

F. J. & J. MERSMAN.
SELECTIVE DEVICE FOR PARTY LINE TELEPHONES.
APPLICATION FILED MAY 29, 1907.

934,979.

Patented Sept. 21, 1909.
3 SHEETS—SHEET 1.

Fig 1

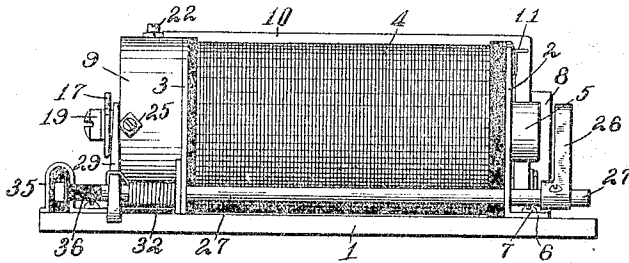


Fig 2

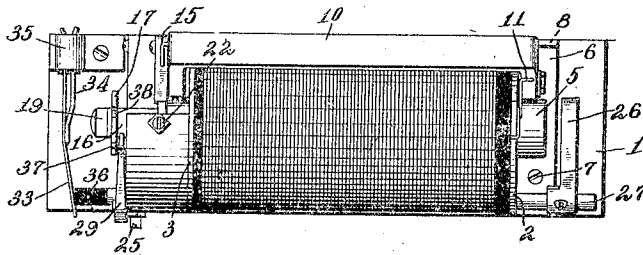


Fig 3

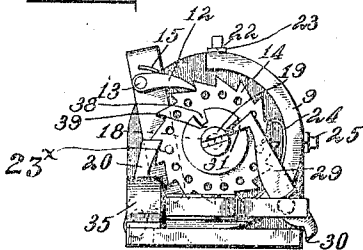
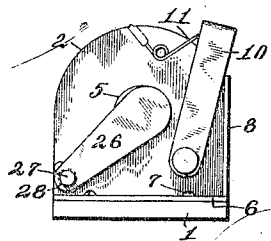


Fig 4



Witnesses
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 2 SHEETS—SHEET 2.

Fig 5

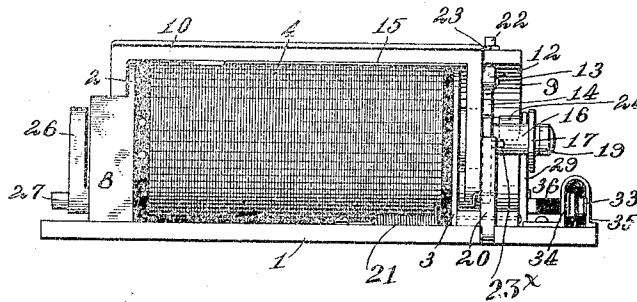
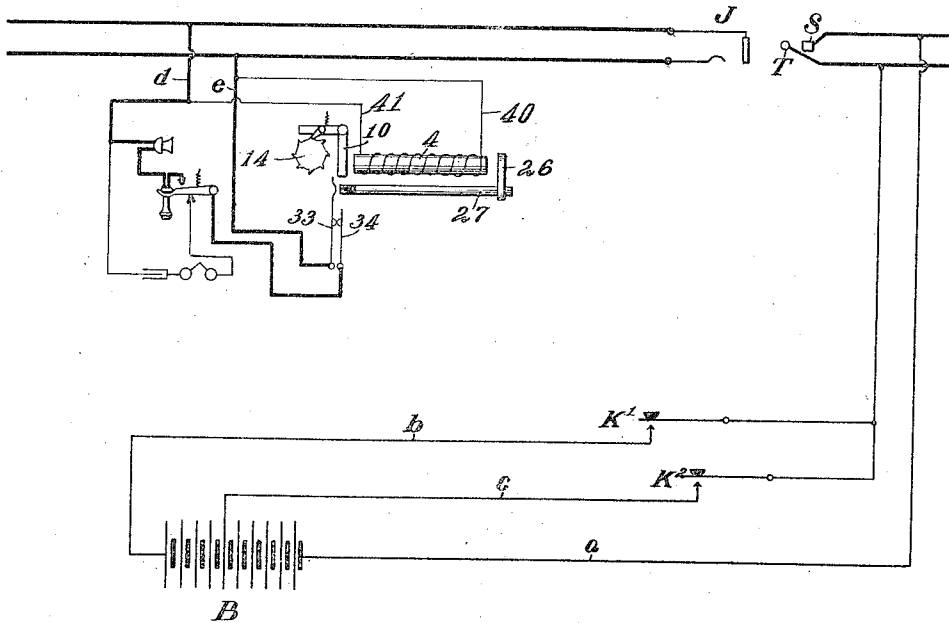


