This invention relates to the class of circuit makers and breakers and pertains particularly to a two-circuit control switch.

The primary object of this invention is to provide, in a manner as hereinafter set forth, a two-circuit control switch of improved design and devised to bring about a quick disconnection or connection of certain switch blades and associate contact points.

The invention has for another of its objects the provision in a manner as hereinafter set forth, a two-circuit control switch of improved mechanism for causing a snapping action of the switch arm in making or breaking a circuit.

The invention contemplates the provision broadly, of a switch base having a revoluble shaft projecting upwardly therefrom and carrying a two point and three point contact arm, the three point arm being designed for the control of one or two circuits and the two point being designed for the control of one circuit with one, two, or three switches. The two point arm is provided with means so that the same will always be in contact with one side of a single circuit.

Other objects and advantages of the structure embodying this invention will become apparent as the description of the same proceeds and the invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawings, but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 shows the switch structure embodying this invention, in side elevation.

Figure 2 is a top plan view of the switch structure.

Figure 3 is a vertical transverse section of the switch.

Figure 4 is a vertical transverse section of the switch taken at right angles through the section shown in Figure 3.

Figure 5 is a transverse section taken upon the line 5—5 of Figure 4.

Figure 6 is a section taken upon the line 6—6 of Figure 4.

Figure 7 is a section taken upon the line 7—7 of Figure 4.

Figure 8 is a detailed perspective view of a shiftable member in the switch structure.

Figure 9 is a section taken upon the line 9—9 of Figure 4.

Figure 10 is a detailed plan view of a ratchet member of the switch.

Figure 11 is a vertical transverse section through the operating knob of the switch.

Figure 12 is a horizontal transverse section through the switch operating knob.

Figure 13 shows a diagram of a single circuit in which the switch is adapted to be employed.

Figure 14 is a diagram of a single circuit in which a pair of the switches may be used conjunctively.

Figure 15 is a diagram of a double circuit having one switch control, and

Figure 16 is a diagram showing the use of three switches in conjunction with a plurality of circuits.

Referring now to the drawings in detail wherein like numerals of reference indicate corresponding parts throughout the several views, the numeral 1 indicates the switch base which is formed of insulation material such as porcelain or the like, and formed centrally in the base is a well 2. The top of the base is formed to set up the peripheral ledge 3, which is adapted to receive the lower edge of the cover cap 4, of the usual design. The top of the cap 4 is provided with a pair of windows 5 and 6 for viewing an indicator disc hereinafter described.

Extending to the bottom of the wall 2 centrally of the base 1, is a sleeve 7 which carries thereon the squared plate 8 which is embedded in the base structure and serves to prevent the sleeve 7 from rotating. A securing nut 9 is threaded upon the lower end of the sleeve and bears against the under side of the base to maintain the sleeve in fixed position. Fixed to the upper end of the sleeve 7 is a ratchet plate 10 which is provided with the peripheral notches 11 and is so formed that one wall of each notch extends outwardly at a greater distance than the opposed wall thus setting up the projecting teeth 12, the outer edge of the connecting portions between the notches being curved as indicated at 13.

Mounted in the sleeve 7 is a shaft 14 which is of sufficient length to project upwardly through the central portion of the top of the
cover 4 when the cover is in position, as shown in Figures 3 and 4. This shaft which operates the contact arms of the switch structure revolves in the sleeve 7 and passes through the apertures 15 formed in the top of the cover 4 as is clearly shown.

Mounted upon the top of the base 1 about the edge of the well 2, are four equidistantly spaced terminals 16, 17, 18, and 19, the terminals 18 and 19 being electrically connected through the shunt strip 20. Each of the terminals 16, 17 and 18 embodies an upstanding portion 21 carrying a wire clamp screw 22 and projecting outwardly from the lower end of each of these upstanding portions is a relatively short tongue 23 carrying a head 24 at the outer end thereof. The terminal 19 does not have the upstanding portion or the wire clamp screw referred to as the current is transferred to this terminal through the shunt 20 from the contact 18, but there is provided in connection with this terminal 19 a tongue 25 carrying a head 26 at the outer end which overhangs the well as do the heads 24 of the other contacts. The contact edges 24 and 26 are all arranged in the same plane so that a revolving contact arm can connect with these heads in the manner to be hereinafter described. The base 1 is provided with suitable apertures 27 adjacent the contacts 16, 17 and 18 for the passage of electrical conductors for engagement with the contacts.

