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AUTOMATIC SWITCH FOR USE IN TELEPHONE OR LIKE SYSTEMS

Filed Aug. 12, 1929

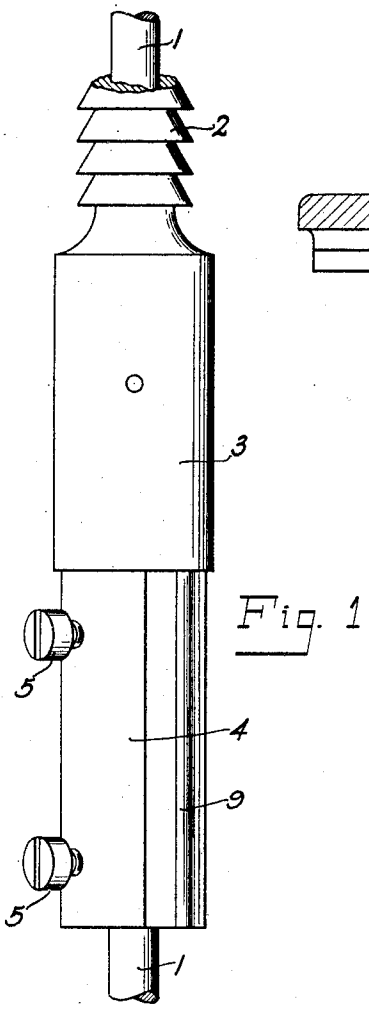


Fig. 1

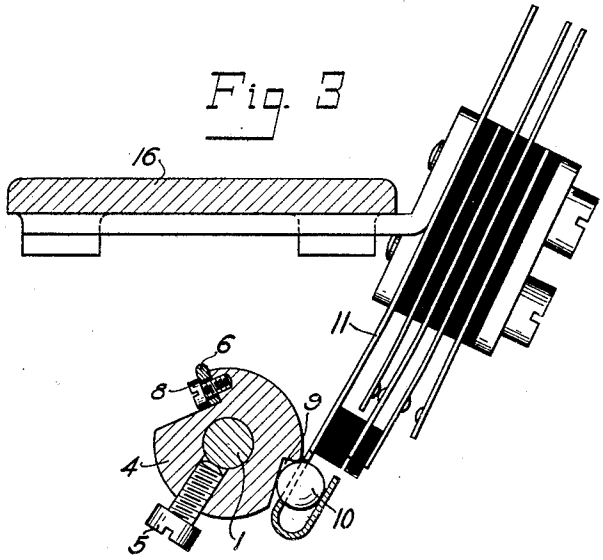


Fig. 3

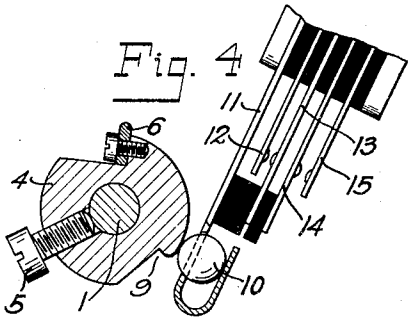


Fig. 4

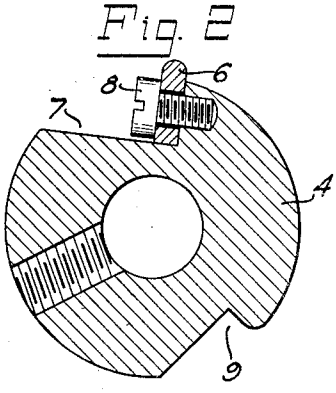


Fig. 2

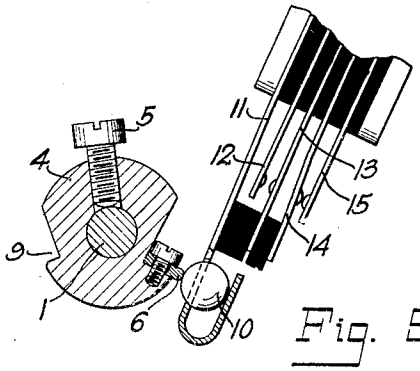


Fig. 5

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UNITED STATES PATENT OFFICE

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AUTOMATIC SWITCH FOR USE IN TELEPHONE OR LIKE SYSTEMS

Application filed August 12, 1929, Serial No. 385,164, and in Great Britain August 23, 1928.

