(No Model.) 2 Sheets—Sheet 1.

H. A. CHASE.

ELECTRIC SWITCH.

No. 451,397. Patented Apr. 28, 1891.

Fig. 4.

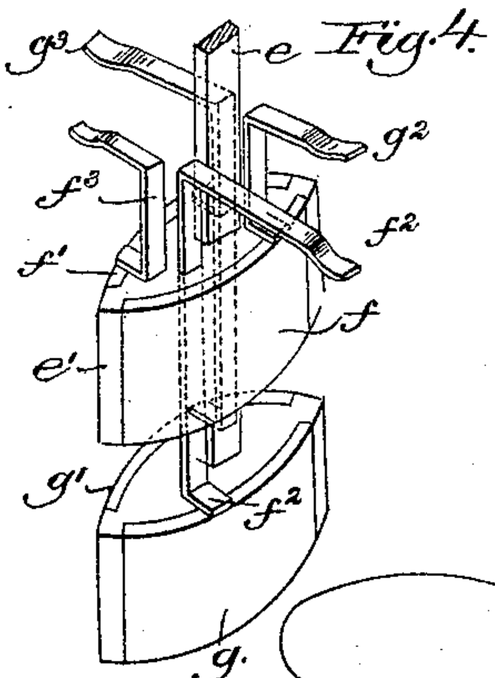


Fig. 1.

Fig. 2.

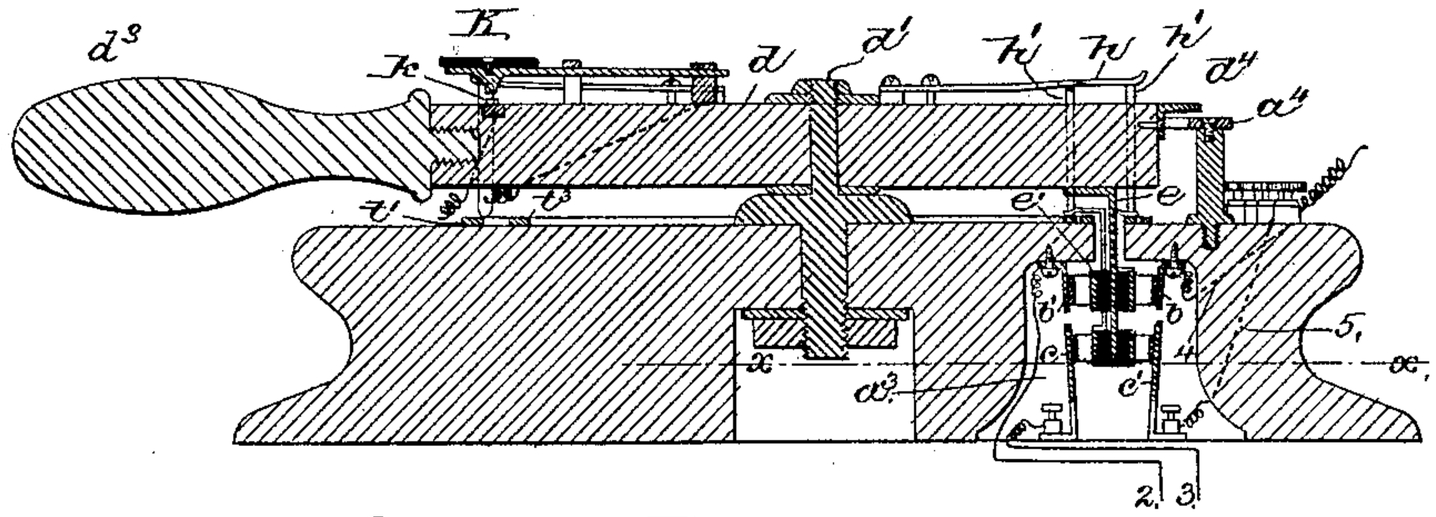
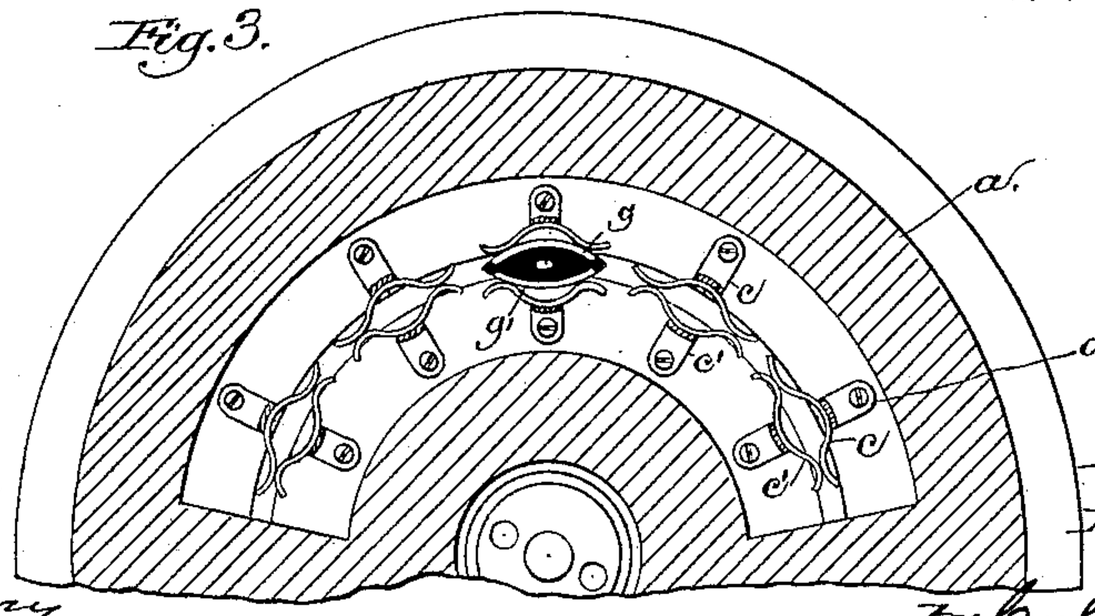


