May 24, 1927.

1,629,896

J. VALERIUS

PUSH BUTTON SWITCH

Filed June 11, 1925

Fig.1.

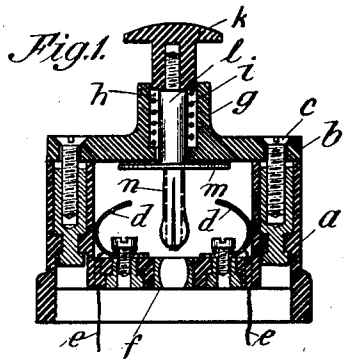


Fig.2.

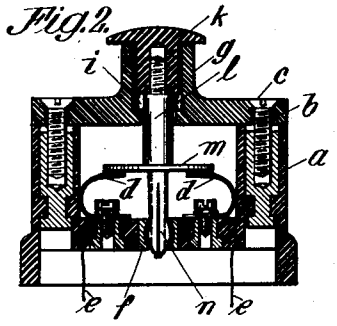


Fig.4.

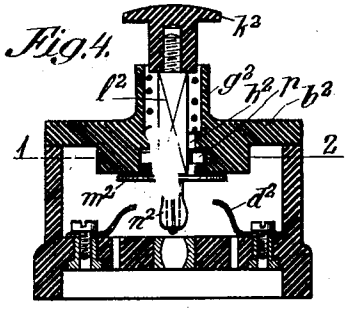


Fig.3.

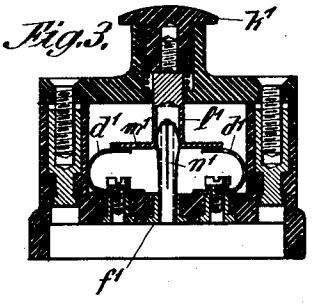


Fig.5.

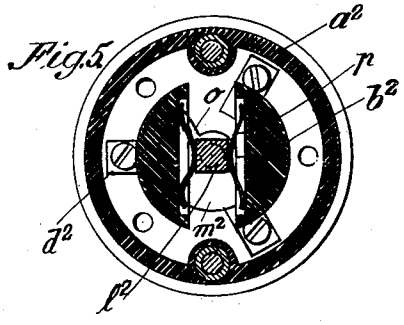
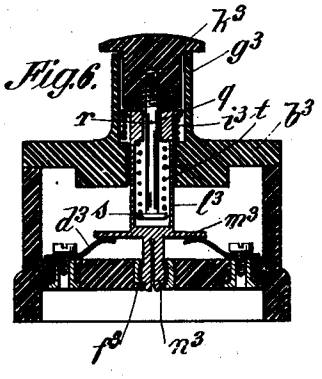


Fig.6.



Inventor:
Johann Valerius
per Theodor Klotz
Attorney.

Patented May 24, 1927. 1,629,896

UNITED STATES PATENT OFFICE.

JOHANN VALERIUS, OF BRESLAU, GERMANY.

PUSH-BUTTON SWITCH.

Application filed June 11, 1925. Serial No. 36,546.

My invention relates to a push button switch in which the circuit is closed by shoving the push button into the switch casing, and is interrupted by drawing the push button out of said casing. The gist of the invention resides therein that stationary clamping members are provided within the said casing, and that another clamping member is attached to the shank of the push-button; furthermore, there are stationary contact pieces provided within the casing, and a third contact-piece is attached to said shank, the arrangement being such that the movable clamping member is retained by and between the stationary ones when the push button has been depressed, the movable contact piece being then in contact with the stationary ones whereby the circuit is kept closed until the button is withdrawn.

A modification is devised in which the movable contact member is rotatory instead of axially movable, and both directions of motions may be combined with one another, especially in the case of series switches, as is all more fully described hereinafter.

My invention is illustrated diagrammatically and by way of example in the accompanying drawing in which Figure 1 is an axial section through a switch devised according to this invention; the switch being shown in that position in which the circuit is broken; Figure 2 is a similar illustration, the movable parts being, however, in that position in which the circuit is closed; Figure 3 shows a modification of the switch, the circuit being closed, as in Fig. 2; Figure 4 shows another modification, in which the shank of the switch can be turned, as well as shifted axially; Figure 5 is a horizontal section in the plane 1—2 of Fig. 4; and Figure 6 shows also a modification.

Referring first to Figs. 1 and 2, *a* denotes a box, *b* a cover therefor, and *c* screws for affixing said cover to said box. *d d* are elastic curved contact members affixed to the bottom of the box *a*, and *e e* are the conducting wires which are connected with said contacts. *f* is a stationary clamping member having a central bore, the circumferential wall of which is curved so as to be concave. This member is located between the screws securing the springs *d d* to the bottom of the box. Said member *f* is located centrally in this bottom.

