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ELECTRIC SWITCH

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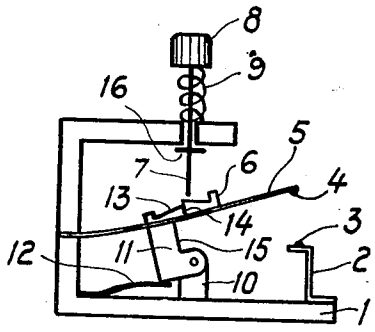


Fig. 1

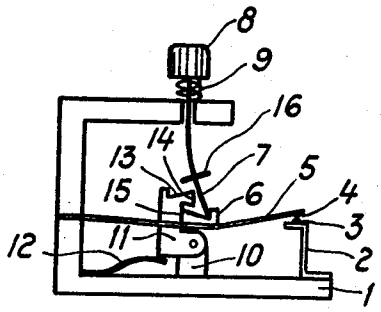


Fig. 2

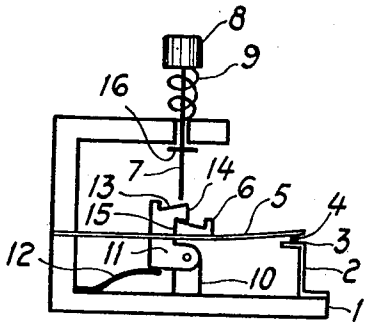


Fig. 3

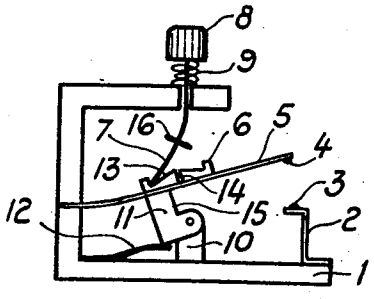


Fig. 4

INVENTOR
HELGE KARLSSON

BY Strauch, Nolan & Neale

ATTORNEYS

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ELECTRIC SWITCH

Helge Karlsson, Huddinge, Sweden, assignor to Svenska Reläfabriken A B, Stockholm, Sweden, a Swedish joint-stock company

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4 Claims. (Cl. 200—74)

The present invention relates to an electric switch of the pressure operated type and has for its object to provide a switch which is simpler and more reliable in operation than previously known switches of this type.

The switch according to the invention comprises a movable contact member carried by a resilient arm which also carries a butt member arranged to cooperate with a locking member. The butt member and the locking member are so arranged that when the resilient arm is in non-operated position, the butt member is situated in the path of travel of an operating member, and so that when the resilient arm is moved to operated position by the operating member acting upon the butt member, the locking member actuated by a directional force, e. g. a spring force, is moved into engagement with the butt member and thereby retains the resilient arm in operated position at the same time as the locking member is moved into the path of travel of the operating member, so that the latter when operated again after having been restored to its home position acts upon the locking member and moves the latter from engagement with the butt member whereby the resilient arm is released and returns to its non-operated position due to its elasticity.

The invention will be described more in particular in conjunction with the accompanying drawing in which Figures 1 to 4 show schematically a simple embodiment of the invention. The different figures show the switch in different positions.

In the figures numeral 1 designates the frame of the switch. The frame is made of insulating material. A supporting member 2 is attached to the bottom of the frame 1 and carries a stationary contact member 3. A movable contact member 4 mating with the stationary contact member 3 is attached to one end of a resilient arm 5 the other end of which is anchored in the frame 1. The resilient arm 5 also carries a butt member 6.

An operating member 7 in the form of a somewhat resilient leaf spring runs through an aperture in the frame 1. A push button 8 by means of which the leaf spring can be displaced in longitudinal direction is attached to that end of the leaf spring 7 which is situated outside the frame or envelope of the switch. Between the push button 8 and the frame 1 a coil spring 9 is provided which surrounds the leaf spring 7 and serves to restore the operating member to the home position when the push button 8 is no longer operated. A stop member 16 is attached to the leaf spring 7, and when the leaf spring 7 is in its initial position, this stop member abuts against the frame 1 thereby preventing the leaf spring from further upward displacement.