Fig 6



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UNITED STATES PATENT OFFICE.

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SELECTIVE DEVICE FOR PARTY-LINE TELEPHONES.

934,979.

Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed May 29, 1907. Serial No. 376,429.

To all whom it may concern:

Be it known that we, FRANK J. MERSMAN and JOSEPH MERSMAN, citizens of the United States, residing at Ottawa, in the county of Putnam and State of Ohio, have invented certain new and useful Improvements in Selective Devices for Party-Line Telephones, of which the following is a specification, reference being had therein to the accompanying drawing.

Our invention relates to selective devices for party-line telephones and it consists in the combinations, constructions and arrangements herein described and claimed.

An object of our invention is to provide a device which is under the direct control of the operator so that any of the parties on the line can be connected or disconnected at pleasure, and which can be successfully used in any magneto, common battery, or central energy system.

A further object of our invention is to provide a device which is simple in construction, has few operating parts, while at the same time it serves to positively connect or disconnect the various parties on the line when the actuating impulses are sent by the operator.

A further object of our invention is to provide a device which requires the use of but a single telephone circuit and dispenses with the use of a complex system of relays and the necessary connections therefor.

Our invention is illustrated in the accompanying drawings, in which similar reference characters indicate like parts in the several different views and in which—

Figures 1 and 5 are side elevations. Fig. 2 is a plan view. Fig. 3 is an end view showing the ratchet mechanism. Fig. 4 is a view of the opposite end showing the sliding armature. Fig. 6 is a diagrammatic view showing the use of our device as applied to a party-line telephone system.

Referring to the drawings, 1 designates a brass or other non-magnetic base having upwardly extending perforated plates 2 and 3 attached thereto. Secured between said upwardly extending plates 2 and 3 is an electromagnet 4 provided with the usual iron core 5 which extends through the perforations in the upright arms at either end of the magnet. The plate 2 is provided with a laterally extending flange 6 which abuts against the base plate 1 and by which the plate is secured to the base through the me-

dium of the screws 7. The plate 2 is also provided with another lateral flange 8 at right angles to the first mentioned flange and extending in a vertical direction from the base plate 1 for a purpose hereinafter explained.

Abutting against the plate 3 is a semi-circular strip 9, the lower end of which is secured to the base 1, the upper part of the strip being flush with the outer edge of the plate and being firmly secured to it.

Pivottally secured to the outer faces of the plates 2 and 3 is a U-shaped armature 10 which is arranged so as to be attracted by both ends of the core 5 when the magnet is energized. A spring 11 which is fastened to the upper part of the plate 2 and which one arm of the U-shaped armature engages when it is drawn up toward the iron core, acts to restore the armature to its normal position, the armature then resting against the upper end of the outwardly turned vertical flange. The downwardly turned arm on the opposite end of the U-shaped magnet carries a pawl 12 pivoted at 13 on the armature and normally held in contact with a ratchet wheel 14 by means of a spring 15 carried by the armature.

