

Dec. 23, 1930.

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1,786,294

SWITCH DEVICE

Original Filed June 22, 1925

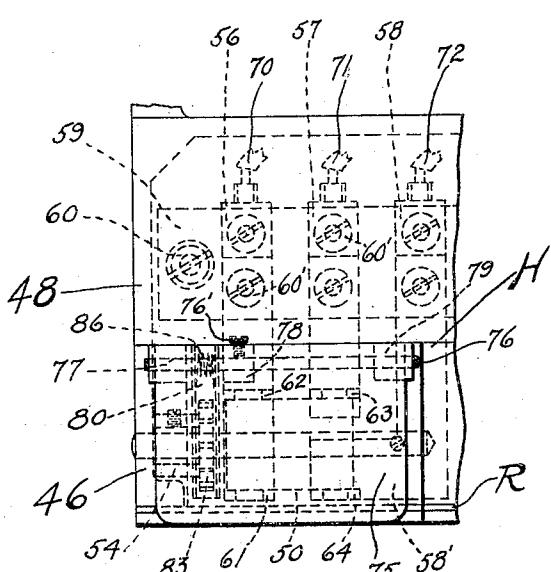


Fig. 1

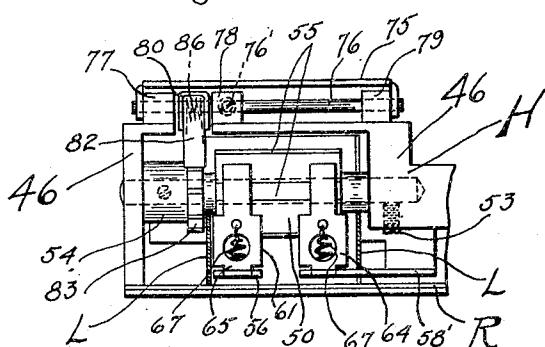


Fig. 2

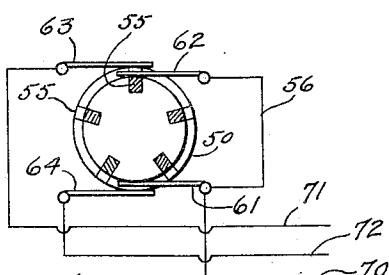


Fig. 6

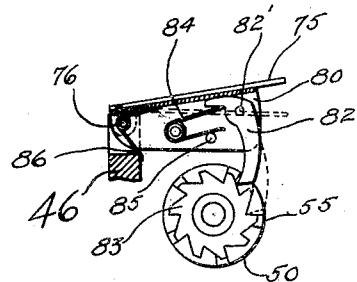


Fig. 3

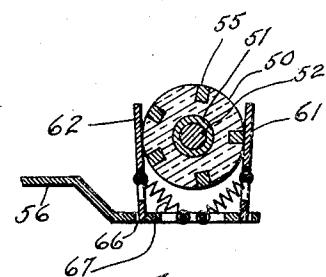


Fig. 4

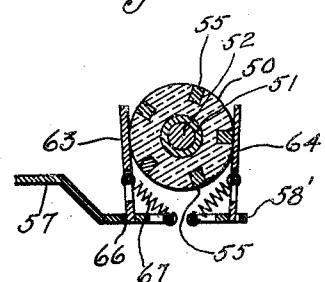


Fig. 5

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UNITED STATES PATENT OFFICE

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SWITCH DEVICE

Original application filed June 22, 1925, Serial No. 38,613, now Patent No. 1,733,951. Divided and this application filed September 27, 1929. Serial No. 395,535.

This application is a division of my co-pending application, Serial No. 38,613, filed June 22, 1925, now Patent Number 1,733,951, entitled Control means for phonographs.

5 The present invention relates to switch devices and more particularly to a switch device of improved construction adapted to control a plurality of circuits.

One object of my invention is to provide 10 an improved switch device which is adapted to be operated to close any of a plurality of circuits and to maintain the same closed until operated to close another of said circuits and which is preferably so constructed that 15 a very slight successive pressure, always in the same direction, will effect the closing of different circuits successively.

Another object of my invention is to provide 20 an improved switch device which is so constructed as to offer very slight mechanical resistance to the operation thereof and which, when operated, is adapted to close and open in predetermined order a plurality of electric circuits.

25 Other and further objects of my invention will be obvious upon an understanding of the embodiment thereof about to be described or will be indicated in the appended claims, and various advantages not referred 30 to herein will occur to one skilled in the art upon employment of the invention in practice.

In order that my invention may be more clearly understood, a preferred embodiment 35 has been chosen for purposes of illustration and description and is shown in the drawing accompanying and forming a part of this specification and wherein:

Fig. 1 is an enlarged plan view of the 40 switch device mounted in a suitable housing, only a part of said housing being shown;

Fig. 2 is a front elevation of the switch device shown in Fig. 1 with the front wall of the housing removed;

45 Figs. 3, 4 and 5 are enlarged detailed sectional views of parts of the switch device; and

Fig. 6 is a diagrammatic view of the electric circuits as controlled by the switch device.

