

1,215,814.

4 SHEETS—SHEET 1.



George C. Mueller
Marionette Grier

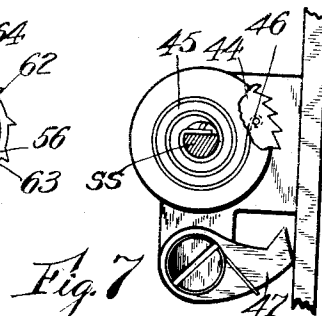
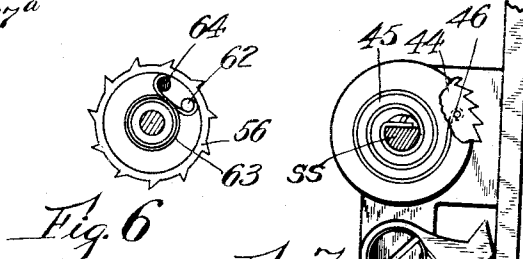
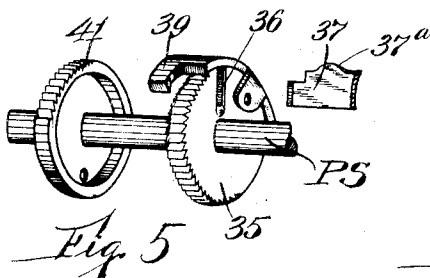
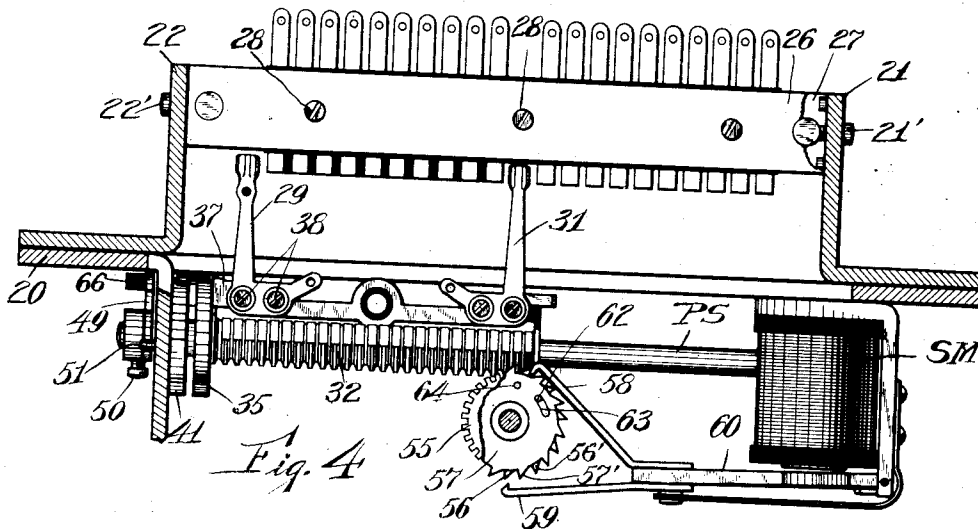
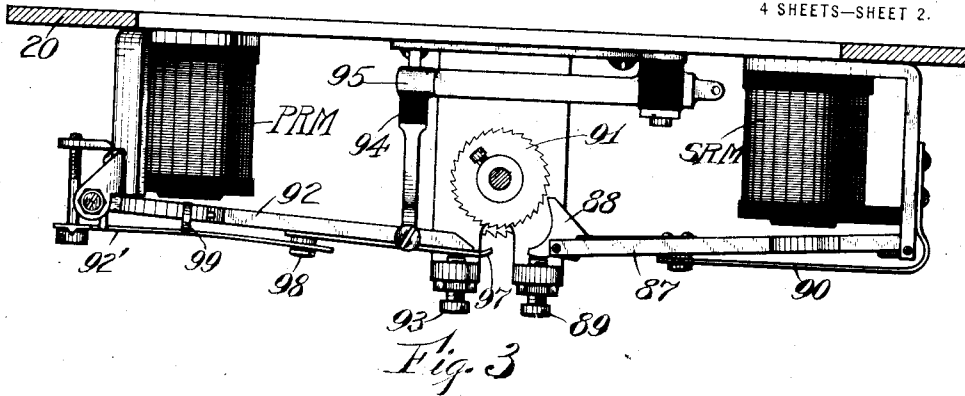
Fig. 2

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 SWITCH FOR AUTOMATIC TELEPHONE SYSTEMS.
 APPLICATION FILED APR. 27, 1910.

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Patented Feb. 13, 1917.
 4 SHEETS—SHEET 2.



