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A. G. KLING ET AL

2,586,056

MOMENTARY CONTACT SWITCH OF THE PUSH-BUTTON TYPE

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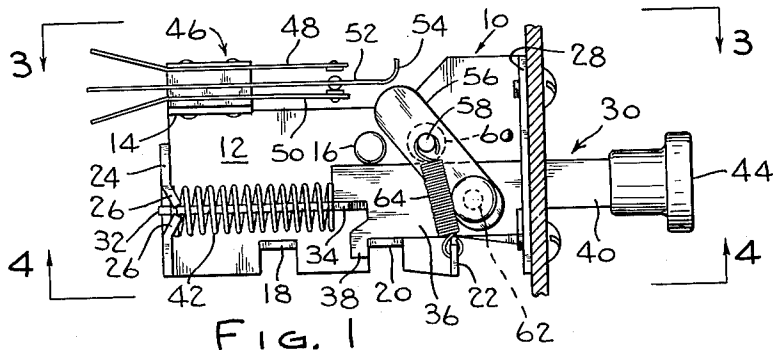


FIG. 1

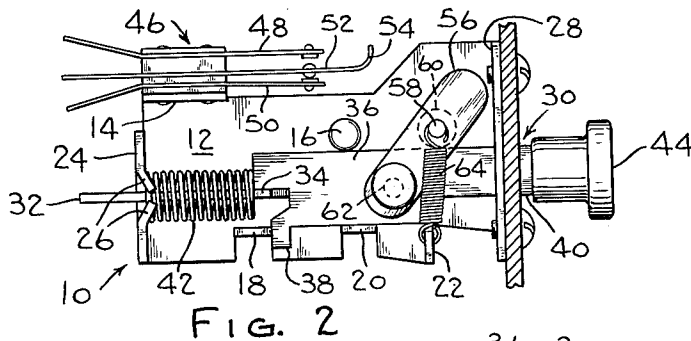


FIG. 2

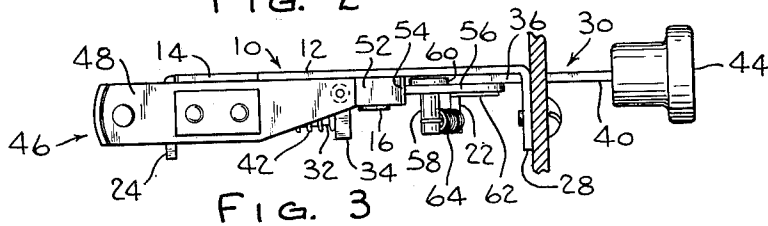


FIG. 3

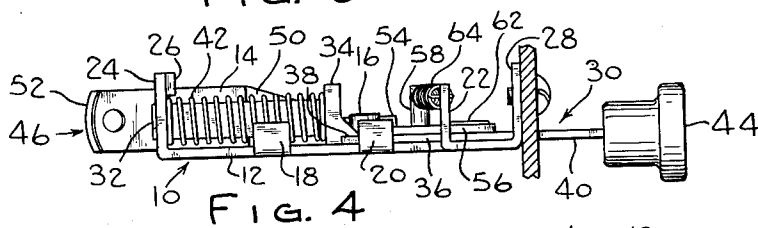


FIG. 4

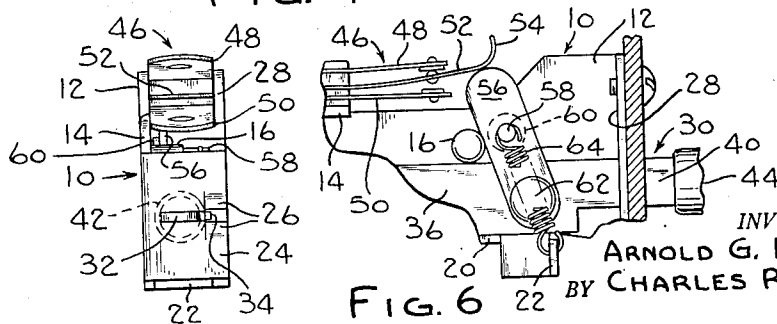


FIG. 5

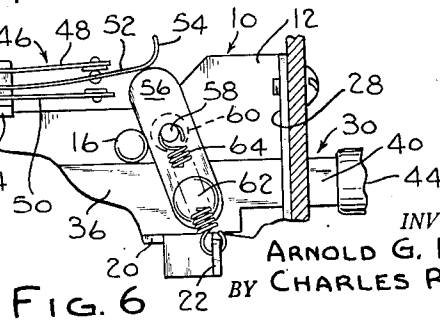


FIG. 6

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MOMENTARY CONTACT SWITCH OF THE
PUSH-BUTTON TYPE

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5 Claims. (Cl. 200—160)

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This invention relates to improvements in push button switches, particularly of the type in which a momentary contact is established and/or a contact is momentarily broken upon operation of the push button.

Certain types of communication systems and program selection systems utilize a large number of solenoid-operated switching devices energized from the same source of electrical power. The type of push button switch presently used for controlling the solenoids establishes and/or breaks contact at the extremities of the button travel. Hence the time during which there is a current drain for each solenoid is determined by the whim of the operator while holding the button in its inner extremity. Hence the probability of a large number of switches being simultaneously in current carrying position is great with consequent possible excessive drain on or overloading of the system.

It is an object of this invention, therefore, to provide a push button switch in which the duration of holding a normally closed contact open or a normally open contact closed is out of the control of the operator and is momentary.

This object is obtained by having the contacts made or broken at some point within the extremities of the travel of the push button. The return spring is made strong enough so that when an operator applies enough pressure to initiate movement of the push bar, such movement will automatically continue until the push bar reaches its inner extreme of travel. An over-center biased actuating member carried on the push bar momentarily actuates the spring contacts from normally closed to open and/or normally open to closed position as the push bar travels from its outer extreme position toward its inner extreme position and before reaching the latter position. Upon reverse travel of the push bar the actuating member remains inoperative until recoiled near the outer