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AUTOMATIC SWITCH FOR TELEPHONE EXCHANGE SYSTEMS.

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Fig. 1.

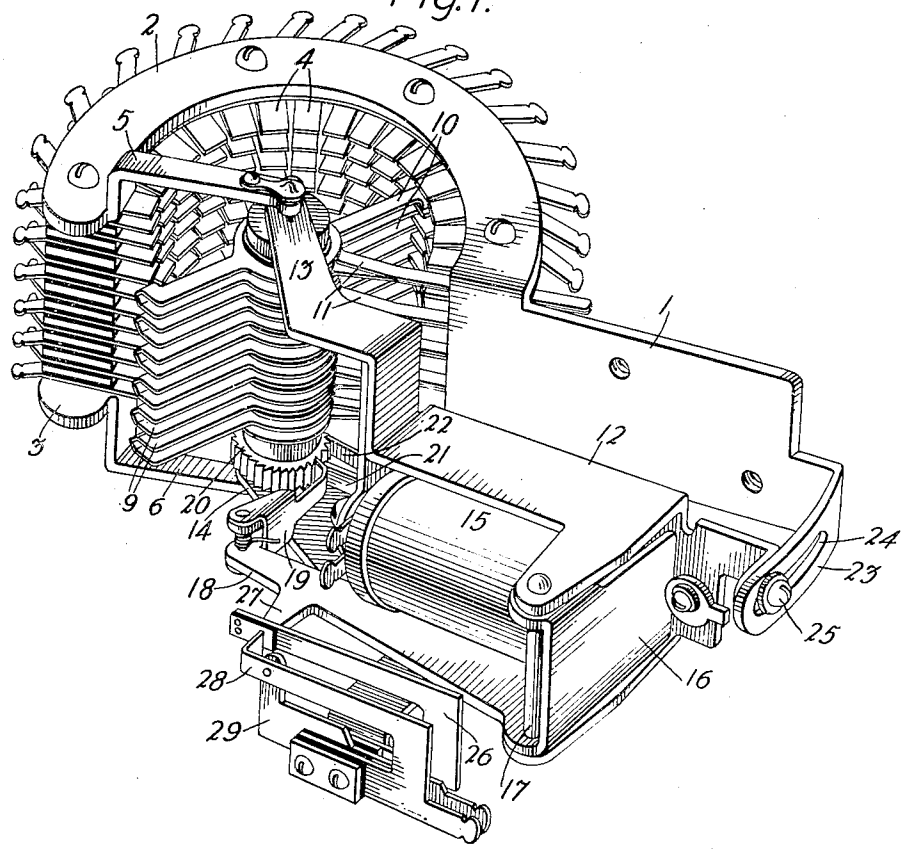
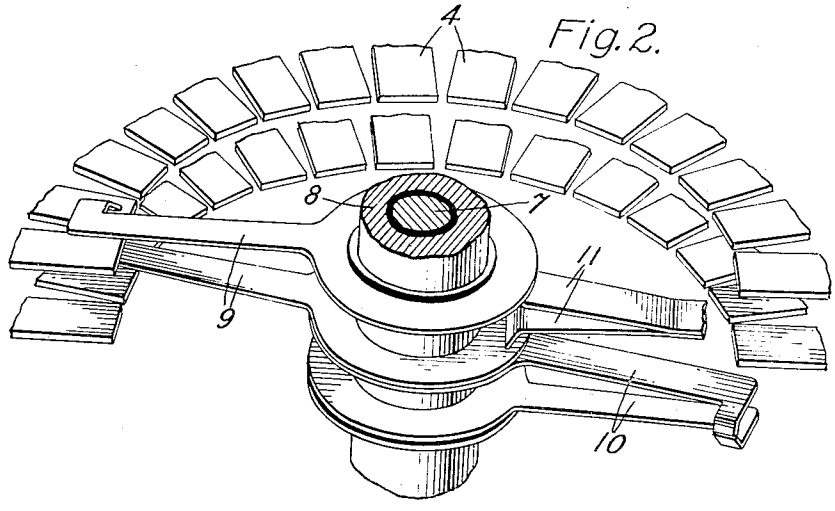


Fig. 2.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC SWITCH FOR TELEPHONE-EXCHANGE SYSTEMS.