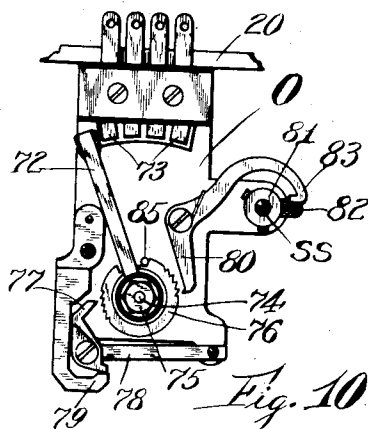
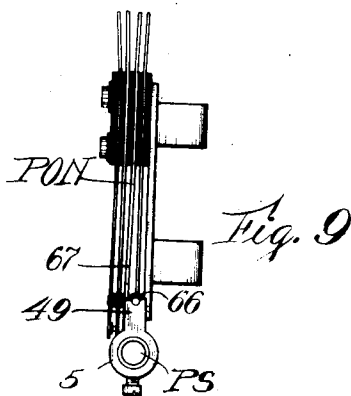
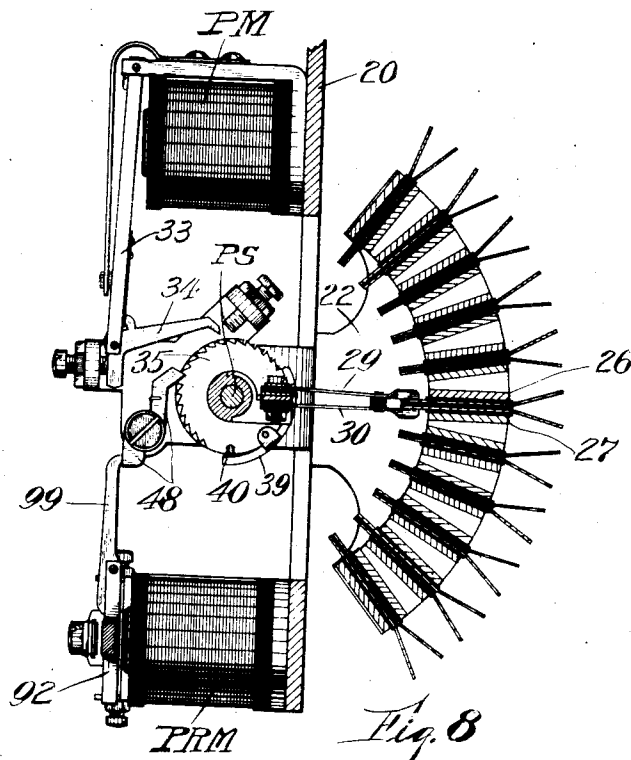
WITNESSES

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1,215,814.

Patented Feb. 13, 1917.
 4 SHEETS—SHEET 3.



Witnesses

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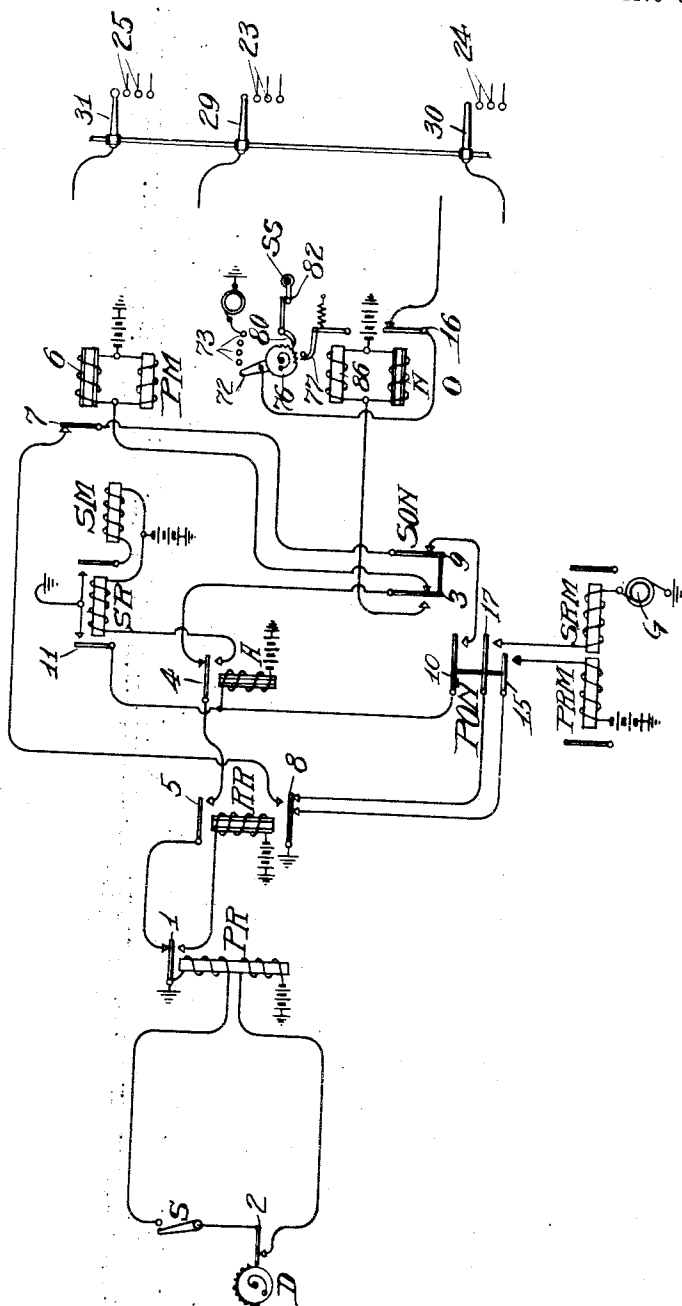
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4 SHEETS—SHEET 4.