Mounted upon the top of the base 1 between the contacts 16 and 17, 17 and 19 and 16 and 18 are other contact members 28, 29 and 30 each of which comprises an upstanding portion 31 of materially greater height than the upstanding portions 21 of the first mentioned contacts and projecting outwardly from the upper ends of each of these upstanding portions 31 to overhang the well 2, are tongue members 32 each having a contact head 33 at the free end thereof. Each of the upstanding portions 31 of the contacts 28, 29 and 30, has a wire binding screw 34 attached thereto and formed from the base adjacent each of these contacts is a wire passage 35.

Surrounding the shaft 14 and resting upon the top of the ratchet wheel 10, is a washer of insulation 36, and surrounding the shaft 14 and resting upon the washer 36 is a switch arm operating and trip mechanism indicated generally by the numeral 37.

The switch arm trip mechanism 37 comprises a relatively thick block of insulation 38 having the under face thereof provided with the relatively broad channel 39 which channel opens at its end through opposite ends of the block as is clearly shown in Figure 5. The block 38 further has formed therein in the inner wall or what might be termed the bottom, of the channel 39, the grooves 40, which as is clearly shown in Figure 6 extends at an angle across the bottom and throughout the length of the channel. A passage is formed through the blocks 38 at each side of and intermediate the ends of the channel, as indicated by the numerals 41, the utility of which will be made apparent as the description proceeds.

Positioned in the channel 39 of the block 38 is a sliding plate 42 which has formed therethrough a quarter circular opening 43, the shaft 14 normally passing through this opening in the angle formed between the right angularly related sides thereof as is clearly shown in Figure 5.

Within the groove 40 of the block 38 is a tension spring 44, one end of which is secured to the block 38, while the other end is secured to the far end of the sliding plate 42.

Secured to the shaft 14 within the opening 43 of the sliding plate is a cam finger 45 which is in length slightly less than the radius of the opening and is designed to have the straight side edges thereof bear against the straight sides of the opening in which it is arranged, under certain conditions.

Secured to the shaft 14 above the contact arm operating mechanism 37 is a relatively short arm member 46 to which is attached adjacent the free outer end, one end of a spring 47 the other end of which spring is secured to one side of the block 38. The finger 45 and arm 46 are angularly related, as shown in Figures 5 and 6.

Extending through the apertures 41 of the block 38 are the pin members 48 each of which has each end projecting a substantial distance beyond one face of the body, as is clearly shown in Figure 3. Surrounding the extended ends of the pins 48 are insulation sleeves 49 and engaged over each of the sleeves 49 which is arranged at the under side of the block body 38 is an extended portion 50 of the two arm contact generally indicated by the numeral 51. The central portion of this contact member 51 is cut away for the passage therethrough of the sleeve 7, the member 51 being entirely supported upon the lower ends of the pin members 48.

The lower ends of these pin members may be swaged over to hold the insulation sleeves 49 and members 51 in position thereon. The contact member is formed in two complementary sections each comprising the laterally projecting portion 50 above referred to and the oppositely directed arms 52 each of which terminates in a head portion 53, which heads 53 are sprung apart as is clearly shown in Figure 4 to enable the same to engage on either side of any one of the contact heads 24 or 26.

Overlying the structure 38 is a three arm structure indicated by the numeral 54, this structure comprising a substantially square hollow frame 55 from each of three corners of which the arms 56 extend, each of which arms
terminate in a head 57. The frame 55 and arms 56 are formed of two complementary sections thus forming the heads 57 in two parts which are spaced for engagement on either side of the contact member heads 33. Opposite sides of the frame 55 are provided with sleeves 58 for the passage therethrough of the insulation sleeves 49 which are arranged upon the upper ends of the pins 48, and upon the pins 48 over the structure 54 additional sleeves 59 are placed upon which rests an indicator disc 60, the upper face of which is provided with certain indications adapted to be seen through a window 5 or 6 in the top of the cover casing 4, to indicate the various positions of the switch arms.

The under face of the sliding plates 42 is provided with a lug 61 which normally engages in one of the notches 11 of the ratchet member 10, as shown in Figures 4 and 5.