1,399,728. Specification of Letters Patent. Patented Dec. 13, 1921.

Application filed July 26, 1919. Serial No. 313,434.

To all whom it may concern:

Be it known that I, ARTHUR H. ADAMS, a citizen of the United States, residing at Galion, in the county of Crawford and State of Ohio, have invented certain new and useful Improvements in Automatic Switches for Telephone-Exchange Systems, of which the following is a full, clear, concise, and exact description.

This invention relates to improvements in switching devices and has particular reference to an automatic switch for use in telephone exchange systems.

An object of the invention is to provide a switch of simple and inexpensive construction which is adapted for use in various capacities, such as a line or side switch, register, cord and trunk finder.

Another object is to provide a simple and effective means for adjusting the brushes of the switch with respect to the terminals of the bank, so that the brushes may be centered on said terminals and maintained in such relation when engaged therewith.

A feature of the invention is the provision in a step by step rotary switch of a stepping unit which may be adjusted angularly about the center of the rotary brushes. This provides a very simple means of adjusting the brushes so that they will properly center on the bank terminals.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawing; but it is to be expressly understood that said drawing is employed merely for the purpose of facilitating the description of the invention as a whole and not to define the limits thereof, reference being had to the appended claims for this purpose.

In the drawing Figure 1 is a perspective view of a switch constructed in accordance with the invention. Fig. 2 is an enlarged fragmentary perspective view of the terminal bank and brushes associated therewith.

Referring more particularly to the drawing, 1 indicates a main frame preferably having formed integrally therewith an upper arcuate member 2 of semi-circular formation. Between this member and a second lower arcuate member 3 of similar formation are secured a plurality of terminals 4. These terminals are arranged in horizontal rows, there being preferably twelve rows with the corresponding terminals of each row arranged in vertical alinement. Each horizontal row preferably contains fifteen terminals and the alternate terminals of each vertically alined row have access to a single trunk. In this manner six of the terminals in each vertical row are assigned to one trunk and the other six to a second trunk.

Mounted in the free ends of upper and lower supporting arms 5 and 6, carried respectively by members 2 and 3 and in alinement with the vertical axis of the terminal bank is a shaft 7 upon which is rotatably mounted a brush-carrying element 8. This element carries a plurality of brush sets 9 and 10 diametrically disposed on opposite sides of shaft 7 and arranged in staggered relation so that when, during rotation of the element 8, a set 9 passes from engagement with the last terminal of a horizontal row, a set 10 will engage the first terminal of another adjacent horizontal row. In accordance with this arrangement it will be apparent that during one complete revolution of the element 8 brush sets 9 and 10 will be caused to pass over the terminals of thirty trunks, there being fifteen trunks connected to one horizontal row of terminals. Adjacent sets of brushes 9 and 10 are in electrical engagement with each other but are insulated from other sets, as clearly shown in Fig. 2. A plurality of current conducting strips 11 are suitably secured in the multiple bank and engage at their inner ends with adjacent brush sets, as is also clearly illustrated in Fig. 2. It is to be noted that each brush set is composed of two wiping members, the outer ends of which are offset in such manner as to engage the upper and lower surfaces of the terminals of the associated rows as the sets are passed thereover.

The switch further comprises a second or auxiliary frame 12 including upper and lower arms 13 and 14 pivotally mounted upon the shaft 7. A stepping magnet 15 is secured to frame 12 and has its armature 16 pivoted at 17. An angularly disposed arm 18 of armature 16 is provided at its free end with a stepping pawl 19 held in engagement with the teeth of ratchet 20 carried by the lower end of the element 8. The free end of pawl 19 engages a stop 21 formed upon the