Fig. 11



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM KAISLING, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD
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SWITCH FOR AUTOMATIC TELEPHONE SYSTEMS.

1,215,814.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed April 27, 1910. Serial No. 558,000.

To all whom it may concern:

Be it known that I, WILLIAM KAISLING, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Switches for Automatic Telephone Systems, of which the following is a specification.

My invention relates to selective switches for automatic telephone exchange systems and more particularly to that type known as selector or connector switches in which movable contacts or wipers are arranged to cooperate with bank contacts, and in which the wipers are given a so-called primary adjustment to select a bank, group or row of contacts and thereafter given a so-called secondary adjustment to connect with a contact in a bank, group or row.

The object of my invention is to provide a switch of the type above referred to which is efficient in operation, simple, cheap and of an improved construction.

The switch of my invention is capable of other uses than that referred to above, and I have elected to illustrate and describe the same as employed for the purpose of a connector for automatic telephone exchange systems, although it is also adapted for use as a first or second selector.

Referring to the accompanying drawings, Figure 1 is a front elevation of the switch; Fig. 2 shows the springs which are broken away from the bottom part of Fig. 1; Fig. 3 is a section along the line 3—3 of Fig. 1; Fig. 4 is a partial plan view of some of the cooperating parts of Fig. 1; Fig. 5 shows the ratchets with their interlocking pawls which are shown at the left end of the horizontal shaft of Fig. 1; Fig. 6 is a view of one-half of the escapement mechanism shown at the top of the vertical shaft of Fig. 1; Fig. 7 shows the method of fastening the spring which is inside of the drum at the right end of the horizontal shaft, and a similar one at the bottom of the vertical shaft; Fig. 8 is a transverse section along the line 8—8 of Fig. 1, but with the wipers moved off-normal; Fig. 9 shows the primary off-normal springs shown at the left of the horizontal shaft in Fig. 1; Fig. 10 is a plan view of the auxiliary switch O shown at the top of Fig. 1, and Fig. 11 is

a diagrammatic circuit for more fully explaining the operation of the switch.

It is believed by first describing the operation of the circuit shown in Fig. 11, the operation of the switch-mechanism will be more fully understood.

The switch includes the so-called private wiper 31 and the two line wipers 29 and 30 adapted to cooperate with a number of banks or groups of contacts 25, 23 and 24. The wipers are first given a so-called primary adjustment to select a group of contacts, this primary adjustment being controlled by a primary shaft and its associated primary magnet PM. The wipers are then given a so-called secondary adjustment to connect with a contact in the selected group, this secondary adjustment being controlled by a secondary shaft and its associated secondary magnet SM.

The primary off-normal springs PON are controlled by the primary shaft, being moved to their alternate position upon the first off-normal movement of the primary shaft, and restored to normal upon the return of the shaft to normal.

The secondary off-normal springs SON are controlled by the secondary shaft in a manner similar to the primary off-normal springs.

The secondary release magnet SRM controls the release of the wipers 31, 29 and 30 from their secondary movement and the primary release magnet PRM controls the release of the wipers 31, 29 and 30 from their primary movement.

The release relay RR, which is a slow acting relay and as such diagrammatically illustrated, is provided to control the operation of the release magnets PRM and SRM. The dial D corresponding to the dial used on calling devices for automatic telephone systems, is provided to open and close the circuit of the relay PR which controls the movements of the wipers.

Referring now to Fig. 11, the switch S corresponding to the subscriber's switch hook is closed and an energizing circuit for the relay PR is closed from ground through the upper winding of relay PR, switch S, contact of the dial spring 2 and the lower winding of the relay PR to battery. The release relay RR is now energized from a

circuit traced from battery through the winding of the relay RR to ground at alternate contact 1 of relay PR. The dial D is now operated in a clockwise direction to bring a number of the teeth on the periphery thereof below the contact spring 2. The dial is then released and is returned by the spring shown thereon, opening and closing the contact at the spring 2. The relay PR is thereby deenergized and energized, at each break of the circuit by the teeth upon the dial, operating the primary magnet PM over a circuit traced from battery through the winding of the magnet PM, normal contact 3 of the secondary off-normal switch, normal contact 4 of relay A, alternate contact 5 of relay RR to ground at normal contact 1 of relay PR. For each deenergization of the relay PR an impulse is sent through the primary magnet, operating the said primary magnet to step the wipers 31, 29 and 30 to select a row of contacts. Upon the first deenergization of the relay PR the impulse from the ground at normal contact 1 is divided at a point above the primary magnet PM, part of the impulse passing through the sluggish relay 6 which attracts its armature and holds the contact 7 open while the primary magnet is operating. After the last opening of the contact at the spring 2, the primary relay PR remains energized long enough for the relay 6 to detract its armature, closing the normal contact 7, and a circuit is now traced from the ground at alternate contact 8 of relay RR, normal contact 7, secondary off-normal contact 9, alternate contact 10 of the primary off-normal switch PON which closed upon the first primary step of the wipers through the winding of the sluggish relay A to battery, energizing the said relay A and moving the contact 4 to its alternate position, but at this time the contact 1 of the relay PR being in its alternate position, nothing else happens.

