

Nov. 1, 1927.

1,647,792

E. W. GENT

SWITCHING DEVICE

Filed June 20, 1921

Fig. 1.

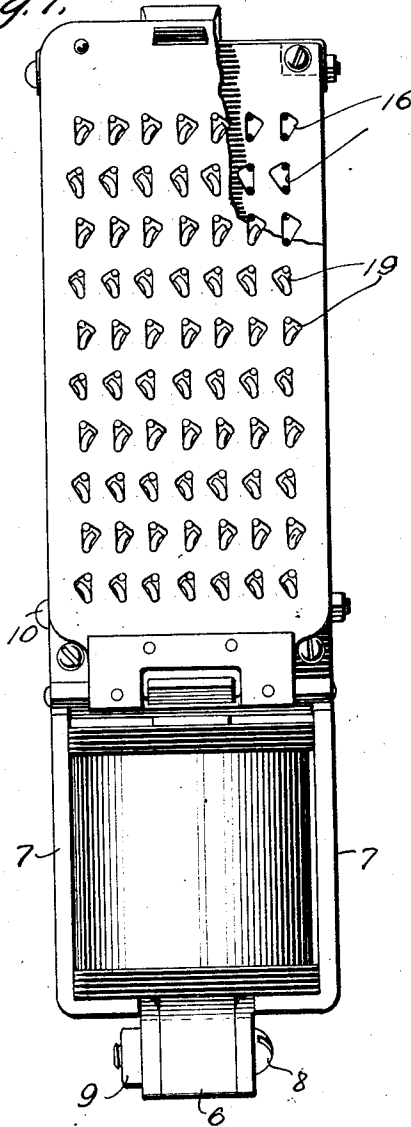


Fig. 2.

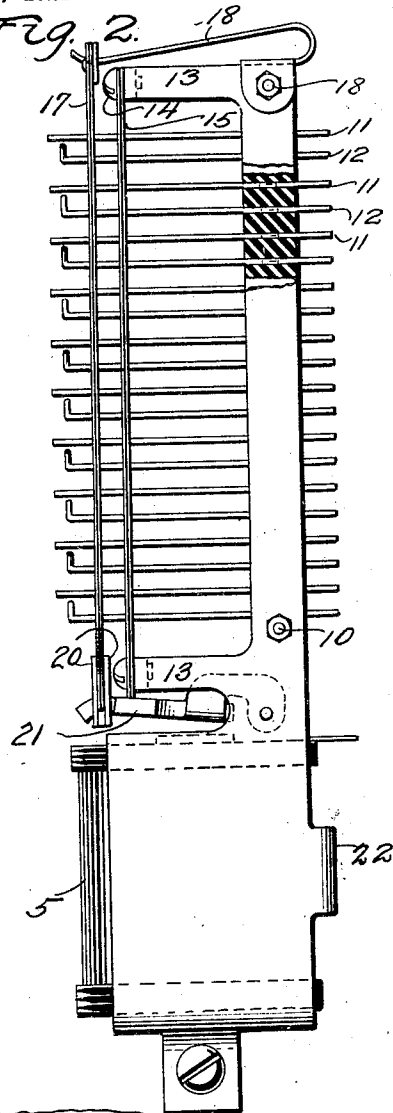


Fig. 3.

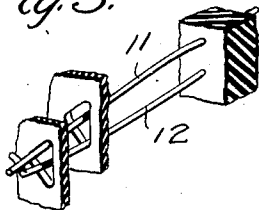
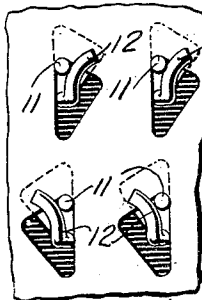


Fig. 4.



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UNITED STATES PATENT OFFICE.

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SWITCHING DEVICE.

Application filed June 20, 1921. Serial No. 479,015.

This invention relates in general to switching devices and more particularly to a relay of the multi-contact type.

In various signaling circuits and also in automatic telephone circuits, conditions at times are such as to necessitate closing a large number of contacts simultaneously, and it is an object of the present invention to provide a relay which will economically and satisfactorily meet such conditions. It is a further object of the invention to provide a relay of this type in which adjustment of the contact springs can be quickly made and such adjustment maintained under service conditions.

To attain these objects and in accordance with a feature of the invention, there is provided a relay in which a plurality of contact springs are operated simultaneously by a plate or bar which may be under the control of an electromagnet.

In accordance with another feature of the invention there is provided a second plate in which are slots to receive the contact springs against which such springs are tensioned.

These and other features of the invention may be more clearly understood by reference to the accompanying drawing in which Figs. 1 and 2 are front elevation and side elevation views respectively, of a type of relay embodying the features of this invention; Fig. 3 is a view in perspective of a pair of contact wires showing the position when engaged; and Fig. 4 is an end view of the contact springs in engagement.

Referring now to the drawings, there is disclosed an electromagnet 5 having a core 6, and a pair of side plates 7, 7, which are formed as shown and clamped rigidly to the core 6 by means of screw 8 and nut 9. By means of clamping screws 10, 10, a plurality of contact banks are securely clamped between the upper portions of the side plates 7, 7. Each of these sections, of which there are seven in the design illustrated, consists of an insulating bar in which are secured, preferably during molding, a plurality of contact springs or wires 11, 11 and 12, 12. The contact wires 11 are straight wires except where they may be crimped within the molded portion, and the wires 12 are formed, as shown more clearly in Fig. 4, so that their free ends are in a plane approximately at right angles to the axis of the wires 11.