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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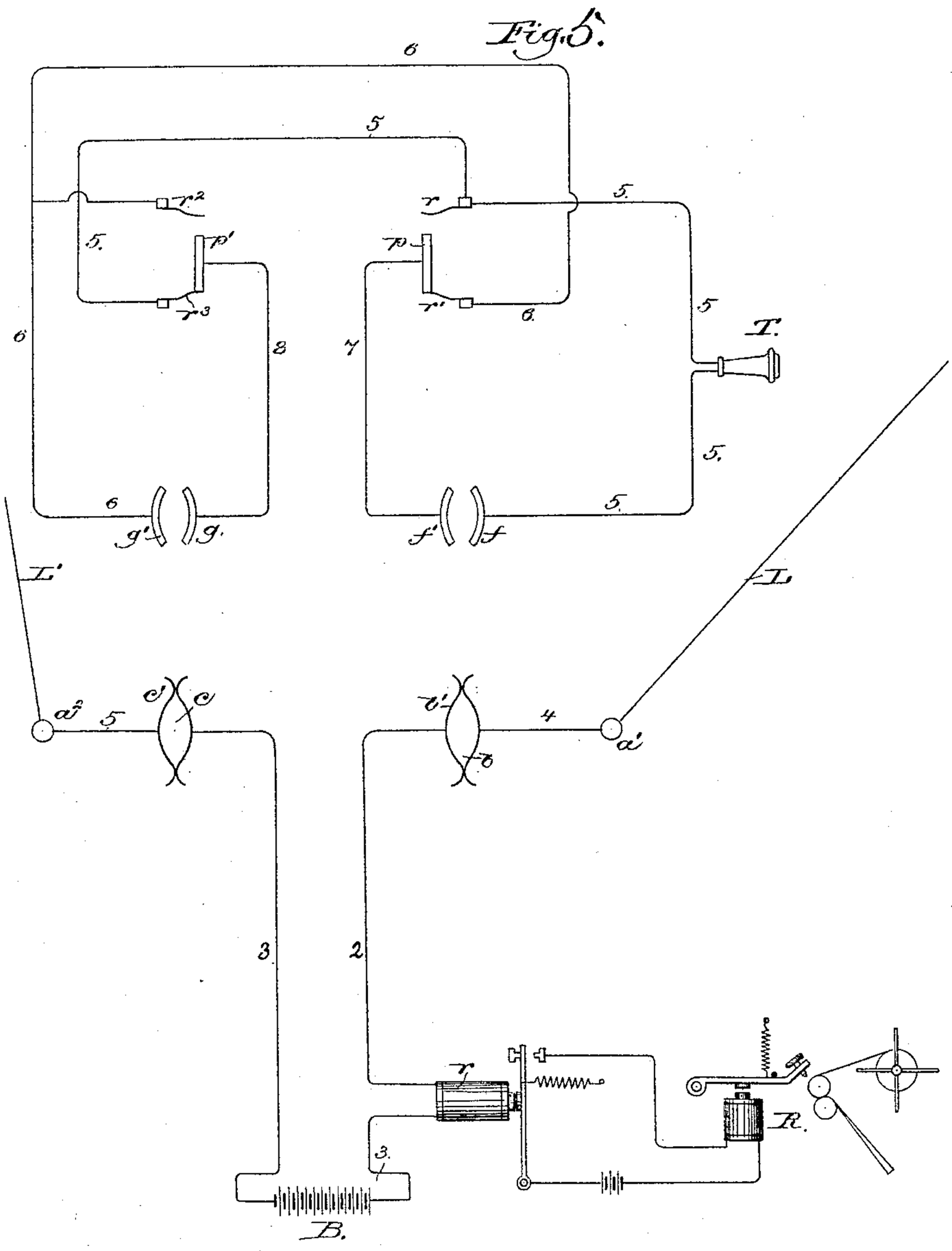
Fig. 5.



