

June 11, 1968

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3,388,228

MOMENTARY TYPE PUSHBUTTON SWITCH WHEREIN THE CIRCUIT
IS AUTOMATICALLY MADE AND BROKEN IRRESPECTIVE
OF THE MANUALLY OPERABLE MEMBER

Filed Nov. 2, 1966

2 Sheets-Sheet 1

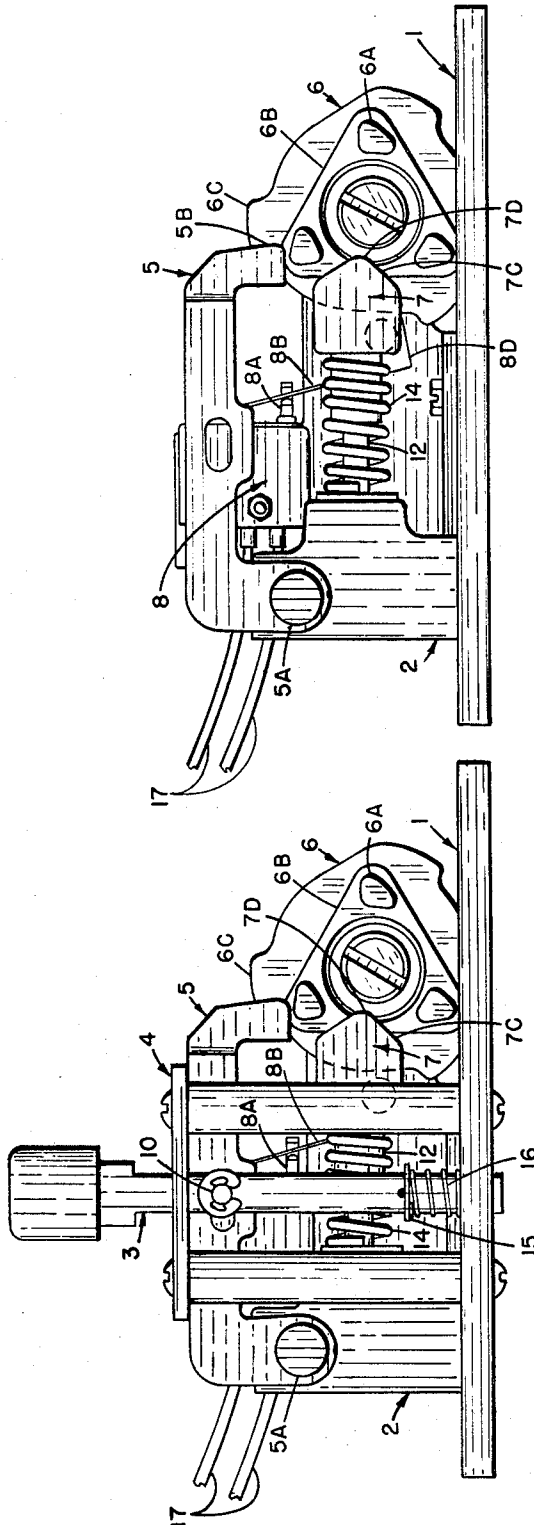


FIG - 2

FIG - 1

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2 Sheets-Sheet 2

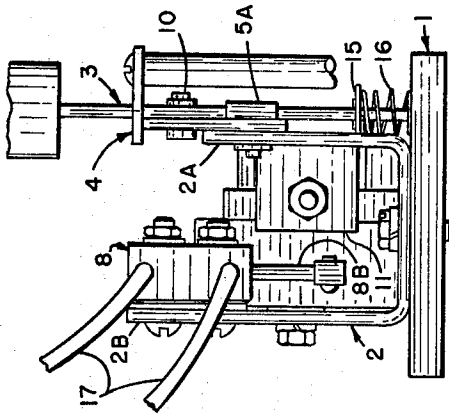


FIG - 4

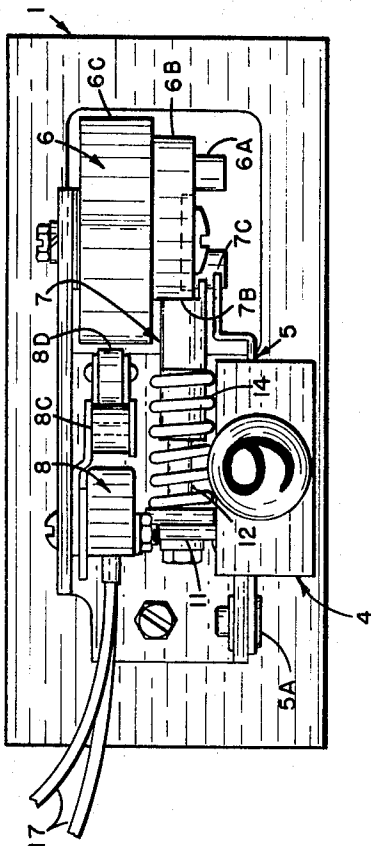


FIG - 3

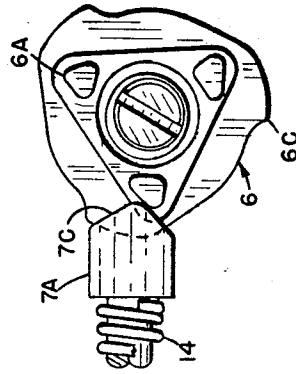


FIG - 5C

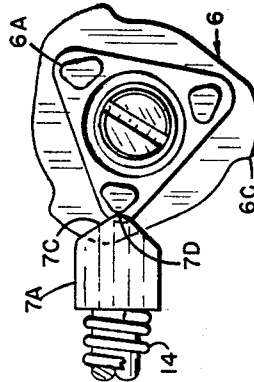


FIG - 5B

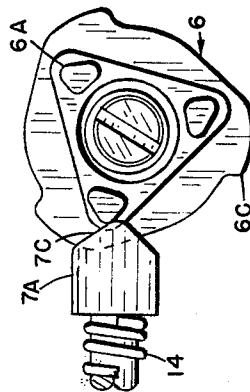


FIG - 5A

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MOMENTARY TYPE PUSHBUTTON SWITCH WHEREIN THE CIRCUIT IS AUTOMATICALLY MADE AND BROKEN IRRESPECTIVE OF THE MANUALLY OPERABLE MEMBER

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9 Claims. (Cl. 200-160)

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a manually operated pulse switch, having switch contact means supported for closing and opening. A member is operatively associated with the switch contacts and provided with a camming surface for closing and opening the same and manually operable force applying means is positioned for engagement with and for moving the switch closing member. An energy storing spring mechanism is associated with said member and adapted to be energized by said member upon depression of said force applying means. The energy stored in said spring mechanism is released upon movement of said member to one position to automatically move said camming surface past said switch contact means to sequentially close and open said switch contacts, whereby the length of time that the switch contacts are closed is controlled automatically, and not manually, so as to insure a constant duration of switch closing time for each operation of said switch.

This invention relates to improvements in switch actuating devices, and more particularly to a push button type of manually operated pulse switch which will provide automatic control during the making and breaking of the switch circuit.

A more particular object is to provide a push button switch actuator wherein the switch automatically breaks its circuit, after momentarily closing the same, whether the push button is released immediately or whether the push button is held down indefinitely.

A further object of the present invention is to provide an improved push button switch which is relatively simple in design and construction, which is durable, and which is well adapted for use in connection with various types of devices.

These and other objects will become more apparent from reading of the following specification and appended claims taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a vertical plane view of one side of the switch device;

FIG. 2 is a view similar to FIG. 1 with the keystone and guides removed for purpose of clarity;