The ratchet wheel 14 is mounted on a sleeve 16 having at one end thereof an integral collar 17 and adapted to rotate on a screw threaded shaft 18 having a head 19, said shaft being secured in a tap in the end of the core 5. The ratchet wheel 14 and the collar 17 being on the same sleeve, revolve in unison. The semi-circular strip 9 has a slot at its lower edge which registers with a similar one in the base 1. A pawl 20 is pivoted in the slots and is normally kept in contact with the teeth of the ratchet wheel 14 by means of a spring 21 which passes through an opening in the upright plate 3 and is secured to the base 1. A screw 22 provided with a locking nut 23 passes through a threaded opening in the top of the strip 9 and is for the purpose of regulating the movement of the pawl 12.

It will be noted that with the above construction every movement of the U-shaped armature toward the core of the magnet will cause the pawl 12 to move the ratchet wheel one step and that when the magnet is de-energized the spring 11 will restore the armature 10 to its normal position, the pawl 12 being retracted to a position immediately in front of an adjacent tooth while the pawl

20 prevents any movement of the ratchet wheel during the retraction of the U-shaped armature.

Near the outer edge of the ratchet wheel there is a circular row of perforations, any one of which is arranged to receive a pin 23^a which is adapted to engage a spring 24 as shown in dotted lines in Fig. 3, at a certain portion of the revolution of the ratchet wheel and which will prevent the latter from turning until actuated by the operator in a manner hereinafter described. A gage screw 25 similar to the screw 22 is mounted on the strip 9 and serves the purpose of adjusting the tension of the spring 24.

An armature 26 is adjustably secured to a rod 27 adjacent the end of the core opposite the ratchet wheel. The rod 27 passes through perforations 28 in the plates 2 and 3 and is adapted to reciprocate in said perforations. An arm 29 is rigidly secured to the shaft 27 and is provided at its lower end with an extended portion, one edge of which forms a shoulder 30 adapted to engage the edge of the base 1 to limit the movement of the arm. The upper end of the arm 29 has a laterally projecting tooth 31 provided with a beveled point adapted to rest normally on the sleeve 16 and to be held in engagement therewith by the coiled spring 32 which surrounds the rod 27. One end of the spring is secured to the base 1 and the other end is hooked over the arm 29. A contact spring 33 and its anvil 34 are carried by an upright standard 35 and are suitably insulated. This spring 33 is normally in contact with the anvil. When the armature 26 is attracted by the core it moves the rod 27 in the openings 28 and 28' and the end of said rod which bears an insulating member 36 is brought into engagement with the spring 33 and forces the latter away from its anvil.

The collar 17 is provided with a radial slot 37 which extends from the outer edge of said collar to the sleeve. A second slot 38 is provided and its location depends upon the station at which the instrument is used, as will be explained hereinafter. The slot 38 extends inwardly from the outer edge of the collar but is not as deep as the slot 37. This provides a flange 39 between the end of the slot and the sleeve. The flange 39 is beveled from the end of the slot to the sleeve on the side of the collar adjacent the ratchet wheel.

The above described apparatus constitutes our step by step selective device for party line telephones. One of these instruments is arranged in the circuit at each station on the line, in the manner indicated in Fig. 5. The relative disposition of the two slots 37 and 38 in the collar 17 depends upon the number of the station at which the device is located, thus for station No. 1 the slot 38 is arranged one step from the slot 37. At sta-

tion No. 2 the slot 38 is arranged two steps from slot 37. At station No. 3 the slot 38 is arranged three steps from slot 37, etc.

When the slot 38 registers with the tooth 31 and the armature 26 is attracted toward the core, the beveled tooth is forced over the flange 39 and drops on the side of the collar farther from the ratchet wheel. The insulated end of the rod 27 coming into engagement with the spring 33 forces the latter away from its anvil 34 and the contact is kept opened by the engagement of the tooth with the flange 39. If the ratchet wheel and the collar be rotated so as to bring the opening 37 opposite the tooth 31 the latter will be forced by the spring 33 through the opening into its normal position on the inner side of the collar and the contact between the spring 33 and its anvil will be closed.