The dial D is now operated again to open and close the contact of spring 2 to transmit another set of impulses from the ground at normal contact 1, through alternate contact 5 of relay RR, alternate contact 4, through the winding of the secondary relay SR to battery, energizing and deenergizing said relay SR for each impulse sent from the ground at contact 1. Upon each energization of the secondary relay SR the secondary magnet SM is operated to step the wipers 31, 29 and 30 to connect with a contact in the selected row. Upon the first secondary movement of the wipers 31, 29 and 30 the contact springs 3 and 9 of the secondary off-normal switch SON are moved to their alternate position, the contact 9 opening the circuit for the relay A, but the said relay being sluggish, it retains its armature attracted due to the impulses from the ground at the

alternate contact 11 of the secondary relay SR and remains energized while the said contact 11 is vibrating. After the last impulse has been sent through the secondary relay SR from the ground at normal contact 1, the said secondary relay SR is deenergized and the relay A again detracts its armature moving the contact 4 to its normal position.

Assuming that the switch is being used as a connector in an automatic telephone system, and that the wipers 31, 29 and 30 have connected to a party line of four subscribers, the next step is to ring the bell of the subscriber desired. For this purpose I provide the switch O with its associated magnet 86. Assuming that there are four telephones on the line of the called subscriber, and that the well known harmonic system of ringing is used, the next step is to pick out the proper frequency. The dial at D is operated once more to vibrate the contact 1 of the relay PR, the proper number of impulses are transmitted from the ground at the normal contact 1 through alternate contact 5, normal contact 4, alternate contact 3 of the secondary off-normal switch, and then dividing, part passing through the winding of magnet 86 and part through the winding of magnet N to battery, energizing and deenergizing the magnet N to step the wiper 72 to connect to the proper contact 73, which is connected to a generator of the proper frequency to ring the bell of the desired subscriber on the line. The shaft SS which is the shaft controlling the secondary movement of the wipers 31, 29 and 30 having moved upon the first secondary step of the said wipers, the retaining pawl 80 moves into engagement with the teeth of the ratchet wheel 76 due to the pin 82 being moved away from the retaining pawl 80. Thus, when the magnet 86 is operated to step the wiper 72 to select a contact 73, the retaining pawl 80 through its engaging ratchet 76 holds the wiper 72 in engagement with its selected contact. The relay N being sluggish, retains its armature in an attracted position while the last set of impulses are being transmitted through the said relay and magnet 86, holding the contact 16 open until the proper frequency of ringing current has been selected.

To release the connector switch and its associated mechanism, the switch S is opened, allowing the relay PR to deenergize and opening the circuit through the release relay RR at contact 1 and closing a circuit for the secondary release magnet SRM from ground at normal contact 8 through alternate contact 17 of primary off-normal switch, through the winding of the secondary release magnet SRM to the alternating current generator.

A circuit is also closed from the ground at normal contact 8 through the alternate con-

tact 15 of the primary off-normal switch, through the winding of the primary release magnet PRM to battery energizing the said magnet.

5 The closing of the circuit through the secondary release magnet SRM results in its armature being vibrated and stepping the secondary shaft to its normal position, the said shaft restoring the wipers 31, 29 and 30 from their secondary movement.

10 The primary release magnet has upon its energization, withdrawn the retaining pawl from its engagement with a ratchet on the primary shaft so that when the wipers 31, 29 and 30 have been restored from their secondary movement, the primary shaft automatically restores them from their primary movement.

15 The secondary off-normal switch SON and the primary off-normal switch PON have been restored to their normal position upon the return of their respective associated shafts.

20 Upon the opening of the contacts 15 and 17 of the primary off-normal switch, the circuit through the release magnets is opened and they remain inert. Upon the restoration of the wipers 31, 29 and 30 to their secondary normal position, and the restoration of 30 the secondary shaft SS, the arm 82 which is secured to the said secondary shaft SS, engaging the pawl 80 moves it out of engagement with the ratchet 76, allowing the wiper 72 to restore. The switch with all of 85 its associated mechanism is now again at normal.

Referring now to the switch mechanism, in Fig. 1 is shown the frame 20 with the bank contacts arranged as shown in the 40 large opening at the bottom of the frame, the banks being mounted between two rearwardly extending parts of the frame 21 and 22, as shown in Fig. 4. In Fig. 1, I have represented the contacts by single lines, as 45 to show the contacts as they really appear would complicate the drawing unnecessarily. The bank contacts 23 and 24 are known as the line contacts, while the bank contacts 25 are known as the private bank contacts. 50 the line contacts serving to conduct the talking strands and the private contact and its associated wiper usually controlling the connecting with a certain set of contacts.