FIG. 3 is a top plane view of FIG. 1;

FIG. 4 is an end view as seen from the left of FIG. 1; and

FIGS. 5A, 5B, and 5C are fragmentary views of the switch showing the switching cam in the different adjusted positions.

Referring now to the drawings, the switch element will be described with reference to a supporting base 1, U-shaped support bracket 2, manually operable force applying arm 5, switch cam member 6, energy storing spring mechanism 7, switch 8 and circuit 17.

Referring now particularly to FIGS. 2, 3, and 4, the switch mechanism is supported on the base 1 by means of a U-shaped supporting bracket 2 (FIG. 4). The U-shaped supporting bracket has two legs 2A and 2B, with leg 2A supporting arm 5 (FIG. 2) and spring mechanism 7. Leg 2B supports the switch cam member 6 (FIG. 2) and switch 8 (FIG. 4). The force applying arm 5 (FIG. 2) is pivotally connected at 5A to the upper end of leg portion 2A and connected to keystone 3 (FIG. 4) by a pin 10. Leg portion 2A has an intumed ear 11 (FIGS. 3 and 4) which has supported thereon a detent anvil guide 12 (FIGS. 2 and 3). Supported on detent anvil guide 12 is a detent anvil 7A (FIG. 2) which includes a detent surface 7B (FIG. 3) and a camming surface 7C (FIG. 2). Journaled by detent anvil 7A and between it and ear 11 (FIG. 3) is a compression spring 14 which urges the detent anvil from left to right as seen in FIGS. 2 and 3. The keystone 3 (FIG. 4) is supported in slots (not shown) on keystone guide means 4 and base for vertical input movement (FIG. 1). Journaled on the lower end of keystone 3 between base 1 and a stop element 15 (FIG. 4) is a compression spring 16 which continually urges the keystone upwardly to a non-operating position. Mounted on leg portion 2B (FIG. 4) for rotary movement, is a switch cam member 6 (FIG. 2) which includes a driving lobe 6A, a detent camming surface 6B, and a switch closing cam 6C. Also mounted on leg 2B is a switch 8 (FIG. 2) which includes a switch making plunger 8A having a lever 8B pivotally supported at 8C (FIG. 3) and operatively associated with plunger 8A for closing and opening the contacts (not shown) of switch 8. Mounted on the lower end of lever 8B is a roller 8D (FIG. 3) which is supported in a position to be moved by switch closing surface 6C (FIG. 2) upon rotation of the switch cam member 6. The force applying arm 5 (FIG. 1) and keystone 3 (FIG. 4) is supported in such a manner that upon depression of the keystone 3, arm 5 (FIG. 2) will contact driving lobe 6A to cause the switch cam member 6 to rotate counterclockwise. Referring to FIG. 2, the switch cam is held in a nonoperating position by the detent anvil 7A engaging any one of three detent cam surfaces 6B of the switch cam member 6. The detent anvil camming surface 7C is designed with a peak center portion 7D, to cooperate with driving lobe 6A to cause automatic rotation of the switch cam member 6 as hereinafter described.