extreme position. Thus an operator reacting normally to these conditions will push the button all the way to its inner extremity with one stroke and this will automatically complete the switching operation. If some operators hold the button in inner position, it will have no effect on the duration of break or make of this switch as such events occurred and the contacts returned to normal before the button reached such inner extremity. Some operators after pushing the button to inner position often rapidly reciprocate it without letting it return to its outer position. This does not activate the contacts because the button must be

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returned to its fully outer or normal position before the actuating member is cocked. Thus rapid pulsing is avoided. These features of this push button switch make it highly desirable for use in the systems previously described and the probability of an undue number of solenoids simultaneously drawing current or overloading the line is minimized.

The novel features, which are considered characteristic of the invention, are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawing, in which:

Fig. 1 is a view in side elevation of a push button switch embodying the present invention, the parts being shown in the positions assumed when the push button is in normal or outer position;

Fig. 2 is a view similar to the view of Fig. 1 with the parts being shown in the positions assumed after the push button has been moved to its inner position;

Fig. 3 is a top plan view taken from line 3—3 of Fig. 1;

Fig. 4 is a bottom plan view taken on line 4—4 of Fig. 1;

Fig. 5 is a rear plan view of the push button switch shown in Fig. 1; and

Fig. 6 is an enlarged fragmentary view in plan elevation showing the actuation of the switch contacts as the push button is traveling from its normal or outer position toward and before reaching its inner position.

Referring to the drawing by reference numerals, the push button switch comprises a frame 10 which has a side wall 12, an inner wall 24, and a front wall 28. The side wall 12 is the support for a switch contact mounting 14, an actuating member engaging a stud 16, a pair of spaced travel limit tabs 18 and 20, and a spring anchor 22. The inner wall 24 is provided with an open end slot for guiding the push bar. Such slot has a pair of offset tabs 26 for holding the push bar in place, as hereinafter described. The front wall 28 has a slot for guiding the forward end of the push bar and further provides the means for securing the switch to a panel or the like.