Each bank includes the two strips 26 and 55 27 as shown in Fig. 4 having the contacts clamped between them by the screws 28, each bank being adjustably held between the pieces 21 and 22 by the screws 21' and 22'.

The line wipers 29 and 30 are adapted 60 to cooperate with the bank contacts 23 and 24, while the private wiper 31 is adapted to cooperate with the private contacts 25.

The said wipers are secured to the sleeve 32 which fits loosely about the primary shaft 65 PS. Secured to the face of the mounting

plate 20 is the primary magnet PM which is adapted when energized to attract its armature 33 bringing its pawl 34 in engagement with the teeth of the ratchet 35 as shown in Fig. 8.

70 The ratchet wheel 35 is secured to the primary shaft PS and has a slotted opening 36 as shown in Fig. 5. Projecting to the left of the wipers 29, 30 is the catch bar 37 shown in Figs. 4 and 5, the said catch bar 75 being fastened to sleeve 32 by the screws 38, and normally projecting through the slot 36 of ratchet 35 so that when the ratchet 35 is rotated by the operation of the primary magnet PM, the wipers are rotated to a point 80 opposite a row or bank of contacts. The pawl 39 Fig. 5 is pivotally secured to the ratchet wheel 35 and has the spring 40 Fig. 8 pressing against the tail of the pawl. Fastened to the frame is the stationary 85 ratchet 41 through which the shaft PS rotates and having a number of teeth adapted to be engaged by the retaining pawl 39, as will be explained later on. When the wipers are at normal as shown in Fig. 1, and the 90 catch bar 37 is in the slot 36, the cam 37^a holds the retaining pawl 39 out of engagement with the teeth of the stationary ratchet 41.

The primary shaft PS is journaled in the 95 forwardly extending brackets 42 and 43 of the frame 20 and mounted on the right end is the ratchet drum 44 which is loose on the shaft PS and having one end of the spring 45, Fig. 7, secured to the said drum by means 100 of the pin 46, while the other end of the spring 45 is fastened to the shaft PS. The check pawl 47 is normally in engagement with the teeth of the ratchet 44 so that by rotating the ratchet 44 in either direction, 105 the tension of the spring 45 may be increased or decreased as desired. The tension of the spring 45 tends to rotate the shaft PS in a reverse clockwise direction, but the arm 49 which is fastened to the shaft PS by 110 the screw 50 as shown in Fig. 4, normally rests against the pin 51 preventing this.

The secondary shaft SS is journaled in the forwardly extending brackets 52 and 53 115 which are riveted to the frame 20. At the bottom of the shaft SS is a drum ratchet 54 loosely mounted thereon and having a spring and ratchet arrangement similar to that shown in Fig. 7, so the tension of the spring for the secondary shaft SS may be 120 adjusted in a manner similar to that of the primary shaft PS. Fastened to the middle of the shaft SS is the pinion 55 which engages the teeth of the rack on the sleeve 32, so that when the shaft SS is rotated, the 125 pinion 55 engages the teeth on the sleeve 32 and moves the wipers 29, 30 and 31 along the shaft PS.

At the top of the shaft SS is mounted the escapement wheels 56 and 57 cooperating 130

with the respective pallets 58 and 59 which are riveted to the armature 60 of the secondary magnet SM. Referring now to the escapement mechanism, the escapement wheel 56 is fastened to the shaft SS by the screw 61 and the escapement wheel 57 is loose on shaft SS. The pallet 58 normally engages a tooth of the wheel 56 and as the wheel is secured to the shaft SS and the shaft SS is normally under tension of the spring in the drum 54, the said shaft is prevented from being rotated by the said spring until the magnet SM is operated. The pin 62 driven into the wheel 56 projects up through the slot 63 of the wheel 57 and supports one end of the spring 63 while the other end of the spring is held by the pin 64 which is driven into the upper wheel 57. The spring 63 tends to draw the pins 62 and 64 toward each other, and the pin 62 being in the fastened wheel 56, the upper wheel 57 is held under the tension of the spring 63 with the end of the slot 63 against the pin 62. The operation of the escapement mechanism is as follows: The secondary magnet SM being energized, the armature 60 is attracted, moving the pallet 58 out of engagement with the tooth of the wheel 56 and moving the pallet 59 in front of the tooth 57' of the upper wheel 57. The shaft SS is now rotated in a clockwise direction by the spring in drum 54 until the tooth 57' strikes the pallet 59, but as the spring in the drum 54 is strong enough to overcome the spring 63 in the wheel 56, the shaft SS and wheel 56 which is secured to the shaft continues to move until the pin 62 reaches the other end of the slot 63 which acts as a stop for the shaft SS. The armature of the magnet SM is now retracted and moves the pallet 59 out of engagement with the tooth 57', but the pallet 58 engages the tooth of wheel 56 which is now adjacent to it, before the pallet 59 has disengaged from the tooth 57', allowing the upper wheel 57 to again advance a half step ahead of the lower wheel 56 due to the action of the spring 63. The pinion 55 being secured to the shaft SS and engaging the rack on the sleeve 32, for the first step of the magnet SM, the sleeve 32 is moved along the shaft PS carrying the wipers to the first set of contacts and for each step thereafter to the next set of contacts. Upon the first secondary step of the wipers 29, 30 and 31, the catch bar 37 is moved out of engagement with the slot 36 and the cam 37^a now allows the retaining pawl 39 to engage a tooth of the stationary ratchet 41. By having the said pawl engage the ratchet 41, in withdrawing the pawl 48 from the ratchet 35 when releasing the switch, the rotary tension is held off the wipers in restoring over the contacts until the wipers have disengaged from the contacts as will be more fully explained.