The cover *b* is provided with a neck *g* having a bore *h* in which is located an axially shiftable bolt or shank *l*, to the upper end of which a push-button *k* is affixed. Also this push-button proper or head is provided with a neck, and this neck fits into the bore *h* of the neck *g* of the cover *b*. Within the box *a* the shank *l* is provided with a contact disk *m*, and below this disk the shank is rendered elastic in such a manner that it or, more precisely, its end can be retained in the bore of the bottom clamping member *f*; *n* denotes this part of the shank. When the button *k* is depressed, the somewhat enlarged or ball-shaped end of the part *n* enters into the member *f* and is retained therein elastically, and at the same time the disk *m* is in contact with the springs *d d* whereby the wires *e e* are conductively connected with each other. Besides, also at the same time a helical spring *i* located in the neck *g* of the cover *b* and encompassing the shank *l* is compressed, but this compressed spring is not strong enough to withdraw the clamping member *n* from the clamping member *f*. The object proper of the spring *i* is to keep the disk *m* off the contact springs *d d* when the clamping members *f* and *n* have been disconnected by drawing the neck of the button or head *k* out of the neck *g*.

The modification shown in Fig. 3 differs from Figs. 1 and 2 chiefly in the feature that the position of the clamping members (*f* and *n*, Figs. 1 and 2) is inversed, that is to say, the member *f* is dispensed with, and instead thereof a cavity or bore is provided in the lower end of the shank bearing the push-button, and instead of an axially shiftable clamping member *n* a stationary clamping member n^1 is secured to the bottom of the box, the enlarged free end of this member n^1 being intended to enter into the cavity or bore l^1 in order to retain the contacts in closed position.

There are, in the two constructional forms illustrated in Figs. 1–3, two springs *d*, or d^1 respectively. These switches are not series switches. In the case of series switches at least three contact springs are required and one thereof must remain out of contact when the switch is closed, there being always only two contact springs inserted into the circuit. A constructional form of this kind is shown in Figs. 4 and 5 in which the contact disk m^2 is provided with a recess *o* and can be turned in its plane and can be secured in any of its essential positions. The shank l^2 is square in cross-section and the cover

b^2 is provided with undulated springs p. There are two such springs arranged in opposite position, and they contact always with two of the four sides of the square shank so as to retain this latter in the position it just assumes. The size of the bore h^2 in the neck g^2 of the cover b^2 is such that the shank in question can freely turn therein. The shape of the undulated springs p, as well as of the recess o, is such that the disk o can be turned as desired without any risk of the disk being prevented from turning by said springs.

I wish it, however, to be understood that instead of the recess o a sector of an insulated material and of the same size and shape may be employed, in which case the disk may be turned in one or the other direction either before it has been depressed or thereafter.

In order to facilitate the use of the switch marks may be provided upon the knob k^2 and upon the neck g^2, the position of said marks being such that they permit to ascertain which of the circuits has been closed.

Fig. 6 shows a constructional form in which means are provided to throw the switch more quickly out of circuit in order to prevent the arising of an arc. The pressure contact is composed of a hollow shank l^3 which is firmly connected with the contact disk m^3 and the clamping member n^3 which co-operates with a counter-member f^3 in the same manner as has been described with respect to Figs. 1 and 2. The pressure is composed further of a pin q screwed into the knob k^3 and bearing at its lower end a small disk s upon which bears a helical spring t, the other end of which contacts with the top part of the shank l^3 in which there is a bore r for the passage of the pin q. Said top part has a flange below which is a helical spring i^3 bearing at its lower end upon an internal shoulder of the cover b^3. This spring is stronger than the spring t.

The spring t tends to move the pin q downwards and to press the knob k^3 against the top part of the shank l^3, but this shank is pressed upwards or outwards by the stronger spring i^3, the extent of this movement being such that the contact disk m^3 touches the bottom surface of the cover b^3. Fig. 6 shows the movable members of the switch in that position in which the circuit is closed. When the knob k^3 is pulled forward, first the weaker spring t is compressed so that the contact between the disk m^3 and the contact springs d^3 is not broken although the knob has nearly reached the end of its outward path. Only when the spring t has been compressed completely, the pull is transmitted to the shank l^3, and the spring i^3 can now fling the shank suddenly forward along the pin q, when the circuit will be broken at once and no arc will arise.

It is obvious that also this constructional form of the switch can be so devised as to be suitable for series connection. The pin q is then square in cross-section, and the cover is provided with undulated springs, as in Figs. 3 and 4. Furthermore, also the cavity within the shank l^3 is made rectangular in section, and the small disk is shaped correspondingly. When the knob k^3 is turned, the disk s is turning the shank l^3 and the disk m^3 is sliding upon the contact springs d^3, practically all as in Figs. 3 and 4.

I claim:

1. In a switch of the character described the combination of a closed switch casing, a pair of curved contact plates mounted in spaced relation on the bottom plate of said casing and insulated from each other, a spring-controlled push button movably mounted in the top plate of said closed casing, a contact plate on the lower end of said push button, a central female clamping member in the said bottom plate, an elastic male clamping member on the other contact element said clamping members being made to engage the one with the other when said push button is being depressed so that said contact plate is held in contact with said contact springs.

2. In a switch of the character described the combination of a closed switch casing, a bottom plate in said casing having a central clamping socket, a pair of curved contact springs mounted in spaced relation on said bottom plate and insulated from each other, a spring-controlled push button movably mounted in the top plate of said closed casing, a contact plate on the lower end of said push button, an elastic clamping element downwardly projecting from the center of said contact plate and designed to engage with said central clamping socket when said push button is being depressed so that said contact plate is held in contact with said contact springs until said push button is pulled out.

In testimony whereof I affix my signature.

JOHANN VALERIUS.