Fig. 6 shows the manner of connecting up our improved device in a party-line system. The main battery B consists of a number of cells grouped in series. One of the terminals of the battery leads directly to the sleeve side S of the operator's cord circuit by means of a conductor *a*. The other terminal of the battery leads to the tip side T of the cord circuit by means of conductor *b* and includes the normally open switch key K'. A shunt circuit comprising a conductor *c* and a second normally open key K² is connected with the cells of the battery as shown in the figure so that when the key K² is depressed a smaller number of cells is thrown into circuit with a corresponding decrease in the voltage. The party-line terminates, as usual, in a jack J and the telephone sets of the various parties on the line are bridged across the main line L as usual by the conductors *d* and *e* which are connected to the contact spring 33 and its anvil 34, respectively. The magnet 4 is bridged across the circuit *d-e* by the conductors 40-41, as clearly shown in the figure.

The foregoing description of the device and the manner of connecting it up for use will render clear the explanation of the operation of the device for party-line selective work. We will assume that there are eight stations on the line, each equipped with one of the devices described above and that the slots 37 of all of the instruments are in a position to register with the tooth 31, this being the zero or starting position. A call comes to the operator from the party at station No. 3 who desires to talk with another subscriber in the system. The operator first depresses the key K' sending a high voltage current over the line which operates both the armatures 10 and 26, the former actuating the ratchet wheel to move the collar 17 of each of the instruments one step and the latter having no effect except upon the arm 29 and its tooth 31 at station 1. At this sta-

When the tooth is now opposite the slot 38 and is forced through the slot out of its normal position to the opposite side of the collar, being prevented from returning to the normal side of the collar by the flange 39. This disconnects station No. 1 from the line, since the insulated end 36 of the rod 27 has forced the spring 33 away from its anvil 34, in the manner already explained. At another high voltage impulse, station No. 2 is similarly disconnected while the attraction of the magnet for the armature 26 is ineffectual on the remaining instruments by reason of the fact that the arm 29 being in engagement with the collar 17 prevents the movement of the armature. The third impulse is made by depressing key K². A low voltage current is sent out which is sufficient to operate the pivoted armature 10 and thus to turn the ratchet wheel forward one step but is not sufficient to actuate the armature 26. Station 3 therefore is left connected. The operator now rapidly sends five other high voltage impulses over the line and thus disconnects the remaining parties from the line, leaving the party at station 3 free to talk without any danger of being heard by any of the other parties on the line. It is not necessary of course to disconnect all of the other parties from the line, the device being capable of disconnecting as many or as few as desired.

It sometimes happens that with step by step devices an instrument at one station may be operated through some local disturbance and will get out of step with the others on the line. It is of course necessary that all of the instruments be in step and that each instrument be at the starting or zero point when a call comes in. We have provided means for putting all of the instruments in step in case any of them should be out of step with the others. This means consists of the pin 23 which, as above stated, may be inserted in one of the openings opposite the tooth corresponding to the station number. Should a part of the instruments be operated and the consecutive relation between all of the instruments be broken thereby, the instruments can be brought into step by the operator sending a series of low voltage impulses over the line. Every instrument on the line will then step up until its pin 23 reaches the spring 24, when it will be stopped, the low voltage impulse not being sufficient to force the pin past the spring. It will be seen that in this way all the instruments can be brought into their normal relation with the slots 38 in consecutive order. The operator finally sends one high voltage impulse which forces the pin of each ratchet wheel past the spring 24, and brings all of the wheels to the zero or starting point. This operation it will be observed is very simple and obviates the necessity of sending out a

trouble-man along the line to restore the instruments to their normal condition whenever they happen to be disturbed.