The primary off-normal springs PON shown in Figs. 1 and 9 are moved to their alternate position upon the first movement of the shaft PS. Secured to the left end of the shaft PS is the cam 65 with the insulation stud 66 riveted to the end thereof. This stud normally rests against the spring 67 and when the shaft PS is rotated off-normal the stud 66 moves away from the spring 67 allowing it and its connected spring to move to their alternate position.

The secondary off-normal springs SON shown in Fig. 1 are moved to their alternate position upon the first movement of the secondary shaft SS. Fastened to the shaft SS is the collar 68 having an arm 69 with the stud 70 riveted to the farther end thereof. Upon the first off-normal movement of the shaft SS, the stud 70 is moved away from the spring 71, allowing it and its connecting spring to move to their alternate position.

Mounted at the top end of the mounting 20 in Fig. 1 is the auxiliary switch O also shown in Fig. 10. This switch includes the wipers 72 which cooperate with the bank contacts 73. The wipers 72 are clamped to shaft 74 by the nut 75 and also secured to the shaft 74 is the ratchet wheel 76. The pawl 77 is fastened to the armature 78 and is normally out of engagement with the ratchet 76, due to the said pawl resting against the stop 79 as shown in Fig. 10. The retaining pawl 80 is normally out of engagement with the ratchet 76, but upon the first movement of the shaft SS off normal, the arm 81 which is secured to the shaft SS, moves the pin 82 out of engagement with the arm 83 of the retaining pawl 80 allowing the pawl 80 to engage the ratchet wheel 76. The shaft 74 has secured to its lower end a ratchet drum and spring arrangement 84 which is similar to that shown in Fig. 7. This tends to hold the shaft 74 with its wipers 72 under tension, with the ratchet wheel 76 resting against the stop pin 85. When the magnet 86 is energized, the armature 78 is attracted and the pawl 77 engages a tooth of the ratchet wheel 76, moving the wipers 72 to engage the first contact 73 in the row. For each actuation of the magnet 86 the wipers are advanced one step. The wipers now remain in engagement with the selected contact until the shaft SS is restored, when the pin 82 again engages the arm 83 of the retaining pawl 80, withdrawing it from engagement with the ratchet wheel 76 and the wipers are restored.

Having described the mechanism for advancing the wipers 29, 30 and 31 to select a bank or row of contacts and for selecting a set of contacts in a row, the mechanism for restoring the wipers will now be described.

For restoring the wipers from their sec-

ondary movement, the secondary release magnet SRM is operated. The said magnet is fastened to the mounting plate 20 as shown in Fig. 3 and has an armature 87 having the pawl 88 pivotally secured thereto and normally held against the adjustable screw stop 89 by the spring 90. The ratchet wheel 91 is secured to the secondary shaft SS and is rotated by the operation of the pawl 88.

The primary release magnet PRM Fig. 3, is fastened to the mounting plate 20 and has the armature 92 pivotally secured thereto and held under tension against the adjustable screw-stop 93 by the adjustable spring 92'. Pivotally secured to the armature 92 is the plunger 94 which normally is out of engagement with the springs 95 and 96 shown in Figs. 3 and 2. When the magnet PRM is energized, the armature 92 is attracted forcing the plunger 94 between the springs 95 and 96 and moving them and the associated spring to their alternate position. The spring retaining pawl 97 fastened to the armature 92 by the screw 98, engages the teeth of the ratchet wheel 91 when the armature 92 is attracted by the magnet PRM during the release of the wipers.

Secured to the armature 92 of the primary release magnet PRM is the release arm 99 as shown in Fig. 8. When the magnet PRM is energized, the arm 99 engages the retaining pawl 48 moving the said pawl out of engagement with the ratchet wheel 35, allowing the wipers 29, 30 and 31 to restore from their primary movement at the proper time.

Release of switch mechanism.

Assuming the wipers 29, 30 and 31 have been moved to select a row or bank of contacts and then connected with a set of contacts in the selected row, the restoration of the wipers and associated mechanism to normal will now be described.