frame 12 and when said pawl is in normal position in engagement with a tooth, ratchet 20 and consequently element 8 are prevented from rotating in a counter-clockwise direction. A holding pawl 22 also secured to frame 12, has one end in engagement with the teeth of ratchet 20 and prevents rotation of said ratchet in the opposite direction. It will thus be apparent that any movement of the frame 12 about the shaft 7 as an axis will cause element 8 and consequently brush sets 9 and 10 to be rotated with respect to the terminals of the multiple bank. This will permit of centering the offset ends of the wiping members of said brush sets on the respective terminals to aid in producing perfect conduction. In order to limit the adjustment of frame 12 with respect to frame 1, the latter is provided with an offset arm 23 having an elongated opening 24 therein through which extends a screw or other fastening element 25 secured to the frame 12. By loosening this screw it will be obvious that the frame 12 and brush sets may be slightly rotated with respect to the terminal bank, the limit of such movement being determined by engagement of screw 25 with the portions of arm 23 forming the ends of opening 24. When the opposite ends of the brush sets are centered upon the terminals, screw 25 may be then tightened to maintain frame 12 in its adjusted position relative to frame 1.

To make stepping magnet 15 self-interrupting the arm 26 is preferably secured to frame 12 in any suitable manner so as to be actuated by projection 27 formed upon the arm 18 of the armature 16. Each time the armature 16 is attracted by the energization of stepping magnet 15, arm 26 engages an end of a contact member 28 to disengage the same from a similar contact member 29 so as to open the circuit of said magnet.

Briefly, assuming that the six brush sets 9 are in engagement with the first and each other alternate terminal of any of the vertically alined rows, the brush sets 10 will then be disengaged from the terminals of their respective rows. When stepping magnet 15 is operated, the brush sets will be rotated by the operation of stepping pawl 19 so as to cause the brush sets 9 to pass over their respective terminals in hunting for an idle trunk. If the idle trunk is not found when brush sets 9 have engaged the last vertically alined row of terminals shown at the left of Fig. 1, the next step of the switch will disengage brush sets 9 from said terminals and then engage brush sets 10 with the second and each succeeding alternate terminal of the first vertically alined row shown at the right of Fig. 1. Continued operation of magnet 15 will then cause brush sets 10 to hunt for an idle trunk over the other terminals associated with said sets. It will thus be obvious that during one complete revolution of brush-carrying element 8 the brush sets will be passed over the terminals of twice as many trunks as there are terminals in each horizontal row.

What is claimed is:

1. A rotary switch comprising a terminal bank, a rotatable brush set coöperatively associated with said bank, a ratchet wheel for driving said brush set, stepping means comprising a stepping pawl and motor magnet therefor adapted to rotate said ratchet wheel, said stepping means pivoted concentrically with said ratchet wheel and adapted to be adjusted angularly about its pivot.

2. A rotary switch comprising a frame, a terminal bank supported thereby, a shaft mounted in said frame, a brush carrying element rotatable about said shaft, a second frame pivotally mounted on said shaft and movable relative to the first named frame, and means carried by the second frame for normally preventing relative movement between the brush carrying element and said shaft whereby when said second frame is moved about said shaft the brushes carried by said element will be adjusted with respect to the terminals of said bank.

3. A rotary switch comprising a frame, a terminal bank supported thereby, a shaft mounted in said frame, a brush carrying element rotatable about said shaft, a second frame pivotally mounted on said shaft and movable relative to the first named frame, means carried by the second frame for normally preventing relative movement between the brush carrying element and said shaft, whereby when said second frame is moved about said shaft the brushes carried by said element will be adjusted with respect to the terminals of said bank, and means for limiting the movement of said second frame relative to the first named frame.

4. A rotary switch comprising a frame, a terminal bank supported thereby, a shaft mounted in said frame, a brush carrying element rotatable about said shaft, a second frame pivotally mounted on said shaft and movable relative to the first named frame, means carried by the second frame for normally preventing relative movement between the brush carrying element and said shaft whereby when said second frame is moved about said shaft the brushes carried by said element will be adjusted with respect to the terminals of said bank, and means carried by said second frame for operating the last named means to rotate said brush carrying element about said shaft.

In witness whereof, I hereunto subscribe my name this 19th day of July, A. D. 1919.

ARTHUR H. ADAMS.