April 6, 1926.

1,579,304

F. M. GODDARD

SWITCHING DEVICE

Filed Dec. 17, 1919

Fig. 1.

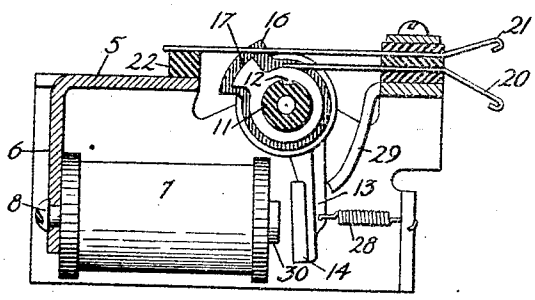


Fig. 3.

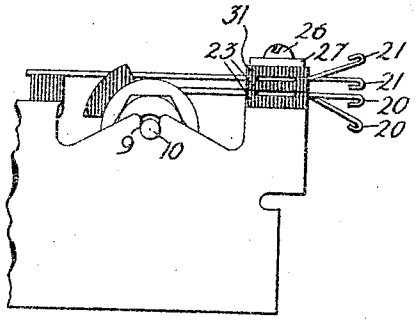


Fig. 2.

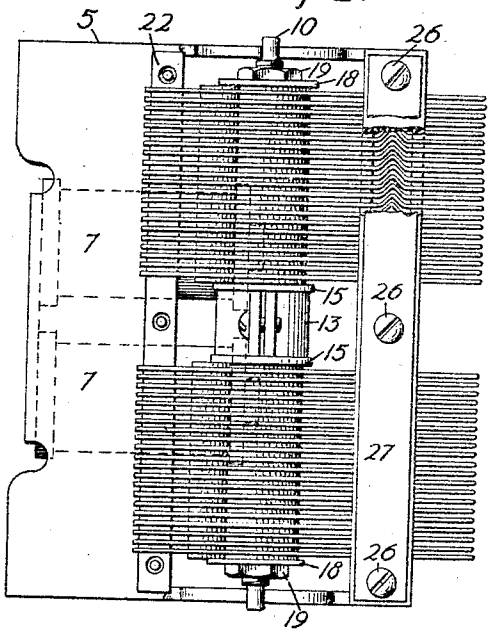
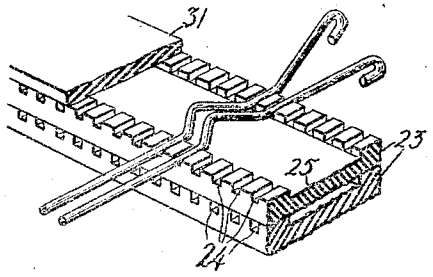


Fig. 4.



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UNITED STATES PATENT OFFICE.

FREDERICK M. GODDARD, OF BROOKLYN, NEW YORK, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SWITCHING DEVICE.

Application filed December 17, 1919. Serial No. 345,498.

To all whom it may concern:

Be it known that I, FREDERICK M. GODDARD, a citizen of the United States, residing at Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Switching Devices, of which the following is a full, clear, concise, and exact description.

This invention relates to switching devices in general and more particularly to a multi-contact relay especially suitable for use in connection with telephone work.

In various types of signaling and telephone systems, it becomes necessary to open or close a large number of contacts practically simultaneously, and it is also required that this work be done very efficiently, in view of the small amount of energy available. Not only must the work be done efficiently as regards electrical energy but the apparatus for doing this work must be so designed as not to be prohibitive in cost of manufacture.

It is therefore the object of this invention to provide a switching device which will be capable of opening or closing a large number of contacts practically simultaneously and one which will be cheap to manufacture, efficient in operation and require a minimum amount of attention in service.

To attain this object and in accordance with a feature of this invention, there is provided a switching device comprising a self-aligning rotating member consisting of alternate sections of insulating and conducting material, a set of conducting springs or brushes adapted to bear against the conducting segments continuously, and a second set of contact springs or brushes adapted to engage the contact segments when the latter are rotated.

This and other features of the invention will be more clearly understood by reference to the accompanying drawing, in which Fig. 1 is a side elevation partly in section to show the construction of the rotating member; Fig. 2 is a plan view of the relay as shown in Fig. 1; Fig. 3 is a partial view showing the manner in which the rotating member is carried by the mounting plate; and Fig. 4 is an enlarged view showing the manner in which the contact springs or brushes are held in place.