To release the switch the magnets PRM and SRM are energized, the magnet PRM being energized by a direct current and the magnet SRM by alternating or an interrupted current. Although upon the energization of the primary release magnet PRM the retaining pawl 48 is disengaged from the ratchet 35, the rotary strain on the primary shaft PS does not cause the wipers 29, 30 and 31 to rub against the sides of their respective contacts, due to the pawl 39 engaging a tooth of the stationary ratchet 41. The armature 87 of the secondary release magnet SRM now vibrates and the pawl 88 steps the ratchet wheel 91 in a reverse clockwise direction, and the said pawl and the pinion 55 being secured to the secondary shaft SS, the sleeve 32 is moved toward the left along the shaft PS, restoring the wipers from their secondary movement. The catch bar 37 which is carried along with wipers,

again enters the slot 36 of the ratchet wheel 35 and the cam 37* on catch bar 37 engages the pawl 39 moving it out of engagement with the stationary ratchet 41. The primary release magnet PRM being energized and holding the retaining pawl 48 out of engagement with the ratchet wheel 35, and the pawl 39 now being out of engagement with the ratchet 41, the wipers are restored from their primary movement, due to the spring 45 acting upon the primary shaft PS. The primary off-normal springs PON and the secondary off-normal springs SON are moved to their normal position upon the restoration of their respective shafts. The energizing current for the release magnets may be cut off in any desirable manner, but I preferably perform this by means of the off-normal springs as described in connection with the circuit diagram.

What I claim as new and desire to secure by Letters Patent is:

1. An electrical switching mechanism, comprising passive contacts arranged in straight line rows, a wiper having a contact end adapted to connect with said contacts, a connected rotatable shaft and associated driving mechanism therefor whereby said wiper is moved to select a row, and a second connected rotatable shaft and associated driving mechanism therefor whereby said wiper is moved in a straight line to select a contact in a row.

2. An electrical switching mechanism comprising passive contacts arranged in straight line rows, a wiper having a contact end adapted to connect with said contacts, a connected rotatable shaft and associated driving mechanism therefor whereby said wiper is moved to select a row, a second connected rotatable shaft and associated driving mechanism therefor whereby said wiper is moved in a straight line to select a contact in a row, and electromagnetic means for restoring said wiper.

3. An electrical switching mechanism comprising passive contacts arranged in straight line rows, a wiper having a contact end adapted to connect with said contacts, a rotatable shaft, a step-by-step magnet for rotating said shaft to move said wiper to select a row, a second rotatable shaft connected to said wiper, and a second step-by-step magnet for rotating said second shaft to move said wiper in a straight line to select a contact in a row.

4. A selective switch for telephone systems comprising passive contacts arranged in straight line rows, a wiper having a contact end adapted to connect with said contacts, a rotatable shaft, a ratchet wheel associated with said shaft, an electromagnet for operating said ratchet to move said wiper to select a row, a second rotatable shaft connected with said wiper, and an

electromagnet for rotating said second shaft to move said wiper in a straight line to select a contact in a row.

5. A selective switch for telephone systems comprising passive contacts arranged in straight line rows, a wiper for cooperating with said contacts, a rotatable shaft, an electromagnet for operating said shaft whereby said wiper is given a primary adjustment to select a row, a release magnet for said shaft, a second rotatable shaft, suitable mechanism connecting said second shaft and wiper, an electromagnet for operating said second shaft and connecting mechanism whereby said wiper is given a so-called straight line secondary adjustment to select a contact in a row, a release magnet for said second shaft and means controlled by said release magnets for restoring their respective associated shafts.

6. A selective switch for telephone systems comprising passive contacts arranged in rows, a rotatable shaft, a sleeve loosely mounted on said shaft, a wiper secured to said sleeve for cooperating with said contacts, means for rotating said sleeve to move said wiper to select a row, and means for moving said sleeve along said shaft whereby said wiper selects a contact in a row.

7. An electrical switching mechanism comprising contacts arranged in straight line rows, a single set of movable wipers having contact-ends adapted to engage said contacts, a supporting sleeve for said contact ends, a shaft for said sleeve, an electromagnet for moving said shaft, sleeve and contact-ends to select a row, an escapement and suitable associated mechanism for controlling the movement of the sleeve and contact ends in a straight line to select a contact of a row, and an electromagnet for operating said escapement.

8. An electrical switching mechanism comprising passive contacts arranged in straight line rows, a single set of movable wipers having contact-ends adapted to engage said contacts, a supporting sleeve for said contact ends, a shaft for said sleeve, an electromagnet for moving said shaft, sleeve and contact ends to select a row, an escapement and suitable associated mechanism for controlling the movement of the sleeve and contact ends in a straight line to select a contact of a row, an electromagnet for operating said escapement, and restoring means for said wipers.

9. An electrical switching mechanism comprising passive contacts arranged in rows, movable wipers having contact ends adapted to engage said contacts, an electromagnet for moving said contact-ends in a primary direction to select a row, an escapement for controlling the secondary movement of the contact ends to select a contact of a row, an electromagnet for operating

said escapement, a release magnet for restoring said contact-ends from said secondary movement, and a second release magnet for restoring said contact ends from their primary movement.