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UNITED STATES PATENT OFFICE.

HENRY A. CHASE, OF STONEHAM, ASSIGNOR OF ONE-HALF TO GEORGE W. GREGORY, OF BOSTON, MASSACHUSETTS.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 451,397, dated April 28, 1891.

Application filed November 2, 1886. Serial No. 217,777. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. CHASE, of Stoneham, county of Middlesex, and State of Massachusetts, have invented an Improvement in Electric Switches, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to an electric switch intended for connecting instruments at a main office or central station in any desired one of a number of circuits radiating out from the said office, whereby a single set of instruments may be used with a number of different circuits.

The switch apparatus is especially applicable for use in connection with a system of police-signals such as shown in Letters Patent No. 344,467, dated June 29, 1886, in which the main office or police-station forms one terminal of a number of circuits radiating out from the said station through the streets of the city and provided with signal-boxes containing appliances for automatically transmitting telegraphic messages from the said boxes to the main office, and also containing telephonic instruments by which oral communication is established between the boxes and the main office. The boxes also contain polarized signaling-instruments that respond to reversals in polarity of the current produced at the main office.

As heretofore generally practiced where such systems have been in use, the different circuits centering in the main office include each a separate battery and relay or receiving instruments for telegraphic messages, and each a separate pole-changer for producing the reversals in polarity to operate the signals at the boxes, while a single set of telephonic instruments at the main office has been switched into any desired one of the said circuits, as desired, by means of a switch-board, such as commonly employed in connection with telephonic or telegraphic offices. The use of such switch-boards is likely at times to cause confusion, especially as the person in charge is not always thoroughly familiar with electrical apparatus, and one of the main objects of the present invention is to avoid such confusion by providing an instrument that can be readily operated by persons wholly unfamiliar with electrical apparatus.

The switch-board forming the subject of this invention is provided with a dial or indicator having graduations numbered or otherwise designated to correspond with the different circuits centering in the office and a movable member provided with a pointer, which when brought opposite the number or character by which any circuit is designated, places instruments at the main office in the said circuit. The said switch and dial are preferably circular in form and the movable switching device pivoted, so as to have a rotary movement, although this is not essential, and the said movable device carries a series of contacts which remain permanently connected with the proper parts of the instruments at the main office, and which when brought into position corresponding to any circuit severs the said circuit and introduces the instruments at the central office into the opening thus made in the circuit, and as soon as the device is moved to place the instruments at the central office in another circuit the circuit from which the said instruments are removed is immediately closed.

Figure 1 is a plan view and partial diagram of a switch-board and circuits and instruments controlled by it in accordance with this invention; Fig. 2, a vertical longitudinal section of the said switch-board; Fig. 3, a horizontal section on line $x\,x$, Fig. 2; Fig. 4, a detail to be referred to; and Fig. 5 a diagram of the circuit, showing the relations of the instruments and connecting devices of the switch.