The push bar, indicated generally at 30, has portions providing a spring guide 32, an actuating member carrier 36, and a guiding and button carrying shank 40. The spring guide 32

slides in the slot of inner wall 24 and a return compressing spring 42 encircling such guide reacts between a spring lug 34 and the inner face of the wall 24 to urge the push bar 30 to normal outer position. The guide 32 is held within such slot by the tabs 26 which overlie and engage the spring 42. A stop 38 projects from the central portion of the push bar 30 and slides between the tabs 18 and 20 to limit the inner and outer positions of the push bar. The shank 40 is slidably guided in a slot of front wall 28 and projects forwardly therefrom to form a mounting for a push button 44. The push bar 30 is assembled in the frame 10 before placing the button 44 thereon by: inserting the shank 40 through such front wall slot from the rear thereof until the push bar reaches its outer position; placing the spring 42 on the guide 32 compressing it until it clears the tabs 26; lowering the guide 32 into the rear wall slot; and releasing the spring 42 so that it slides under the tabs 26 and holds the guide 32 within the rear wall slot. However, before the push bar is so assembled, the contact-operating member hereinafter described is mounted thereon.

The contacts, indicated generally at 46, consist of an upper spring arm 48, a lower spring arm 50, and an intermediate spring arm 52. Both upper and lower arms have single contact points and the intermediate arm has a double contact point all of customary construction and mounted in alinement for making and breaking electrical circuits. The arms are mounted between insulating blocks in the customary manner and each arm has a terminal. The intermediate arm 52 has an end extending beyond the ends of the other arms and is provided with a curved tip 54 to procure a ready sliding engagement with the contact-operating member. In this embodiment the intermediate spring arm 52 is stiffer than either of the upper or lower arms and in its normal position it is biased into engagement with the lower spring arm 50 slightly downwardly deflecting such arm. When the intermediate arm 52 is raised, the contact between it and the lower arm 50 will not be broken for a small portion of the initial upward movement of the intermediate arm 52. Continued upward movement then breaks such contact and establishes contact between the intermediate arm 52 and the upper arm 48.

A contact actuating member or lever 56 made of insulating material is swingably mounted to the push bar 30 by a pivot 62 mounted in the carrier portion 36. Near the center of actuating member 56 there is a spring pin 58 having a head 60 which is large enough to engage the edge of carrier portion 36 to limit the operative position (Fig. 1) and inoperative position (Fig. 2) of such member. The pin 58 is held in place by the sliding engagement between its head 60 and the surface of side wall 12. The contact actuating member 56 is biased to either such operative or inoperative positions by a tension spring 64 acting between the pin 58 and the anchor 22. The over center action of spring 64 is brought about as the pivot 62 moves relative to the spring in either of its positions and passes through the center line of such spring.

When the actuating member 56 is in the operative position shown in Fig. 1 and pressure is applied to the push button 44 to move the push bar 30 toward and to its inner position, the member 56 will be engaged by the stud 16 and will be swung clockwise with respect to the push bar

as such bar moves inwardly. This causes the end of such member to rise and engage and lift the end of the intermediate contact arm 52. Initial upward movement does not break the contact between such intermediate arm and the lower spring arm 50. However, continued upward movement breaks such contact and causes said intermediate arm to make contact with the upper arm 48 as shown in Fig. 6. At such time pivot 62 is substantially at the center line of the spring 64. Continued inward movement of the push bar 30 causes such pivot to pass to the inner side of such center line and the member 56 will be quickly sprung to its inoperative position shown in Fig. 2 permitting contact between the intermediate arm and the upper arm to break and contact between the intermediate arm and the lower arm to be remade. The action thus far described occurs before the push bar 30 reaches its inner position. As the bar continues to move to its inner position, and while in such position, no further switching action takes place. When pressure on the push button 44 is relieved the return spring 42 will move the push bar toward its outward position carrying the member 56 with it. The end of such member abuts against the front wall 28 and such member is swung counter-clockwise with respect to the push bar as such bar moves outwardly. This causes the pivot 62 and the center line of spring 64 to approach each other and just before the outer position is reached the spring will cause the member 56 to be swung into its operative position shown in Fig. 1 without engaging the contact 52.