A post 10 is also attached to the bottom of frame 1, and a lever 11 is pivoted on the upper end of this post. A spring 12 is so arranged that it strives to turn the lever 11 clockwise about the pivot. At its free end the lever 11 is provided with a butt surface 13 and a hook-shaped extension 14.

Figure 1 shows the switch with the resilient arm 5 in its non-operated position. The upper concave V-shaped surface of the butt member 6 is then situated below the free end of the operating member 7, and the hook-shaped extension 14 of the lever 11 abuts by its outer side against the butt member 6 due to the action of spring 12.

Figure 2 shows the switch with the push button 8 pushed down. The operating member 7 has now by its free end pushed the butt member 6 and also the resilient arm 5 downwards so that the movable contact member has been brought into contact with the stationary contact member 3. Since the butt member 6 does not now abut against the outer side of the hook-shaped extension 14, the lever 11 is rotated due to the action of spring 12 so that the hook-shaped extension 14 extends over the upper surface of the butt member 6. However the lever 11 will be arrested by its surface 15 striking against the butt member 6.

When the push button 8 is released, the operating member 7 is restored to its initial position by the spring 9. The butt member 6 will then move upwards due to the elasticity of the arm 5. The switch then assumes the position shown in Figure 3. The hook-shaped extension 14 of lever 11 now catches the upper surface of the butt member 6 and thus retains the resilient arm 5 in its operated position. Furthermore the surface 13 on the lever 11 is now positioned below the free end of the operating member 7 and is thus located in the path of travel of the operating member 7 when the button 8 is again pushed down.

The latter case is illustrated in Figure 4. Here the push button 8 has been pushed down again whereby the free end of the operating member 7 has been pressed against the butt surface 13 on lever 11. The surface 13 is concave, and since the leaf spring 7 is flexible, its lower end will first glide along the surface 13 until it has reached the lowest part of the surface 13. This part of the surface 13 is so located in relation to the pivot of lever 11 and to the main extension of the leaf spring 7 that when the leaf spring 7 is further pressed against the surface 13, a turning moment will be exerted on the lever 11 which will then be turned (counter-clockwise in the embodiment shown) so that the hook-shaped member 14 is disengaged from the butt member 6. The arm 5 is then restored to its initial position by its own elasticity. Since the lower end of the leaf spring 7 is now flexed aside, the butt member 6 will not strike against the leaf spring 7 during the return movement of the arm 5. When the push button 8 is thereafter released, the switch is restored to the condition shown in Figure 1.

The locking member, i. e. the lever 11, is preferably arranged at the side of the resilient arm 5. In order that the locking member shall be capable of cooperating with the butt member 6 on the arm 5, the butt member 6 must extend a certain distance outside the resilient arm 5 at that side thereof at which the locking member is situated. However it is also possible to let the locking member 11 extend through a slot extending along the central line of the resilient arm 5, the butt member then being arranged symmetrically with respect to the central line of the resilient arm.

The upper surface of the butt member 6 and the surface 13 on the locking member 11 need not necessarily have the V-shape shown on the figures, but they should however be so formed that the leaf spring 7 when actuating the butt member 6 or the locking member 11 during its downward movement is flexed to one or the other side as appears from Figure 2 or Figure 4 respectively. Especially it should be noted that the surface 13 on the locking member 11 should be so formed that the force exerted by the leaf spring 7 on the locking member will have the correct direction, i. e. so that the locking member is

moved out of engagement with the butt member **6** and so that the upward movement of the butt member is not impeded by the leaf spring **7**.

