of the subscribers' stations controlling the connection of said branches with the party-line, electromagnetic mechanism in association with and provided for effecting the operation of each switching mechanism, said electro-magnetic mechanism and switching mechanism being in connection with said branches between said switch-hooks and telephone-receivers and the party-line, and switching mechanism connected with the party-line for governing said electromagnetic mechanism, substantially as described.

20. The combination with a party-telephone line having parallel branches extending therefrom to the telephone-receivers and switch-hooks, one having normal connection with the telephone-receiver and the other an open connection with the switch-hook, of switching mechanism at each of the subscribers' stations controlling the connection of said branches with the party-line, electromagnetic mechanism in association with and provided for effecting the operation of each switching mechanism, said electromagnetic mechanism and switching mechanism being in connection with said branches between said switch-hooks and telephone-receivers and the party-line, and switching mechanism at the exchange connected with the party-line for governing said electromagnetic mechanism, substantially as described.

21. The combination with a party-telephone line having parallel branches extending therefrom to the telephone-receivers and switch-hooks, one having normal connection with said telephone receiver and the other an open connection with the switch-hook, of switching mechanism at each of the subscribers' stations controlling the connection of said branches with the party-line and governing the signal-receiving circuit thereat, electromagnetic mechanism in association with and provided for effecting the operation of each switching mechanism, said electromagnetic mechanism and switching mechanism being in connection with said branches between said switch-hooks and telephone-receivers and the party-line, and switching mechanism connected with the party line for governing said electromagnetic mechanism, substantially as described.

22. The combination with a party-telephone line having parallel branches extending therefrom to the telephone-receivers and switch-hooks, one having normal connection with said telephone-receiver and the other an open connection with the switch-hook, of switching mechanism at each of the subscribers' stations controlling the connection of said branches with the party-line and governing the signal-receiving circuit thereat, electromagnetic mechanism in association with and provided for effecting the operation of each switching mechanism, said electromagnetic mechanism being in connection with said branches between said switch-hooks and telephone-receivers and the party line, and switching mechanism at the exchange connected with the party-line for governing said electromagnetic mechanism, substantially as described.

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