The tendency of most operators of a push button type of switch is to push the button into its extreme inner position and hold it there. This action is not harmful with the switch herein described. In fact a complete continuous inner movement to such inner position is insured by making the spring 42 strong enough so that in addition to the tension in spring 64 considerable pressure must be applied to initiate inward movement. After such movement has been initiated, however, the extra pressure applied to initiate such movement will insure continuation thereof until the inner position is reached. Because the contacts are broken, made, and remade, before the push button reaches its inner position, without any realization thereof on the part of the operator, the control of the length of time in which a circuit is broken or a circuit is made, or both, is not within the control of the operator. Another feature of the operation of this switch is that after the operating member 56 has been moved to its inoperative position, as shown in Fig. 2, reciprocal movement of the push button before permitting the push bar to return to normal position, will not have any effect on the switch contacts. In order to again make the actuating member effective, the push button must be released so that the push bar moves outwardly to its outer extreme.

Although only several embodiments of the invention are shown and described herein, it will be understood that this application is intended to cover such other changes or modifications as come within the spirit of the invention or scope of the following claims.

We claim:

1. A push button switch comprising a frame, a push bar slidably carried in said frame between normal and inner positions, a spring urging said bar to normal position, a spring contact normally

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biased to one of two operating positions, an operating member carried by said bar, spring means biasing said member into either side of over-center position, said member being engageable with said spring contact only during the intermediate portion of its travel over-center to momentarily operate said contact, and means for shifting said member over-center as said bar is moved toward inner position.

2. A push button switch comprising a frame, a push bar slidably carried in said frame between normal and inner positions, a spring urging said bar to normal position, a spring contact normally biased to one of two operating positions, an operating member carried by said bar, spring means biasing said member over-center into either of contact engaging or non-engaging positions, said member being engageable with said spring contact only during the intermediate portion of the over-center travel carried by the inward movement of said bar, means for shifting said member over-center from contact engaging position as said bar is moved toward inner position, and means for shifting said member over-center from contact non-engaging position as said bar moves outwardly to normal position.

3. A push button switch comprising a frame, a push bar slidably carried in said frame between normal and inner positions, a spring urging said bar to normal position, said spring being strong enough to require enough operating force to initiate movement of said bar to cause said bar to travel to said inner position before the operator can in normal use remove the operating force, a spring contact normally biased to one of two operating positions, an operating member carried by said bar, spring means biasing said member over-center into either of contact engaging or non-engaging positions, said member being engageable with said spring contact only during the intermediate portion of the over-center travel carried by the inward movement of said bar, and means for shifting said member from contact engaging position as said bar is moved toward inner position.

4. A push button switch comprising a frame, a push bar slidably carried in said frame between

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normal and inner positions, a spring urging said bar to normal position, said spring being strong enough to require enough operating force to initiate movement of said bar to cause said bar to travel to said inner position before the operator can in normal use remove the operating force, a spring contact normally biased to one of two operating positions, an operating member carried by said bar, spring means biasing said member over-center into either of contact engaging or non-engaging positions with snap action, said member being engageable with said spring contact only during the intermediate portion of the over-center travel carried by the inward movement of said bar, means for shifting said member over-center from contact engaging position as said bar is moved toward inner position, and means for shifting said member over-center from contact non-engaging position as said bar moves outwardly to normal position.

5. In a push button switch having a push bar normally biased to outer position and a pile-up leaf spring switch with a switch arm, means for momentarily changing the position of said switch during a part of the travel of said push bar intermediate its outer and inner positions comprising an over-center biased actuating lever carried by said bar, and spaced abutments fixed relative to said push bar to operate said lever over center as said push bar is moved between outer and inner positions, the end of said lever being positioned to engage and operate said switch arm only during a portion of that over-center travel of said lever caused by the inward movement of said bar.

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