Referring now to the drawings, there is provided a mounting plate 5 of magnetic material having a downwardly projecting member 6 to which the spools 7—7 of an electromagnet are secured by means of screws 8. The side plates of the mounting frame 5 are provided with slots 9, as shown, adapted to receive the end-portions of the shaft 10 of the rotating member. Encircling this shaft is a bushing 11 of insulating material such as hard rubber and provided with a key slot 12. At the center portion of the bushing 11 there is provided a short metal sleeve, not shown in the drawing, which is pinned to the bushing and the shaft 10. About the sleeve is clamped the member 13, the outer end of which is rigidly connected to the armature 14 of the electromagnet. On either side of the sleeve there is provided a washer 15—15 and upon the bushing are then threaded alternate segments 16 of insulating material and segments 17 of conducting material, the number of such segments depending upon the number of contacts which are to be employed, one conducting segment being provided for each circuit to be interrupted. The segments 16 and 17, as can be clearly seen in Fig. 1, are provided with inwardly projecting members or tangs adapted to fit in the key-way 12 and prevent the segments from angular motion with respect to the bushing 11. When the desired number of conducting and insulating segments are positioned upon the bushing 11, washers 18—18 and nuts 19—19 are provided at either end, the nuts being adapted to engage the threaded end-portions of the shaft 10 so that the parts may be clamped rigidly together. The conducting springs which are preferably of phosphor bronze wire, are clamped between suitable insulating members and secured to the mounting frame 5. For each conducting segment 17, there is provided a conducting spring 20 which is adapted to bear continuously and with the desired amount of tension against the segment, as illustrated in Fig. 1, and a second conducting spring 21 which is considerably longer and normally is tensioned against an insulating member 22 riveted or otherwise secured to the mounting frame 5. Each pair of conducting springs 20 and 21 is held in alignment over its corresponding conducting segment 17 and separated from adjacent springs by means of the insulating segment 16—16 on either side and the springs in turn serve to

hold the rotating member in position and in correct alignment. In order to attain a compact piece of apparatus and to provide space for making the necessary soldering connections, alternate springs 20 are given a downward bend and alternate springs 21 are given an upward bend. In order to prevent these springs from rotating, each spring is given a bend or crimp, as shown more clearly in Fig. 4. The insulating members 23—23 are provided with spaced slots 24—24 of suitable dimensions to receive the contact wires 20 and 21 and the inner portion of each insulating member is provided with a slot 25, the depth of which is substantially the diameter of the conducting wire. The conducting wires are placed in the slots 24 with the crimp portions lying in a plane parallel to the plane of the insulating member and when clamped in place by means of the screw 26—26, the clamping plate 27 and the insulating member 31 are prevented from rotation by the crimped portions. A retractile spring 28 is connected between the projecting arm of the mounting plate 5 and the armature 14 to keep the apparatus normally in an unoperated position. The backward movement of this armature is limited by the stop 29 which is rigidly secured to the frame.

Upon energization of the electromagnet 7, the armature 14 is attracted to the core 30 and, in its movement, causes the rotation of the various insulating and conducting segments. Upon the conducting segments 17 being rotated sufficiently far, the cam portion engages the springs 21, thereby closing the contact between springs 20 and 21 since each spring 20 is continuously in contact with its corresponding conducting segment. The rotation of the conducting segments is such as to cause a slipping movement between the spring contacts 21 and the segment, thus providing a self-cleaning contact. The spring members 21 may be tensioned against the insulating strip 22 with any desired tension, thus providing corresponding contact pressure between the segments 17 and the springs 21 when the former are given the necessary rotation.

What is claimed is:

1. In a switching device, the combination of a mounting frame arranged with a slot on two opposite ends, a rotatable switching member pivotally arranged in said slots, conducting and insulating cams interposed on said member, and sets of conductors tensioned against said conducting cams for holding said member in adjusted position in said slots.

2. In a switching device, the combination of a mounting frame, superposed banks of contacts arranged on said frame, means for holding said contacts against movement in said banks, said means comprising a plurality of indentures on each of said banks, a crimped portion at one end of each of said conductors lying in an associated recess, and an insulating strip for holding said wires in said banks collectively.

In witness whereof, I hereunto subscribe my name this 12th day of December A. D., 1919.

FREDERICK M. GODDARD.