10. An electrical switching mechanism comprising passive contacts arranged in rows, wipers adapted to engage said contacts, an electromagnet for giving a primary movement to said wipers to select a row, a stop for holding said wipers, an electromagnet for giving a secondary movement to said wipers to select a contact in the row, a step-by-step release magnet to restore said wipers from said secondary movement and a release magnet for removing said stop, whereby said wipers are restored from the primary movement.

11. A selective switch for telephone systems comprising passive contacts, a wiper for cooperating with said contacts, a shaft for controlling a movement of said wiper to connect with one of said contacts, an auxiliary switch for said selector including passive contacts and a movable contact for cooperating therewith, an electromagnet for moving the said movable contact to connect with one of said associated passive contacts, and means controlled by said shaft for restoring said movable contact.

12. A selector switch for telephone systems, comprising a rotatable shaft, bank contacts arranged in straight rows parallel to and equidistant from the axis of said shaft, a wiper supported by said shaft, means acting upon said shaft for rotating said wiper to select a row, and means for thereafter advancing said wiper independent of said shaft to successively engage the contacts in a row.

13. A selective switch for telephone systems comprising a rotatable shaft, bank contacts arranged in straight rows parallel to and equidistant from the axis of said shaft, a sleeve loosely supported by said shaft, a wiper carried by said sleeve, means for rotating said sleeve and wiper to select a row, and means for thereafter moving said sleeve along said shaft whereby said wiper successively engages the contacts in a row.

14. A selective switch for telephone systems comprising a rotatable shaft, bank contacts arranged in straight rows parallel to and equidistant from the axis of said shaft, a sleeve loosely supported by said shaft, a wiper secured to said sleeve, an electromagnet for rotating said shaft whereby said wiper is rotated to select a row, a second electromagnet and associated mechanism for advancing said sleeve along said shaft whereby said wiper successively engages the contacts in a row.

15. A selective switch for telephone systems comprising a rotatable shaft, bank contacts arranged in straight rows parallel to

and equidistant from the axis of said shaft, a sleeve loosely supported by said shaft, a wiper secured to said sleeve, an electromagnet for rotating said shaft whereby said
 5 wiper is rotated to select a row, a second electromagnet and associated mechanism for advancing said sleeve along said shaft whereby said wiper successively engages the con-
 10 for controlling the restoration of said wiper from its primary and secondary movements respectively.

16. An electrical switching mechanism comprising a member having rotary and lon-
 15 gitudinal movements, a supporting member for said first member, means for rotating said supporting member whereby said first member is rotated, means for longitudinally moving said first member independent of
 20 said supporting member, groups of contacts arranged in rows, a wiper carried by said first member, whereby a row of contacts is selected and thereafter a contact in the row selected.

25 17. A selector switch for telephone systems comprising bank contacts arranged in straight rows parallel to and equidistant from a definite axis, a wiper suitably supported at said axis and adapted to partake
 30 of rotary and longitudinal motion, a primary shaft and suitable mechanism for rotating said wiper to select a row, a rotatable secondary shaft and suitable connecting mechanism for moving said wiper along
 35 the contacts of the selected row, and means for rotating said secondary shaft to bring about the last mentioned operation of the wiper.

18. A selector switch comprising a face
 40 plate having a rectangular orifice therein, a contact bank suitably supported against the back of said plate within the outline of said orifice, a primary shaft supported on the other side of said plate, a sleeve carried
 45 by said shaft, a wiper secured to said sleeve and projecting through said orifice into operative relation with said contact bank, a secondary shaft also supported upon the last

mentioned side of said plate, mechanism connecting said sleeve and secondary shaft, and
 50 primary and secondary operating means for said primary and secondary shafts respectively.

19. In an automatic selecting switch the combination of a plurality of stationary con-
 55 tacts fixed in intersecting rows in the surface of a cylindrical figure, a rotatable shaft, a sleeve slidably mounted thereon, a complementary contact fixed on said sleeve, means for rotating said shaft, and means for slid-
 60 ing said sleeve axially.

20. In an automatic switch, a plurality of rows of contacts, a shaft, a sleeve non-rotatably mounted thereon, a brush carried by
 65 said sleeve for engagement with said contacts, means for rotating said shaft, and means for sliding said sleeve on said shaft.

21. In an automatic switch, a shaft, a cylindrical terminal bank having longitudi-
 70 nally extending rows of contacts parallel to said shaft, a sleeve non-rotatably mounted on said shaft, a brush carried by said sleeve for engagement with said contacts, means for rotating said shaft, and means for slid-
 75 ing said sleeve on said shaft.

22. In an automatic switch, the combination with a cylindrical terminal bank having longitudinally extending straight rows
 80 of contacts, of a support, a brush adapted to cooperate with the contacts of said rows mounted on said support, means for rotating said support to select one of said rows of contacts, a rotary holding means for preventing reverse rotation, means for there-
 85 after moving said support longitudinally, longitudinal holding means, and means for preventing releasing movement of the rotary holding means until the longitudinal return movement is completed.

Signed by me at Chicago, county of Cook, 90
 and State of Illinois, in the presence of two witnesses.

WILLIAM KAISLING.

Witnesses:

CAROLYN WEBER,
 CARRIE E. ANDERSON.