The present invention relates to automatic switches for use in telephone or like systems and is particularly concerned with switches of the well-known type having motion in two directions, the motions preferably comprising first a vertical motion and then a rotary motion. It is often found desirable in switches of this type to arrange for certain circuit changes to be effected for instance as soon as the switch leaves its normal position and also possibly as soon as it commences the second motion. Moreover, in the use of these switches it has become general practice for a switch which is adapted to hunt to find a free line to be advanced clear of its bank when no such line is available by taking what is generally an 11th rotary step. When this occurs the wipers in general no longer engage bank contacts but circuit changes are brought about by the operation of so-called cam springs. A further requirement sometimes encountered is that it may be desirable to operate springs on certain levels only, such springs generally being termed normal post springs. The design and mounting of springs of the above types involve a number of problems in order to ensure that the springs shall operate satisfactorily under all conditions and the chief object of the invention may be said to be the provision of a contact spring operating assembly which shall be suitable for operating one or more of the above four types.

It has already been proposed to effect this object by making use of a pivoted bar extending vertically for a length corresponding to the vertical travel of the switch shaft which bar co-operates with a disc secured to the shaft and arranged to partake of both its vertical and rotary motions. With this construction in order to obtain all the facilities above indicated it was necessary to employ specially contoured cam surfaces on both the pivoted bar and on the movable disc.

According to the present invention however the member for operating the contact springs comprises a ball or roller of small vertical dimension for engaging with the operating member which accordingly comprises a two-dimensional surface on any suitable portion of which projections may be located so as to operate the springs in different positions of the switch shaft. Moreover, as will be clear, these projections may be of different heights so as to permit a stepped operation of the contact springs.

The invention will be better understood from the following description of a preferred form of carrying it into effect which is given by way of example only and should be taken into conjunction with the accompanying drawings comprising Figs. 1–5. Of these drawings, Fig. 1 shows an enlarged view of a portion of the shaft of a switch of the well-known vertical and rotary type showing the location of and method of securing the special cam member, Fig. 2 is a sectional plan of the cam detached, while Figs. 3, 4 and 5 show in plan the cam and the co-operating springs in three different positions the flexure of the springs being somewhat exaggerated. The full details of the switch are not shown as these are well known and it will suffice to state that the shaft which carries brushes or wipers is mounted vertically and is adapted to be raised bodily and then rotated during the operation of the switch.

Referring now to Fig. 1, the shaft is represented by 1 while 2 and 3 represent respectively the usual vertical and rotary teeth which are conveniently integral with the shaft. The cam member 4 is adapted to fit over the shaft and to be secured in position thereon by means of the set screws 5 and is conveniently located immediately beneath the rotary teeth. With the shape of the cam member 4 shown it is adapted to secure the operation of rotary off-normal springs and also of eleventh-step cam springs, the spring assembly being so arranged that the springs are operated in two steps. It will be seen that the member 4 is cylindrical but is provided with a slot 9 into which the ball 10 is moved by the spring 11 when the switch is in normal position thereby closing the rotary off-normal springs 12 and 13. The ball 10 it will be seen is seated in a hole of slightly less diameter than that of the ball in the spring 11 which is bent back to retain the ball in position. It is clear that since the slot 9 extends vertically for the whole length of the

cam 4 the vertical movement of the shaft will produce no effect on the springs 12 and 13 and it will be seen also that the ball 10 will not introduce any appreciable frictional force which might prejudice the operation of the switch. As soon as the switch shaft commences its rotary motion, however, the ball 10 rides on the cylindrical outer surface of the cam 4 and springs 12 and 13 are separated although the movement is not sufficient to close springs 14 and 15. These conditions are maintained in any rotary position in which the switch wipers are engaging their associated bank contacts but should the switch shaft be moved to the 11th step position the insert 6 which is secured to the slot 7 by a pair of screws 8 engages the ball 10 and operates the springs further so that springs 14 and 15 are now closed while springs 12 and 13 are further opened. The spring assembly is secured to the frame 16 by means of a suitable bracket, the springs being insulated from one another and from the frame in the usual manner.

