

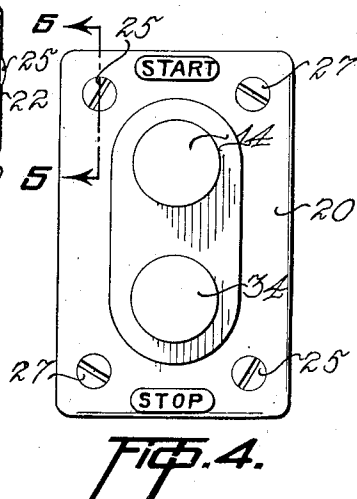
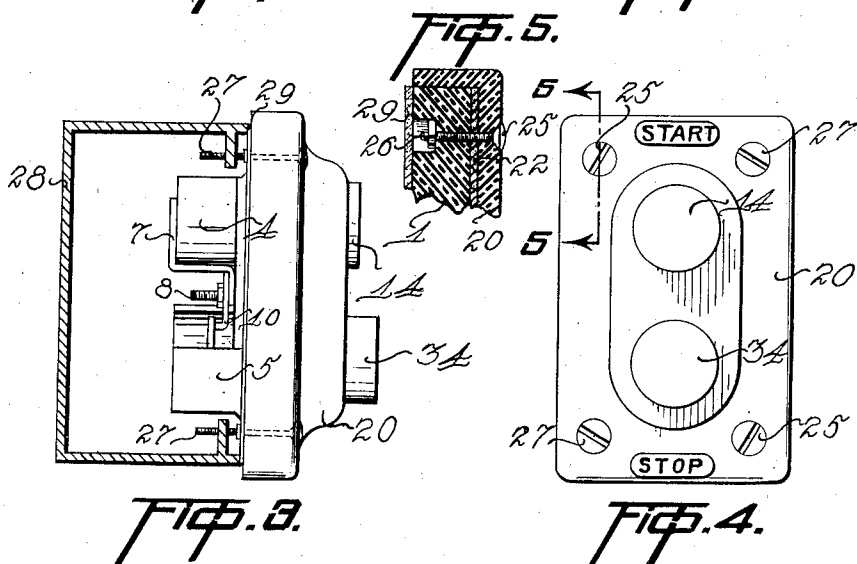
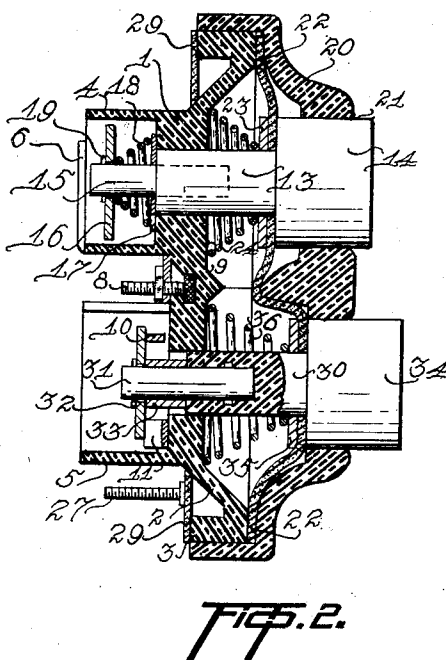
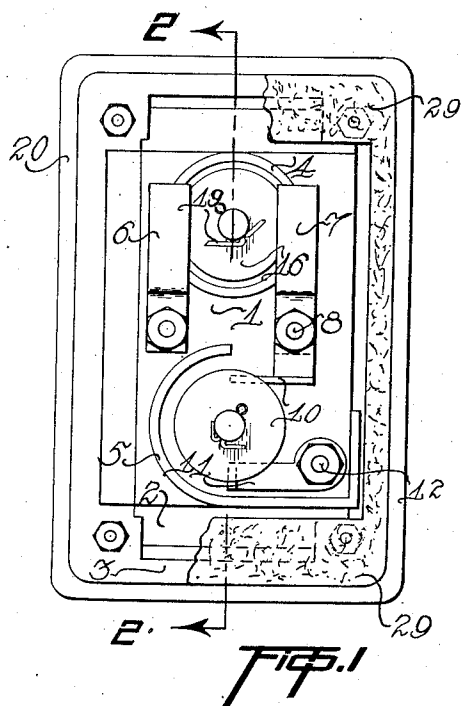
March 28, 1933.