The force applying arm 5 contacts the driving lobe 6A causing the switch cam member 6 to rotate in a counterclockwise direction. The driving lobe 6A contacts the detent anvil camming surface 7C thereby forcing the detent anvil 7A to move horizontally from right to left (FIG. 5A) along the detent anvil guide 12. This action causes the compression spring 14 to become more fully energized. After the driving lobe 6A has been rotated by arm 5 past the peak 7D (FIG. 5B) of the detent anvil camming surface 7C, the energized spring 14 forces the detent anvil 7A to slide from left to right and causing the switch cam member 6 to rotate automatically until the detent portion 7B (FIG. 3) of the detent anvil 7A cooperates with surface 6B of the detent cam member 6 causing a locking action, stopping further rotation. It should be noted that rotation of the switch cam member 6 is only 120° for each actuation. In the event that arm 5 does not return to its maximum up position, driving lobe 6A will contact surface 5B of arm 5 and prevent the detent action of surface 7B to occur as previously described. It also prevents arm 5 from recycling the switch cam member 6. The force applying arm 5 must be raised to its maximum up position before the driving lobe 6A is free to assume its correct recycling position.

The switch closing surface 6C of the switch cam member 6 is detailed relative to the driving lobe 6A and detent cam surface 6B so that in counterclockwise rotation of the switch cam member 6, the switch closing surface 6C will engage roller 8D on lever 8B only after the driving lobe 6A has passed the peak 7D of detent anvil cam-

ming surface. The detailed location of the detent camming surface 7C, the driving lobe 6A, the detent surface 7B, and switch closing cam is such that the movement of the switch plunger 8A is actuated after the driving lobe 6A has passed the peak 7D of the detent anvil camming surface 7C and released before the driving lobe 6A is stopped by the surface 5B of the arm 5.

Therefore, from the foregoing description, it can be seen that the switch is manually controlled by the operator for the beginning of the cycle. During this time electrical contact of the switch has not been made. Switch closure and opening is made only during the automatic portion of the cycle and not under the control of the operator. It must also be noted that the switch cannot be recycled until the operator has released the actuating key.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In an electric switch, having switch contact means supported for closing and opening, the combination of, a member provided with at least one switch closing cam surface operatively associated with said switch contact means for closing and opening the same, manually operable force applying means positioned for engagement with and for moving said member, energy storing spring mechanism operatively associated with said member, means on said member for energizing said energy storing spring mechanism in response to movement of said member by said force applying means, means for releasing said energized spring mechanism to automatically move said switch closing cam surface past said switch contact means to sequentially close and open said switch contacts in response to movement of said member by said force applying means to one position, whereby the length of time that the switch contacts are closed is controlled automatically, and not manually, so as to insure a constant duration of switch closing time for each operation of said switch.

2. In an electric switch as defined in claim 1 in which said member is mounted for movement in a single direction for sequentially closing and opening said switch contacts.

3. In an electric switch as defined in claim 2 in which said releasing means includes abutting cam surfaces on said member and said energy storing spring mechanism designed with peak center portions so that initial movement of said member by said force applying means will cause movement of said energy storing cam surface in one direction to energize said spring mechanism and continued movement of said member past said peak center portion by said force applying means will cause said energized spring mechanism to force said energy storing cam surface in an opposite direction to automatically continue movement of said member and said switch closing surface regardless of the position of the said force applying.

4. In an electric switch as defined in claim 3 in which said switch closing cam surface is positioned relative to said cam surfaces peak portion so that said switch closing surface sequentially closes and opens said switch contacts after said member peak portion has passed said energy storing cam peak portion.

5. In an electric switch as defined in claim 2 in which said member is mounted for rotary movement.

6. In an electric switch as defined in claim 5 in which said member is provided with a detent surface and said energy storing spring mechanism includes a detent anvil having a detent surface in engagement with said member detent surface.

7. In an electric switch as defined in claim 6 in which said member is provided with a driving lobe positioned for engagement by said force applying means and said energy storing cam surface.

8. In an electric switch as defined in claim 7 in which said member including, switch closing cam surface, detent surface and driving lobe are constructed as an integral element.

9. In an electric switch as defined in claim 8 in which said member has at least three switch closing cam surfaces, at least three detent surfaces and at least three driving lobes.

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