It will be observed that the operation of our improved device is simple and at the same time positive and that it is capable of performing the functions of devices of considerably greater complexity and of much greater cost to install. An important point lies in the constant rotation of the ratchet mechanism in the same direction without the necessity of ever returning to the zero point. We shall designate this in the claims as a "unidirectional movement".

While we have shown and described a specific form of our step by step selective device it will be understood that variations could be made in the arrangement of some of the working parts without departing from the principle involved in our invention. We therefore do not wish to be understood as limiting ourselves to the particular form herein shown but desire to include all such modifications as fairly fall within the spirit and the scope of our invention.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. In a selective device for party-line telephones, a magnet, a pivoted armature associated therewith, a second armature, a ratchet wheel, a normally closed contact, means whereby the pivoted armature moves the ratchet wheel when the magnet is energized by a low voltage current, and means whereby the second armature breaks the contact when the magnet is energized by a high voltage current.

2. In a party-line telephone system, a main battery, means for sending a high or a low voltage current from said battery, a selective device bridged across the line circuit at each station comprising a magnet, a pivoted armature adapted to be actuated by the low and the high voltage currents, a sliding armature adapted to be actuated only by the high voltage current, means actuated by said sliding armature for disconnecting the station from the line, a ratchet wheel adapted to be moved by the pivoted armature one step for each impulse received by the magnet, a collar associated with said ratchet wheel having a slot therein, a normally closed contact, and a tooth associated with said sliding armature and adapted to pass through said slot, thereby permitting said sliding armature to open said contact.

3. In a party-line telephone system, a main battery, means for sending high or low voltage impulses from said battery, a selective device bridged across the line circuit at each station, said device comprising a magnet, a pivoted armature adapted to be actuated by the low and high voltage impulses, a sliding armature mounted upon a rod and adapted

to be actuated only by the high voltage impulses, a ratchet wheel adapted to be moved by the pivoted armature one step for each impulse received by the magnet, a collar associated with said ratchet wheel having a slot therein, a second slot in said collar at a definite interval from said first slot, the number of steps in the interval corresponding to the number of the station, thereby bringing around the second slots in the collars at the various stations in consecutive order, a normally closed contact, and an arm carried by said sliding armature rod and provided with a tooth adapted to pass through said second slot when in line to permit the rod to open the contact.

4. In a selective device for party-line telephones, a magnet, a U-shaped armature pivoted adjacent the core of the magnet and carrying a spring actuated pawl, a sleeve rotatably secured on one end of the magnet core and provided with a ratchet wheel and a collar, the latter having a slot extending from its outer edge to the sleeve and a second slot at an interval from the first extending only part way from the outer edge of the collar to said sleeve, a sliding armature mounted on a rod and bearing a laterally extending arm provided with a tooth adapted to pass through said second slot when said sliding armature is attracted, and a normally closed contact adapted to be engaged by the end of the rod.

5. In a selective device for party-line telephones, a magnet, a U-shaped armature having its free ends pivoted adjacent the ends of the magnet and bearing a spring actuated pawl, said armature being actuated by a low voltage current, a sleeve rotatably secured to one end of the magnet core and bearing a ratchet wheel adapted to be moved one step by said pawl at each actuation of said U-shaped armature, an adjustable stop adapted to engage said pawl to regulate its movement, a collar carried by said sleeve and provided with a slot extending from the outer edge of the collar part way toward the sleeve thereby providing a flange between the end of the slot and the sleeve, said flange being beveled on the side of the collar facing the ratchet wheel, a sliding armature mounted on a spring controlled rod having a laterally extending arm, a beveled tooth on said laterally extending arm adapted to engage the beveled side of the flange and to be forced through said slot on the actuation of the sliding armature, a normally closed spring contact and an insulating member arranged on the end of said rod adapted to engage the spring contact to open the latter.

