Aug. 12, 1930. F. F. BAHNSON 1,773,086

SAFETY CONTROL SWITCH

Filed Dec. 17, 1926

Fig. 1.

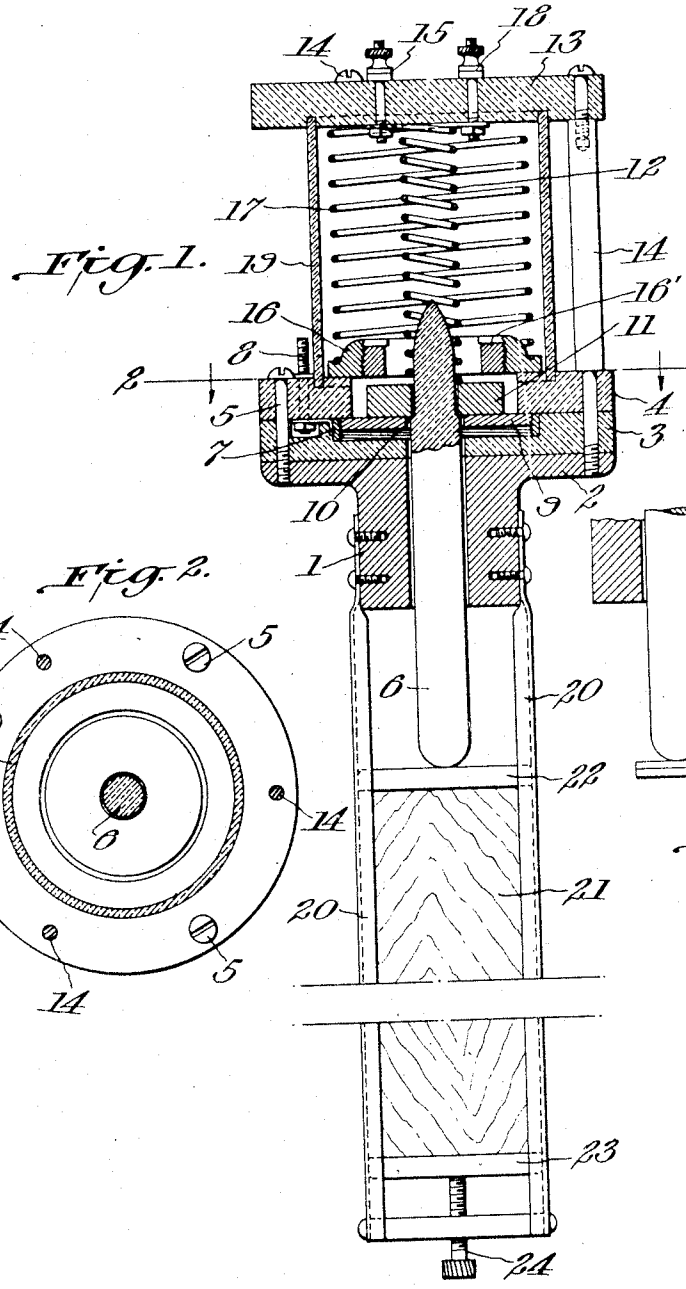

Fig. 2.

Fig. 4.

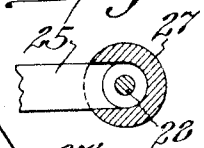

Fig. 3.

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UNITED STATES PATENT OFFICE

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SAFETY-CONTROL SWITCH

Application filed December 17, 1926. Serial No. 155,517.

This invention relates to electrical control switches and more particularly to that class of switches which is operated by hygroscopic elements, thermostats or the like, and which are used to operate controls for temperature, humidity etc.

An object of this invention is to provide a switch in which the frictional resistance opposing the operation of the switch is reduced to a minimum.

Another object is to provide a safety switch wherein the expansion and contraction of the actuating element cannot injure the switch or alter the adjustment thereof, even when such expansion and contraction go far beyond that normally occurring in such elements.

A further object is to provide a switch with simple and accurate adjustments for the contacts thereof.

A further object is to provide a switch for operation by a hygroscopic element or the like wherein an adjustable mounting for the hygroscopic element is provided on the switch casing.

These and other objects will be apparent from the following description taken in connection with the accompanying drawing wherein

Fig. 1 is a section of the complete switch.

Fig. 2 is a section of line 2—2 thereof.

Fig. 3 is a partial section of a modification.

Fig. 4 is a section on line 4—4 thereof.

Referring to the drawings, numeral 1 indicates a base for the switch mounting, preferably of metal, having an upper enlarged face plate 2. Upon the face plate 2 are bolted two insulating plates 3 and 4 by bolts 5. A plunger 6 extends through alined openings in the base 1 and plates 3, 4, the opening in base 1 being of such diameter that the base 1 serves as a guide for plunger 6, and the opening in the plate 3 being counterbored from its upper surface.

Seated in the opening in plate 3 is an internally threaded ring 7, which is electrically connected to a binding post 8. Threaded into the ring 7 is a disk contact 9, which is also perforated to allow plunger 6 to pass freely therethrough. A movable contact disk 11 is carried by a shoulder 10 on the plunger and is normally contained within the opening in plate 4. A coil spring 12 surrounds the plunger 6 and its lower end rests upon disk 11, the upper end of the spring being fixed in an insulating cover 13 carried from base 1 by bolts 14. A terminal 15 on cover 13 is electrically connected to the spring 12, and through the spring with the movable contact disk 11.