Supported on extensions 13, 13 of the side

plates and held in position by means of the screws 14, is a plate 15 of insulating material, preferably micarta. This plate is provided with triangular openings 16, 16 which permit the contact wires 11 and 12 to be readily threaded therethrough. A second plate member 17, which is also preferably of micarta or similar insulating material, is supported upon a spring 18 and is provided with triangular openings 19, through which the free ends of the contact wires may be readily threaded. The lower portion of plate member 17 is provided with metal plates 20, 20, which are riveted thereto, and these plates are provided with an opening through which extends the curved end of armature 21 of the electromagnet 5, this armature being pivotally mounted to the side plates as shown.

In the unoperated position of the electromagnet, the armature 21 is held against the lower portion of stationary plate 15 by means of the spring 18, in which position the slots in the two plates are substantially in alignment. The springs 11, 11 are given slight initial upward tension against the plate member 15, and the spring members 12 are given a slight downward tension against the plate member. Upon energization of the electromagnet 5, and movement of its armature 21, the plate 17 is drawn downward, thus forcing the wires 11 into engagement with the wires 12. On account of the curved ends of wires 12, a certain camming effect takes place and the wires 12 are forced sideways as shown more clearly in Fig. 3, thus insuring a good wiping contact between each pair of wires. In order to eliminate the considerable side thrust that would result in case the wires were all cammed in one direction, alternate wires 12 in each section are formed in opposite directions so that the side thrust is neutralized.

In the normal or unoperated position of the relay, the top spring or wire 11 rests against the upper surface of the slot in the stationary plate 15, and the bottom spring or wire 12 rests with some tension on the bottom of the slot in the stationary plate so that when the armature is operated, the contact end of the top wire moves about its point of contact on the movable plate, and the contact end of the bottom wire 12 moves about its point of contact on the stationary plate, thus providing the equivalent of short wires

with their advantages, although the advantages of full length wires is obtainable for the purpose of adjustment both as regards tensioning and in taking care of any non-parallelism of the wires that might exist after the molding operation.

For the purpose of mounting the relay in position, mounting brackets 22 are provided integral with the side plates 7 to permit the device being mounted upon a clamping plate of the customary type.

What is claimed is:

1. In a switching device, a plurality of passive bare wire contacts, a plate of insulating material, a plurality of active bare wire contacts extending loosely through said plate for cooperation with said passive contacts, and means for moving said plate to cause engagement between the active and passive contacts.

2. In a switching device, a set of contact springs, a second set of contact springs having their free ends formed to engage said first set of springs, a stationary plate of insulating material having apertures therein, said contact springs being loosely disposed in said apertures to allow relative movement therein, a second plate of insulating material having similar apertures through which the springs extend, said apertures being in alignment normally in both plates, and means for causing relative movement between the plates to force the first set of contact springs into engagement with the second set of contact springs.

3. In a switching device, a set of contact springs, a second set of contact springs having their end portions formed to engage the free ends of said first springs, a stationary plate of insulating material having apertures therein through each of which a pair of said springs extend and against the surface of which they are tensioned, a movable plate of insulating material having apertures therein similar to and normally in alignment with the apertures in said stationary plate, and means for causing the movement of said movable plate to force the springs of each pair into engagement.

4. In a switching device, a contact bank, a plurality of contact springs rigidly secured therein, alternate springs having their free ends formed in a plane substantially at right angles to the axis of the spring, a stationary plate of insulating material having apertures therein, said contact springs being loosely disposed in said apertures to allow relative movement therein, a second insulating plate having cam shaped apertures therein nor-

mally in alignment with the apertures in said first plate, and means for causing the movement of said second plate to force alternate pairs of contact springs into engagement.

5. In a switching device, a plurality of contact banks, means for clamping said banks into a unitary structure, a plurality of contact springs secured in each of said banks, alternate springs in each bank having their free ends formed in a plane substantially at right angles to the axis of the spring, a stationary plate of insulating material having apertures therein, said contact springs being loosely disposed in said apertures to allow relative movement therein, a second insulating plate having apertures therein normally in alignment with the apertures in said first plate, and means for causing the movement of said second plate to force alternate pairs of contact springs into engagement.

6. In a switching device, a plurality of contact banks, means for rigidly securing said banks, a plurality of sets of contact springs in each of said banks, alternate springs having their free ends formed substantially as shown to permit engagement with the other spring of said set, means for supporting the free ends of said springs under tension in a given position, a slidable plate adapted to engage one spring of each set, and electromagnetic means for causing the movement of said plate whereby the springs of each set of contacts are forced into engagement.

7. In a switching device, a plurality of passive bare wire contacts, a plurality of active bare wire contacts for cooperating respectively with said passive contacts, a slidable plate of insulating material having apertures therein through which said active contacts project, and means for moving said plate to cause engagement between the active and passive contacts, said passive contacts being so formed as to cause a rubbing action when engaged by the active contacts.

8. In a switching device, a plurality of bare wire contacts, a plate of insulating material having apertures therein, a plurality of second bare wire contacts extending through the apertures in said plate and capable of movement relative to said plate for cooperation with said first mentioned contacts, and means for causing a sliding movement of said plate to cause engagement between said first and second contacts.

In witness whereof, I hereunto subscribe my name this 16th day of June, A. D., 1921.

EDGAR W. GENT