50 Referring to the drawing, the switch de-

vice is shown mounted within a housing H. This housing is also adapted to contain certain other control mechanism which while not shown herein as the same comprises no part of the present invention, is shown and fully described in my co-pending application herein referred to. The switch device disclosed herein need not necessarily be placed within the exact form of housing shown for it is obvious that any suitable 60 housing will serve.

The housing H comprises two sections: a low rear section, indicated by reference character 48, and a higher front section indicated by reference character 46. The switch device 65 is preferably of the commutator type with most of its parts disposed within the higher front section 46 of the housing H, and comprises a commutator cylinder or drum 50 formed of suitable non-conductive material 70 and secured to a sleeve 51 which is rotatably mounted on a horizontal rod 52 supported in the opposite end walls of the section 46 and held in fixed position by a set screw 53. A spacing sleeve 54 is secured to the sleeve 52 by a set screw, and secured to one end of this sleeve is a ratchet 58 comprising a part of the means for actuating the drum 50. Embedded in the body of the drum and flush with the surface thereof are a plurality of conductive bars or strips 55 which extend longitudinally of the drum and parallel to the axis thereof, said bars being equi-spaced circumferentially of the drum. While the drum may be provided with any suitable number of these equi-spaced conducting bars 55, I have shown the same as provided with five such bars. Reference characters 56, 57 and 58 represent stationary contact arms disposed within the housing of the switch device and extending at right angles to the axis of the commutator drum 50. The forward end portions of these contact arms are disposed within the front section 46 of the housing adjacent the bottom thereof and beneath the commutator drum, such arms being bent so that the rear portions thereof will be adjacent the top wall of the rear section 48 of the housing. An insulating member 59 extends across the rear section 48 of the housing and is secured against 80

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the underside of the top of said rear section by screws 60, and the contact arms 56, 57 and 58 are fixed in spaced relation to said member 59 by screws 60'. Two contacts 61 and 62 are mounted on contact arm 56 in spaced relation so as to engage the commutator drum 50 adjacent the left hand end thereof at diametrically opposed points; and similar contact arms 63 and 64 are respectively mounted on the forward end portion of the contact arm 57 and a lateral extension 58' of the contact arm 58 to likewise engage the commutator drum 50 at diametrically opposed points adjacent the right hand end of the drum (Fig. 2). Each of the contacts 61, 62, 63 and 64 is in the form of a flat, substantially rectangular member made of suitable conductive material, such as copper, and has a reduced lower end portion 65 loosely disposed within an opening 66 provided therefor in the contact arm on which it is mounted, whereby the contact is adapted for pivotal movement about its lower reduced end toward and from the commutator drum. Each of said contacts is yieldingly and forcefully held in wiping engagement with the commutator drum 50 by means of a tension spring 67 having its end respectively connected to the contact and the respective contact arm. Conductors 70, 71 and 72 are respectively suitably secured to the rear ends of the contact arms 56, 57 and 58 and extend from the housing H thru a suitable outlet (not shown) provided in the rear side of the housing, said conductors being preferably disposed exteriorly of the casing within a suitable cable (not shown).

The commutator drum 50 is adapted to be turned about its axis by a pawl and ratchet mechanism the operation of which is controlled by a large flat vane or flap 75 pivotally mounted adjacent its rear edge on a horizontal rod 76 supported in spaced rectangular lugs 77, 78 and 79, extending upwardly from the top of the front section 46 of the housing H adjacent the rear edge of said section. The rod 76 is secured in fixed position by a set screw 76' and the vane or flap 75 is mounted on said rod by means of downwardly extending lugs formed at the ends of the vane and thru which the rod 76 extends, the lugs on the vane 75 coacting with the lugs 77 and 79 to prevent substantial longitudinal movement of the vane on the rod 76. Also pivotally mounted on the rod 76 between the lugs 77 and 78 and disposed beneath the vane 75 is a member 80 which, in transverse cross section, has the shape of an inverted U and which is moveable about its pivot toward and away from the axis of commutator drum 50 thru an opening provided in the top wall of the front section 46. A pawl 82 is pivotally mounted on the member 80 adjacent the forward end thereof by means of a pin 82' so as to be in cooperative relation with ratchet 83 secured to the inner end of the sleeve 54 which

is fixed to the sleeve 51 of the commutator drum. The ends of a coiled spring 84 which is mounted on the member 80, respectively coact with the upper end of the pawl 82 and with a pin 85 carried by the member 80 so that said spring yieldingly holds the lower end of said pawl 82 in coacting relation with the teeth of the ratchet 83. A coiled spring 86 disposed on the rod 76 and coacting at its ends with the member 80 and the top of the casing 46, tends to maintain said member 80 and thereby the flap or vane 75 in their uppermost or raised position, as is shown in Figure 3; the upward movement of the vane 75 and the member 80 under the influence of said spring 86 being limited by engagement of the rear edge of the vane with the top surfaces of the lugs 77, 78 and 79 rearwardly of the pivot rod 76.