Upon the upper end of the shaft 14 is the switch operating knob 62 which is provided with the oval passage 63, in the outer end of which passage a shell 64 is secured, which shell projects beyond the end of the opening as shown in Figure 11. The upper end of the shaft 14 is reduced as indicated at 65 which reduced portion is threaded to receive thereon the sleeve 66 which carries at its upper end the oval head 67 which fits snugly in the passage 63. A spring 68 is interposed between the under side of the head 67 and the lower turned portion of the shell 64, and as will be readily seen from this the sleeve 66 is threaded upon the reduced portion 65 of the shaft 14, the spring 68 will operate to maintain the end of the shell 64 in firm contact with the top of the casing 4.

In the diagram shown in Figure 13, the switch is shown as employed in a single circuit, which circuit is controlled by the two arm contact connecting structure 51, while in Figure 14 a two switch two circuit diagram is shown in which the two arm contact connecting structure 51 is also employed to control the same series of lamps or other electrical devices from two points. In this connection it will be seen that each of the arms 52 is always in contact or positioned to complete a circuit through the medium of the shunt plate 20.

The diagram shown in Figure 15 shows the manner in which the three arm structure 54 may be employed for controlling two circuits in such a manner that one may be operated independently of the other or both may be operated simultaneously as desired.

Figure 16 shows the manner, in diagram, in which the two arm structures 51 may be employed to operate in a system employing a plurality of switches so that electrical fixtures may be operated from various points.

From the foregoing description it will be readily seen upon turning the knob 62, the cam arm or finger 45 will be forced against one side wall of the slot 43 to force the plate 49 outwardly in its channel in the block 38, placing the spring 44 under tension and at the same time moving the lug 41 of the fixed ratchet member 10. When the lug has moved outwardly a sufficient distance to clear the adjacent tool 12, the action of the spring 44 will be such as to cause the lug to slide around on the curved surface of the adjacent portion 13 and such turning of the plate 42 will simultaneously force the block 38 to turn about the shaft 14 and consequently revolve the contact connecting arm structures 51 and 54. The spring 47 acting upon the shaft 14 will assist in returning the shaft and the cam 45 to its normal position, as shown in Figure 5.

Having thus described my invention, what I claim is:

1. In a switch structure of the character described, a base, an annular series of contact points secured to said base, a rotatable control shaft mounted in said base concentrically with said annular series of contacts, means to provide a series of stops around said post, a block member carried by and freely rotatable about said post, switch arms carried by said block for setting up connection between certain of said contacts, a shiftable member arranged to slide across the under side of said block, cam means carried by said post and engaging said shiftable member, an engaging finger carried by said shiftable member normally engaging one of said stops, and a spring member connecting said shiftable member with said block, designed to be placed under tension when the shiftable member is shifted, substantially as and for the purpose described.

2. In a switch structure of the character described, a base, an annular series of contact points secured to said base, a rotatable control shaft mounted in said base concentrically with said annular series of contacts, means to provide a series of stops around said post, a block member carried by and freely rotatable about said post, switch arms carried by said block for setting up connection between certain of said contacts, a shiftable member arranged to slide across the under side of said block, cam means carried by said post and engaging said shiftable member, an engaging finger carried by said shiftable member normally engaging one of said stops, and a spring member connecting said shiftable member with said block, designed to be placed under tension when the shiftable member is shifted, said spring member being arranged between said block and the shiftable member at an angle with respect to the line of movement of the shiftable member.

3. In a snap switch structure of the character described, a rotatable shaft, a series of contacts arranged annularly and in the same.
plane about said shaft, a second series of contacts arranged in the same plane and annularly about said shaft below the first mentioned series, a block member carried by and freely rotatable about said shaft, two sets of switch arms arranged one above and the other below said block and carried thereby, each designed for selective engagement with an adjacent series of contacts, a shiftable member designed to slide across one face of said block, a cam element carried by the shaft and engaging said member, means to provide a series of fixed stops about said shaft adjacent said shiftable member, means carried by the shiftable member for progressive engagement with said stops, and a spring member connecting said shiftable member with said block and designed to be placed under tension when the shiftable member is moved by said cam, substantially as described.

In testimony whereof I affix my signature.

WILLIAM G. GROVER.