M. G. REES

1,903,135

PUSH BUTTON ELECTRIC SWITCH

Filed Feb. 6, 1930



INVENTOR

Mackworth G. Rees

BY

Bentley & Bentley

ATTORNEYS

UNITED STATES PATENT OFFICE

MACKWORTH G. REES, OF DETROIT, MICHIGAN

PUSH BUTTON ELECTRIC SWITCH

Application filed February 6, 1930. Serial No. 426,283.

The present invention pertains to a novel switch of the push button type for controlling machinery or other electrical apparatus.

In the use of such switches for controlling machines in the industry, considerable trouble results from the entrance of particles of dust and dirt around the push button into the body of the switch where it interferes with the working parts. The principal object of the invention is to provide a switch which obviates this difficulty.

In the accomplishment of this object, the push button is snugly surrounded by a flexible gasket extending across the switch housing. The button is preferably formed with a head on the outward side of the gasket and surrounded by a spring which holds the gasket firmly against the head.

Another object of the invention is to insure proper engagement between the relatively movable contacts of the switch when contact is desired. The housing carries a pair of fixed contacts engageable by a movable contact mounted on the push button. The movable contact is in the nature of a disk loosely mounted on the push button and placed under tension towards the fixed contacts by means of a spring. The looseness permits and the spring tension compels shifting of the loose contact to the relative position necessary for perfect engagement with the fixed contacts, and by virtue of this construction the accurate setting or adjusting of the switch members in assembly is rendered unnecessary. Furthermore, the spring limits the pressure that may be applied to the fixed contacts, so that the latter cannot be bent by excessive pressure on the push button.

The invention is fully disclosed by way of example in the following description and in the accompanying drawing, in which—

Figure 1 is a bottom plan view of the device, with the lower gasket partly broken away;

Fig. 2 is a section on the line 2—2 of Figure 1;

Fig. 3 is a side elevation of the switch attached to a box or mounting which is illustrated in section;

Fig. 4 is a front elevation of the switch, corresponding to Figure 3; and

Fig. 5 is a section on the line 5—5 of Figure 4.

Reference to these views will now be made by use of like characters which are employed to designate corresponding parts throughout.

The device is built in a housing 1 of suitable insulating material which may be molded or otherwise formed as desired. The lateral wall 2 of the housing is inclined outwardly and formed with a flange 3 depending from its upper edge. At the bottom of the housing is formed an integral boss or well 4 adjacent which is a similar construction in the nature of a curved wall 5, for a purpose which will presently appear.

To the base or bottom of the housing 1 are attached two fixed contacts 6 and 7 which are bent in such a manner as to extend over the lower end of the boss 4 as clearly shown in Figures 1, 2 and 3. These members are held against the bottom of the housing 1 by means of binding posts 8, the heads 9 of which are molded in the bottom of the housing as shown in Figure 2. The member 7 has an extension 10 which enters the area enclosed by the curved wall 5 and there functions also as a contact for another switch unit as will presently appear. To the bottom of the housing is attached still another fixed contact member 11 by means of a binding post 12 and extending into the enclosure within the wall 5.

A push button 13 is slidably mounted in the housing 1, through the bottom thereof, and is equipped with a head 14 at its upper end. The lower end 15 of the push button is reduced and extends into the well 4 where it is loosely surrounded by a movable contact disk 16 adapted to engage the contacts 6 and 7. The shoulder formed between the body of the push button 13 and the reduced end 15 is engaged by a washer 17 surrounding the reduced end. The washer is in turn engaged by a conical coiled spring 18 surrounding the reduced end and bearing against one side of the contact 16 which is held at its other side by a cotter pin 19 passed through the reduced end 15.

The housing is completed by a cover 20 which fits over the flange 3 and is suitably apertured at 21 to receive the head 14. A flexible gasket 22 for shielding the switch mechanism from dust and dirt has its edge clamped between the housing proper and the cover and snugly fits around the push button directly beneath the head 14 as clearly shown in Figure 2. The push button is also surrounded by a washer 23 inwardly of the gasket and finally by another conical coiled spring 24 between the washer and the base 1 of the housing, whereby to press the washer and gasket against the head 14 and normally move the button 13 outwardly. The cover is secured to the housing proper by screws 25 and nuts 26 as shown more clearly in Figure 5. Longer screws 27 are also passed through the cover and housing for securing the switch structure to a box 28 as illustrated in Figure 3. In this connection the gasket 29 is applied to the bottom of the housing 1 around the walls 4 and 5 and positioned to seal against the outer edge of the box 28 as also shown in Figure 3.