The main body or frame-work a of the switch-board may be of wood or insulating material provided with binding-posts a' a^2, with which the terminals of the different circuits entering the office are connected, the said circuit being usually wholly metallic, so that there are two binding-posts in each circuit. The said binding-posts a' a^2 are connected with pairs of springs b b' c c', which springs normally remain in contact with one another, completing the circuit L L', (see Fig. 5,) with which they are connected. One circuit only is shown in Fig. 5, while the switch-

board is shown in Fig. 1 as arranged for five such circuits.

Two pairs of contact-springs—namely *b b'* and *c c'*—are required for each circuit when a pole-changer is to be introduced into any circuit, and in this case the main battery B, Fig. 5, has its terminals 2 3 connected with one spring—namely, *b'* and *c* of each pair—while the other springs *b* and *c'* of the said pairs are respectively connected by wires 4 and 5 with the binding-posts a' and a^2 and main line L L', leading from the main office. The two pairs of springs forming part of each circuit are preferably arranged one above the other, as best shown in Fig. 2, and the sets of springs corresponding to the different circuits are arranged in an arc in a groove or recess a^3 at the under side of the block *a*, as best shown in Fig. 3.

The movable member of the switch-board consists of an arm *d*, of insulating material, pivoted on a spindle *d'*, concentric with the main frame *a*, which is provided with a dial or series of designating-marks at a^4, corresponding in position with the sets of contact-springs *b b' c c'* belonging to each circuit.

The board *a* is provided with an annular slot a^5, extending through from its upper surface into the groove a^3, and the movable switch-arm *b* is provided with a projecting shank or stem *e*, extending through the said slot and into the groove a^3, where it is provided with a head *e'*, (see Fig. 4,) of insulating material, tapering or pointed at both ends and provided at its sides with contact-pieces *f f' g g'*, all insulated from one another.

When the switch-arm *d* is turned by its handle d^3, the head *e'* will force its way between the springs *b b'* and *c c'*, as best understood from Fig. 3, and when the pointer d^4 of the said arm arrives opposite the designating-mark or the dial or indicating-strip a^4 the said head *e'* will be between the springs *b b'* and *c c'*, corresponding to the said circuit in the position shown in Fig. 3, thus separating the two springs of each pair from one another or opening the circuit between them, but at the same time placing the said springs in electrical connection with the corresponding contacts *f f'* and *g g'* on the head *e'*. The said contacts *f f'* and *g g'* are maintained in permanent connection with the instruments at the main office that are to be transferred from one to another of the different circuits centering therein, being shown in this instance as provided with connecting-pieces f^2 f^3 g^2 g^3, all of which extend up through the annular slot a^5 and bear respectively on curved tracks f^4 f^5 g^4 g^5, being pressed against the said tracks by springs *h*, fastened to the arm *d* and bearing on plungers *h'*, that press the flexible ends of the contacts against the corresponding tracks.

The pole-changer P (see Fig. 1) may be of usual construction, having a movable lever with two separate contact-pieces P P', each co-operating with two contact-springs r r' r^2 r^3, the opposite upper and lower ones *r* and r^3 being connected with one terminal and the remaining pair r' r^2 with the other terminal of the circuit in which the polarity of the current of a battery having its opposite poles connected, respectively, with contacts P P', is to be reversed.

In order to bring the pole-changer into cooperation with any one of the circuits connected with the switch-board, it is necessary to place the contacts *p p'* in connection with the terminals of the battery B of the said circuit, and to place one pair of contacts *r* r^3 in connection with one terminal L of the said line and the other pair r' r^2 in connection with the other terminal L' of the said line. To accomplish this result, one pair of contacts *r* r^3 is connected by wire 5 through the track f^4 and contact f^2 with the contact-plate *f* on the movable head *e'*, and the opposite contacts r' r^2 are connected by wire 6 through the track g^4 and contact g^3 with the contact *g'* on the said movable head, while the contact *p* on the movable lever of the pole-changer is connected by wire 7 through the track f^5 and contact f^3 with the contact *f'* on the movable head, and the other contact *p'* of the pole-changer is connected by wire 8 and intermediate connections with the contact *g* on the movable head *e'*.

The telephone T and galvanometer G and any other instruments at the main office that it may be desired to shift from one to another of the circuits may be included in the wire 5 or 6, or both.