When the leaf spring **7** is restored to its initial position from the position shown in Figure 2, it may happen that during part of the movement the lower end of the leaf spring **7** will be pressed against the extension **14** of the locking member **11** thereby exerting a turning moment on the locking member which moment acts in a direction opposite to that of the moment caused by the spring **12**. Therefore the spring **12** should be so arranged and dimensioned that the moment exerted by it on the locking member **11** is larger than the said moment caused by the leaf spring **7** so that the locking member **11** is not moved out of the locked position, when the leaf spring **7** is restored from the position shown in Figure 2.

The switch is of course provided with means for connecting it into a circuit. Since these means are not of interest in connection with the invention they have not been shown on the drawing.

The embodiment described above in conjunction with the drawing is given by way of example only and can be varied and modified in many ways within the scope of the invention. Thus the required directional force on the locking member can be produced in other ways than by means of the spring **12**, e. g. by giving the lever such a shape that it strives to rotate in the desired direction under the influence of gravity. However in the latter case the switch will work satisfactorily only when mounted in certain positions. Furthermore the locking member need not be pivoted on a post as in the shown embodiment but can also be attached to a spring which in turn is attached to the frame of the switch and exerts a pressure on the locking member in the desired direction.

The operating member **7** need not necessarily be operated by means of a push button but can be adapted to be operated by e. g. by the armature of a relay or the like.

What is claimed is:

1. An electric switch comprising: a fixed contact; a resilient arm carrying a movable contact thereon adapted to engage the fixed contact in operated position; a butt member on said resilient arm; a displaceable operating means for acting upon said butt member to move the resilient arm and the movable contact from non-operated to operated position; first spring means for restoring said operating member to its home position after it has been operated; a locking member; second spring means acting upon said locking member for moving it into engagement with said butt member when the resilient arm is moved into operated position, said locking member having a surface located in the path of travel of said operating means when the locking member is in engagement with said butt member, and said operating means being engageable with said surface to move said locking member out of engagement with said butt member.

2. An electric switch comprising: a fixed contact member; a resilient arm carrying a movable contact member thereon; a butt member attached to said resilient arm; a leaf spring which is longitudinally displaceable against the action of a restoring spring; a locking member coacting with said butt member to retain said resilient arm in operated position; said butt member having a concave surface facing one end of said leaf spring when said resilient arm is in non-operated position so that the leaf spring when displaced a first time acts upon said butt member to move the resilient arm into operated position; and said locking member having a concave surface facing said one end of the leaf spring when the locking member is in locking position so that the leaf spring when displaced a second time acts upon said locking member to move it out of locking position, thereby releasing the resilient arm.

3. An electrical switch comprising: a fixed contact; a resilient arm carrying a movable contact thereon; a butt member attached to said resilient arm; a leaf spring which is longitudinally displaceable against the action of a restoring spring; a lever pivoted at one end and having a hook-shaped extension at the other end; spring means acting upon said lever, said hook-shaped extension of the lever having an outer side abutting against said butt member when the resilient arm is in non-operated position and catching said butt member when the resilient arm is in operated position to retain the resilient arm in operated position; said butt member having a concave surface facing one end of said leaf spring so that the leaf spring when displaced a first time acts upon said butt member, thereby moving the resilient arm into operated position, and said lever having a concave surface facing said one end of said leaf spring when the lever is in a position in which said hook-shaped extension catches the butt member, so that the leaf spring when operated a second time acts upon said lever to move said hook-shaped extension away from said butt member, thereby releasing said resilient arm.

4. A switch comprising: a fixed contact; a resilient leaf spring contact arm having a movable contact thereon adapted to engage such fixed contact in operated position, said leaf spring being biased away from said fixed contact; a reciprocable resilient operating means normally spring urged away from said contact arm; butt means on said contact arm having a surface for cooperating with said operating means, said opearting means being engageable with said surface to displace said arm and cause the movable contact to engage the fixed contact; lock means normally urged towards said butt means and engaging the same when the contact arm is moved into operated position to retain said arm and movable contact in operated position, said lock means having a surface for cooperating with said operating means, said operating means being engageable with said surface to displace said lock means and disengage it from said butt means so that the contact arm is displaced from operated position thereby breaking the contacts.

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