Since it is generally desirable that the cam springs should be operated in the 11th step position on each level, the insert 6 will be of sufficient length to bring this about but it will readily be seen that the length of this member could quite well be altered to give different operating conditions. Similarly an alteration in the shape of the slot 9 for instance the provision of an additional depression at the highest point might serve to secure the operation of the vertical off-normal springs. Moreover any other desired operating conditions could be obtained by fixing to the surface of the cam member suitable projections which could conveniently extend either vertically or horizontally or could be of such size as to correspond to only one particular position of the switch.

We claim:—

1. In an automatic step-by-step switch for telephone systems, a switch shaft having a primary and a secondary movement, a cam member attached to said shaft, said cam member having a greater dimension in each movement of said switch shaft than the extent of a single step of the shaft, and a set of contact springs on said switch operated in one manner by said cam member in the initial secondary movement of the shaft, and in another manner at the end of the secondary movement.

2. In an automatic step-by-step switch for telephone switches, a switch shaft having a primary and a secondary movement, a cam member attached to and moving with said shaft, contact springs on said switch, an operating member controlled by said cam member for operating said contact springs in a plurality of different stages at different positions of the secondary movement of said switch shaft, said operating member having an engaging surface with said cam member of a dimension less than the extent of a single step in the primary motion of said switch.

3. In an automatic step-by-step switch for telephone systems, a switch shaft having a primary and a secondary movement, a cam member rigidly secured to said switch shaft, said cam member having a dimension in each movement of said switch shaft greater than a single step of said shaft, contact springs controlled by said cam member, and inserts on said cam member for operating said contact springs in the secondary movement of said switch shaft.

4. In an automatic step-by-step switch for telephone systems, a switch shaft having a primary and a secondary movement, a cam member attached to and moving with said shaft, said cam member having a greater dimension in each movement of the switch shaft than the extent of a single step of the shaft, and a set of contact springs on said switch, said springs operated by said cam member in a plurality of stages at different positions of the secondary movement of said switch shaft.

5. In an automatic step-by-step switch for telephone systems, a switch shaft having a primary and a secondary movement, a cam member attached to and moving with said switch shaft, contact springs on said switch, an operating member controlled by said cam member, said operating member comprising a ball loosely mounted on said contact springs, and means responsive to the secondary movement of said switch shaft and said cam member for operating said ball to control said contact springs.

6. In an automatic step-by-step switch for telephone systems having a switch shaft with a vertical and a rotary motion, a cam member secured to said switch shaft, said cam member having a length and a circumference greater than a single step in either motion of said switch shaft, a set of contact springs on said switch, a ball loosely mounted on one of said contact springs and in operative relation to said cam member, means on said cam member when said switch shaft is operated in its vertical motion for maintaining said ball in its normal position, and means on said cam member when said switch shaft is operated in its rotary motion for controlling said ball to operate said contact springs.

7. In an automatic stepping switch for telephone systems, a switch shaft having a primary and a secondary movement, a cam member secured to said switch shaft, said cam member having a dimension greater than the extent of a single step of said switch, a set of contact springs on said switch, a ball roller on one of said contact springs in operative relation to said cam member, means on said cam member responsive to the primary movement of said switch shaft for maintaining

said ball roller in its normal position, and other means on said cam member responsive to the secondary movement of said switch shaft for operating said ball member to control said contact springs in a plurality of different stages.

In testimony whereof I, the said SIDNEY REYNELL SMITH, have signed my name at Liverpool, England, this 9th day of July, 1929.

SIDNEY REYNELL SMITH.

In testimony whereof I, the said JOHN ELLIS OSTLINE, have signed my name this 8th day of Aug., 1929.

JOHN ELLIS OSTLINE.