It is here noted that contact disk 11 fits loosely on the plunger 6, so that it may have a slight rocking motion thereon to adjust itself to the stationary contact 9. Contact disk 11 has been shown as metallic but it will be clear that this member could be of insulating material with suitable contacts thereon.

Resting upon the upper face of insulating plate 4 is an annular member 16 having a threaded passage therethrough which overlies the counterbored end of the axial passage in which plunger 6 moves. A contact disk 16′ is screw threaded into the outer ring 16 and may be vertically adjusted therein. The annulus 16 is of conducting material and has a shoulder upon which is seated a coil spring 17, enclosing coil spring 12, but spaced a material distance therefrom. This spring 17 holds annulus 16 yieldingly against plate 4 and presses at its other end against the cover 13, being connected to binding post 18 thereon.

Enclosing the springs 12 and 17 and contact 16 is a cylindrical insulating casing 19 clamped between plate 4 and cover 13.

Secured to the lower side of the base 1 are two guideways 20 for slidably receiving the hydroscopic element or the like, in this case shown as an expansible wooden block 21.

Sliding plates 22, 23, of metal or other hard material, are provided at the upper and lower ends respectively of the hygroscopic element 21 to prevent damage to the element by the plunger 6, and an adjusting screw 24 which is mounted in the base of the guideway.

It is believed that the operation of the device as thus described will be readily understood. Upon expansion of the member 21 the plunger 6 rises, carrying contact disk

11 with it, thereby breaking the normal contact between 11 and 9, and upon a continued predetermined rise of the plunger, making contact between 11 and 16'. Since both contacts 9 and 16' are adjustable in the line of movement of contact disk 11, it is apparent that various ranges of movement of the operating hygroscopic element or the like may occur before the circuits are made or broken. If the element continues to rise after contact disk 11 engages contact 16', no injury can result to the switch, as these two contacts simply move upward, the spring 17 allowing a wide range of movement. Since the straight line motion of plunger 6 reduces the friction to a minimum, the switch may be actuated by relatively small forces.

Also, if the element contracts or descends after disk 11 again rests on contact 9, no harm is done since the upper brass plate 24 merely separates from the plunger 6.

In the modification shown in Figs. 3 and 4, a bi-metallic element 25 operates the switch. This element contacts with the lower end of plunger 6 and is tightly clamped in an internally threaded carrier 26. This carrier is adjustably supported in a slotted frame 27 by means of a screw-threaded member 28 upon which the carrier 26 is threaded. By turning the knurled head of screw 28, the carrier 26 is raised or lowered to adjust element 25. The frame 27 is supported from the main casing by a rigid arm 27'.

It will be understood that the use of the terms "vertical" and "horizontal" throughout the specification and claims are not to be construed as limitations but are merely used for convenience of description. The safety control switch is equally capable of operation in other positions than that shown.

It is to be understood that the invention is not restricted to the embodiment herein shown and described, as the construction and arrangement of the various elements are subject to considerable modification without departing from the spirit of my invention. For example, the upper and lower contact disks may be carried directly by the plates 3 and 4 if the switch is to be used in control systems in which no adjustment of the switch is necessary. The initial adjustment of such a switch will be determined by the relative thickness of the movable contact disk 11 and plate 4. In control systems having a single circuit which is to be opened or closed by the switch, either the upper or lower contact disk will be unnecessary.

These and other modifications in the various parts, their relative shape, size and arrangement may be made without departing from the spirit of my invention as set forth in the following claims.

I claim:—

1. An electric circuit maker and breaker for operation by a hygroscopic element or the like comprising a stationary base, a plunger passing through a counter-bored passage in said base and adapted for reciprocating movement by the hygroscopic element, a contact disk carried by said plunger, said disk being of such thickness that it may be completely received by the counter-bored portion of said passage, and a contact carried by said base above said passage, for engagement by said contact disk upon upward movement of said plunger.

2. The structure as in claim 1 wherein the contact is yieldingly held against said base by a spring.

3. The structure as in claim 1 wherein a spring yieldingly opposes the upward movement of said plunger and disk.

4. The structure as in claim 1 wherein the disk is yieldingly held in the counter-bored portion of said passage by a coil spring and the contact is yieldingly held against the face of said base by a second coil spring enclosing the first spring.

5. The structure as in claim 1 wherein a cover is rigidly connected to said base, a coil spring presses against said cover and is connected to the said disk, a second coil spring encloses the first spring and presses against said cover and said contact, and a jacket is arranged between the base and cover to enclose said springs.

6. The structure as in claim 1, wherein said contact comprises two parts, the part engageable by said disk being vertically adjustable with respect to the part which engages said base.

7. The structure as in claim 1, wherein a stationary contact is carried by said base beneath said contact disk.

8. The structure as in claim 1 wherein a second contact is carried by said base beneath said disk, said second contact being vertically adjustable on said base.

9. An electric switch adapted for operation by a hygroscopic element, or the like, comprising a supporting base having a passage therethrough, a plunger carried by said base and guided for reciprocating movement by the walls of said passage, a contact disk on said plunger, a contact resting on said base for engagement by said disk, a spring urging said contact toward said disk, and means on said base supporting a hygroscopic element or the like for contacting engagement with said plunger to move the same to press said disk into engagement with said contact.

In testimony whereof I affix my signature.

FREDERIC F. BAHNSON.