It will be obvious that the strength of the spring 86 determines to a large extent the ease of operation of the switch device. If it is desired, as is the case in the preferred embodiment, to have the device operable with a very slight pressure on the vane 75, the strength of the spring 86 should be just sufficient to sustain the vane, when not otherwise acted upon, in its uppermost position.

The ratchet 83 is preferably provided with twice as many teeth as there are conductive bars 55 on the commutator drum 50, the arrangement being such that each time the vane or flap 75 is depressed the pawl 82 will advance the ratchet 83 the distance of one tooth and thereby move the commutator drum 50 about its axis a distance equal to half the distance between two adjacent conductors 55. The arrangement of the commutator drum 50 and the wiping contacts 61, 62, 63 and 64 coacting therewith is such that each time the commutator drum is moved one step by means of the pawl and ratchet mechanism, either the front pair of contacts 61 and 64 will be in engagement with one of the conductor bars 55 and the rear pair of contacts 62 and 63 will be in engagement with a non-conductive surface portion of the drum between two adjacent conductors or, vice versa, i. e. the rear contacts 62 and 63 will be in engagement with one of the conductors 55 and the front pair of contacts 61 and 64 will be in engagement with a non-conductive surface portion of the drum intermediate two adjacent conductors 55.

The pin 85 is secured to the member 80 in such a position that when the vane or flap 75 is depressed to the dotted-line position shown in Figure 3, said pin will engage between two adjacent teeth of the ratchet 83 and act to limit the forward movement of said ratchet and thereby the rotary movement of the commutator drum 50 to a distance corresponding to the distance between two adjacent teeth of the ratchet no matter how quickly the vane or flap is depressed.

Accordingly either one of the two pairs of contacts must at all times, except when the drum is in motion, be in engagement with one of contact bars 55 and the other pair of contacts must be in engagement with a non-conductive surface of the drum.

To guard against short-circuiting of the switch device, especially in case any of the elements within the housing H becomes loose or broken, the inner sides of the top, bottom, front and rear walls of the housing are lined with suitable insulation R and insulating partitions L are disposed within the front casing section 46 so as to prevent moving parts of the switch coming in contact with conductive parts of the casing.

Referring to Figure 6, it will be noted that the switch device is shown as controlling two circuits having the common conductor 70, and that because of the arrangement of the switch device, one of these circuits must be closed and the other must be open at all times except when the switch is being actuated. One of said circuits comprises conductor 70, conductor 56, contact wiper 62, a contact bar 55, contact wiper 63 and conductor 71, and with the drum in the position shown this circuit is closed. The other of said circuits, comprising conductor 70, contact wiper 61, a contact bar 55, contact wiper 64 and conductor 72 is open as the contact wipers 61 and 64 are now in engagement with a non-conductive surface of the drum. If the drum is then turned a distance represented by one tooth of the ratchet by depressing the vane 75, the first described circuit will be opened and the other circuit will be closed, for the contact wipers 62 and 63 will then engage a non-conducting surface portion of the drum between two adjacent bars 55 and the contact wipers 61 and 64 will be in engagement with one of the contact bars 55.

As various changes may be made in the shape, form and arrangement of parts described in the foregoing embodiment, it is to be understood that all matter herein contained is to be considered as illustrative and not in a limiting sense.

Having thus described by invention, what I claim and desire to secure by Letters Patent, is as follows:

1. In a switch device comprising a member mounted for rotary movement, and means for turning said member about its axis comprising a ratchet secured to said member and a movably mounted member having a pawl cooperating with said ratchet, said movably mounted member having means which when such member is moved to cause the pawl to turn the ratchet acts to limit the turning movement of the latter, substantially as described.

2. In a switch device, a rotatably mounted commutator drum having a ratchet secured

thereto, a member pivotally mounted for movement towards and from said ratchet and carrying a pawl for cooperating with the ratchet to turn the latter and said drum, said member being provided with means which when the member is moved in one direction engages between adjacent teeth of the ratchet to thereby limit the forward movement of the latter under the action of said pawl, substantially as described.

3. In a switch device, a rotatable commutator drum, means for imparting step-by-step rotary movements to said drum, a conductive member adjacent said drum, a contact pivotally mounted at one end on said conductive member, and resilient means connected with said contact and yieldingly holding the latter on its pivotal mounting and in wiping engagement with the surface of said drum, substantially as described.

4. In a switch device comprising a rotatable commutator drum, means for imparting step-by-step rotary movements to said drum, a plurality of conductive members adjacent said drum, contacts pivotally mounted at one end on said conductive members, and resilient means connected with each of said contacts and yieldingly holding the same on its pivotal mounting and in wiping engagement with the surface of said drum, the arrangement being such that upon any step or movement of the drum certain of said contacts will engage a conductive portion of the drum and certain of said contacts will engage a non-conductive portion of the drum and upon the next step or movement of the drum this relation of the engagement of the contacts with the drum will be reversed, substantially as described.

This specification signed this 26th day of September, 1929.

NELSON C. DURAND.

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