The telegraphical signal-receiving instrument, shown as relay *r*, and local circuit containing a register R, may be placed at any point in the main line L L'; but preferably the said relay *r* is placed, as shown in Fig. 5, in one of the wires 2 3, leading directly from the battery, so that it is wholly unaffected by the action of the pole-changer, said relay being intended to operate either by interruptions in the circuit or by changing the current strength by throwing resistance in and out from the circuit at the signal-boxes.

The operation will be best understood by referring to Fig. 5, in which the circuit is shown in its normal condition, the springs *b b'* and *c c'* of each pair being in contact, and the main line being completed through the wires 2 3 4 5, including the battery and receiving-relay. When, however, the movable switch-arm is turned to bring the contacts *f f'* between and into connection with the springs *b b'*, respectively, separating the said springs from one another, and at the same time to bring the contacts *g g'* between and in contact with the springs *c c'*, which are then separated, then, assuming that the pole-changer is in nornal condition, with the contacts *p p'* resting against the contacts r' r^3, respectively, the circuit will be as follows, namely: from one pole of the battery B by wire 3, through spring *c*, contact g^3, and wire 8 to contact *p'*, spring r^3, and wire 5, to con-

tact *f*, and spring *b* and wire 4 to one terminal *a'* of the main line, and from the other pole of the battery by wire 3 to spring *b'*, contact *f'*, wire 7, contact *p*, contact *r'*, wire 6, contact *g'*, spring *c'*, and wire 5 to the other terminal a^2 of the main line, thus placing the telephone T and any other instruments that may be in the wire 5 or 6 directly in the main line, and also placing the battery B under control of the pole-changer, which will reverse the polarity of the battery by moving the contacts *p p'* from the contacts *r' r*^{3} and against the contacts *r r*^{2} in the usual manner. The pole-changer lever may be operated by a finger-key, or, preferably, by a magnet *m* in the local circuit controlled by a suitable finger-key, and preferably the said finger-key K is mounted on the switch-lever *d*, as shown, so as to be accessible to the fingers of the hand holding the handle d^3 of said switch-lever, the said key being connected by a plunger *t* with a track *e*, connected with one end of the local circuit of the magnet *m*, while the anvil or contact-piece of the said key is connected by plunger t^2 with another track t^3, connected with the other end of the local circuit, so that the said key controls the said circuit in all positions of the switch-lever. If it were desired merely to place the telephone T or any other instrument that can be placed directly in circuit in the different circuits centering in the switch-board, one pair of the spring-contacts *d d'* or *c c'* might be omitted, together with the corresponding contacts on the movable head *e'*, and the terminals of the telephone or other instrument would then be connected directly with the remaining pair of contacts on the movable head *e'*, and thus introduced in the circuit by the said contacts coming between the springs.

It is obvious that the mechanical construction may be varied without departing from the invention, the main feature of which consists in providing a switch-board with a dial or series of marks characterizing the different circuits, and with a movable device having a definite positive movement and an indicator and circuit-connections so arranged as to automatically make all necessary connections for a given circuit when the indicator is brought opposite the characterizing mark of the said circuit or the said dial.

I claim—

1. The combination of a number of circuits radiating from the main office with a switch-board having a movable switching device and a pole-changer and operating electro-magnets and local circuit therefor, the contact-points of said pole-changer being connected with the movable switching device, as described, whereby the said pole-changer may be placed in control of any desired one of the circuits, and the movable switching device being provided with a key controlling the local circuit of the pole-changer, substantially as set forth.

2. The combination of a number of circuits radiating from the main office and a switch-board having several pairs of contact-springs, each pair being connected with one of the radiating circuits of a movable switch-arm having a head provided with contacts, which in the movement of the said switch-arm enter between the pairs of contact-springs successively, and contact-springs attached to the contacts on the head, and tracks upon which the said contact-springs continuously bear, said tracks being electrically connected with an instrument at the main office which by the movement of the switch-arm it is desired to include in any one of the radiating circuits.

3. The switch-board comprising the recessed and grooved base, the contact-springs secured within the recess, the pivoted switch-arm and head carried by it, contacts secured to said head and contact-springs leading therefrom, curved tracks upon which the said contact-springs bear, the indicating-plate a^4 and the pointer d^4, and the spring-controlled plunger *h'* for maintaining the contact-springs of the head in contact with the curved tracks, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY A. CHASE.

Witnesses:
BERNICE J. NOYES,
H. L. EMERY.