6. In a selective system for party-line telephones, a single telephone circuit, a series of telephones on said circuit, means for sending a high or low voltage current of electricity through said circuit, a series of step-

by-step mechanisms adapted for synchronous control by the low voltage current, a series of mechanisms actuated by the high voltage circuit adapted to successively throw the series of telephones out of operative relation to the circuit, and devices actuated by the high voltage circuit for bringing said mechanisms simultaneously to a common starting point.

7. In a party line telephone system, a line circuit, a plurality of talking sets connected to said line circuit, means for sending a high or low voltage current over the line, and a selective device at each station, comprising means responsive to low voltage current for passing the station while leaving the talking circuit intact, and other means responsive to the high voltage current only for cutting out the station in passing, by opening its talking circuit.

8. In a party line telephone system, a line circuit, a main battery, means for sending a high or low voltage current from said battery, a plurality of stations on the line, and a selective device bridged across the line circuit at each station, the same comprising an electromagnet, a step by step selector, a pivoted armature working the selector on a low energization of the magnet, and a sliding armature controlled by the selector and adapted to disable the station on a high energization of said magnet.

9. In a party line telephone system, a pair of line wires, means for throwing high or low voltage currents on the same, a plurality of stations bridged across said line wires, and a selective device at each station comprising the following instrumentalities: an electromagnet permanently bridged across the line wires, a step by step lockout selector, an armature adapted to work the selector on a low voltage current, and a second armature adapted to disable the station for talking purposes on high voltage current, both of said armatures being controlled and actuated by the same electromagnet.

10. In a party line telephone system, a pair of line wires, means for throwing high or low voltage currents on the same, a plurality of stations bridged across said line wires, and a selective device at each station comprising the following instrumentalities: an electromagnet permanently bridged across the line wires, a step by step lockout selector, an armature adapted to work the selector on a low voltage current, and a second armature adapted to disable the station for talking purposes on high voltage current, together with means on the selector cooperating with both of said armatures to synchronize all the selectors or restore them to zero position.

11. In a party line telephone system, a line circuit, a plurality of stations on said

line, talking and signaling circuits at each station, and a selective device at each station comprising the following instrumentalities: an electromagnet permanently bridged
 5 on the line, a unidirectional rotor controlled thereby, means for selecting the station, means for locking out a station, and means for synchronizing the selectors, all of said means actuated by the same electromagnet
 10 and controlled by said rotor.

12. In a party line telephone system, a selective device comprising a single non-polarized electromagnet, and unidirectional rotary means for selecting the station, for locking
 15 out the station, and for synchronizing, all actuated by said electromagnet.

13. In a party line telephone system, a line circuit and a plurality of stations thereon, together with selective devices at the several
 20 stations comprising non-polarized electromagnets, unidirectional ratchets controlled thereby and selecting, locking out, and synchronizing devices all actuated by the same electromagnets acting in conjunction with
 25 said ratchets.

14. In a party line telephone system, a line circuit, a plurality of stations, non-polarized electromagnets connected to the line at each station, unidirectional ratchets controlled thereby, and selective means, synchronizing means, and means for locking out one

or more stations at will, all actuated by the same electromagnets and controlled by said ratchets.

15. In a party line telephone system, a 35 line circuit, a plurality of stations thereon, and a selective device at each station comprising the following instrumentalities: an electromagnet connected to the line, unidirectional rotating means associated there-
 40 with, synchronizing means and station selecting means controlled thereby, with means also controlled by the magnet for selectively locking out its station or leaving it in as the station is passed in selection.

16. In a party line telephone system, a 45 line circuit, a plurality of stations on said line, and unidirectional rotating means controlled by an operator over the line for selecting the stations *serially* and one by one,
 50 and for selectively locking in or locking out one or more of the stations at will, said means actuated by a single bridged electromagnet in response to currents of different characteristics.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANK J. MERSMAN.
 JOSEPH MERSMAN.

Witnesses:

GEORGE PRITZ.
 HERMAN D. RECKER.