Another push button 30 generally similar to that described is slidably mounted in the housing 1 and cover 22 for cooperation with the contacts 10 and 11. The reduced inner end 31 of this member may consist of metal suitably attached to the body portion of the button which is preferably of a molded insulating material. On the reduced end is loosely mounted a contact disk 32 adapted normally to bridge the contacts 10 and 11 as will presently appear. A spacer 33 is preferably fitted over the reduced end 31 between the disk and the molded body portion of the push button. The stem of the push button passes snugly through the gasket 22 directly beneath the button head 34 in the manner already described, and beneath the head is a washer 35 engaging the inner side of the gasket. A conical coil spring 36 surrounds the push button between the washer 35 and the base of the housing 1, thereby pressing the washer and gasket against the head 34 and holding the contact 32 in engagement with the fixed contacts 10 and 11 as illustrated.

The walls 4 and 5 serve as guards to prevent wiring within the box 28 from taking a position between the fixed and movable contacts where it would interfere with the engagement of the contacts.

The dual switch illustrated is intended for use in conjunction with a relay system, although either of the units may be used separately for the making and breaking of a circuit. In a relay system, however, the contacts 7 and 10 may be attached to a common conductor at their common binding post 8, while separate conductors may be attached to the remaining binding post 8 and the post 12. The contacts 6 and 7 are normally spaced from each other, since the spring 24 tends

to retract the push button 13 and the movable contact 16 from the contacts 6 and 7. The other movable contact 32 however is in engagement with the fixed contacts 10 and 11 as already stated.

As an illustration of the use of the switch, the contacts 6 and 7 may be comprised in a circuit controlling a relay for making and breaking the circuit containing the contacts 10 and 11, the latter circuit also controlling a motor or machine. On compression of the push button 13 to bridge the contacts 6 and 7, the first circuit is closed to operate the relay which closes the circuit of the contacts 10 and 11 of the machine. The button 13 may then be released to break the first circuit but without interfering with the second circuit. When it is desired to break the main circuit, the push button 30 is depressed to separate the contact 32 from the contacts 10 and 11. Accordingly, the exposed heads 14 and 34 of the push buttons are labeled "Start" and "Stop" respectively as shown in Figure 4.

Due to the loose mounting of the movable contacts 16 and 32 and the spring tension thereon in the direction towards the fixed contacts, the movable contacts will at all times bear firmly against the fixed contacts, thereby removing the necessity of accurate setting, fitting and aligning the various parts of the switch structure. This tension is applied to the disk 16 by the spring 18 and to the disk 32 by the spring 36. After engagement of the fixed contacts 6 and 7 by the adjacent movable contact 16, continued depression of the push button 13 results merely in a sliding movement of the button relatively to the contact 16 surrounding it, the latter contact being held against the adjacent fixed contacts by the spring 18. It will be evident that the spring mounting of the contact 16 prevents bending of the contacts 6 and 7 under excessive pressure on the push button 13.

The several springs are so formed as to flatten on compression, with the coils nested within each other. It is obvious that due to such construction, greater tension may be developed in a spring of given size than if the spring were merely cylindrical.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention, as indicated by the appended claims.

What I claim is:

1. In a switch, a housing having a bottom wall, a pair of fixed contacts carried by said housing beneath said wall, a headed push button having a sliding fit in said housing and wall, a movable contact carried by said button and adapted to engage said fixed con-

tacts, a gasket snugly surrounding said push button between said head and wall, a washer loosely surrounding said push button beneath said wall, a compressed spring surrounding said push button between said wall and gasket, another compressed spring surrounding said push button between said movable contact and washer, whereby said springs press said gasket and washer respectively against said head and wall.

2. In a switch, a housing having a bottom wall, a pair of fixed contacts carried by said housing beneath said wall, a head push button having a sliding fit in said housing and wall, a movable contact carried by said button and adapted to engage said fixed contacts, a gasket snugly surrounding said push button between said head and wall, a washer loosely surrounding said push button beneath said wall, a compressed conical coiled spring surrounding said push button between said wall and gasket, another compressed conical coiled spring surrounding said push button between said movable contact and washer, whereby said springs press said gasket and washer respectively against said head and wall, said springs being adapted to be compressed into a substantially flat condition.

In testimony whereof I affix my signature.

MACKWORTH G. REES.