Sept. 23, 1952 W. G. BOURNE 2,611,843

COMBINED MAGNETIC AND MANUAL SWITCH

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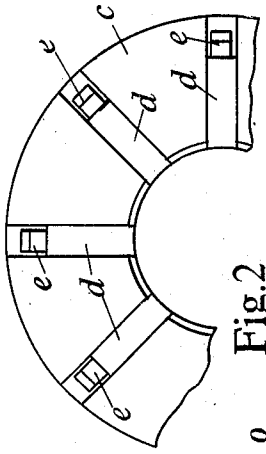


Fig.2

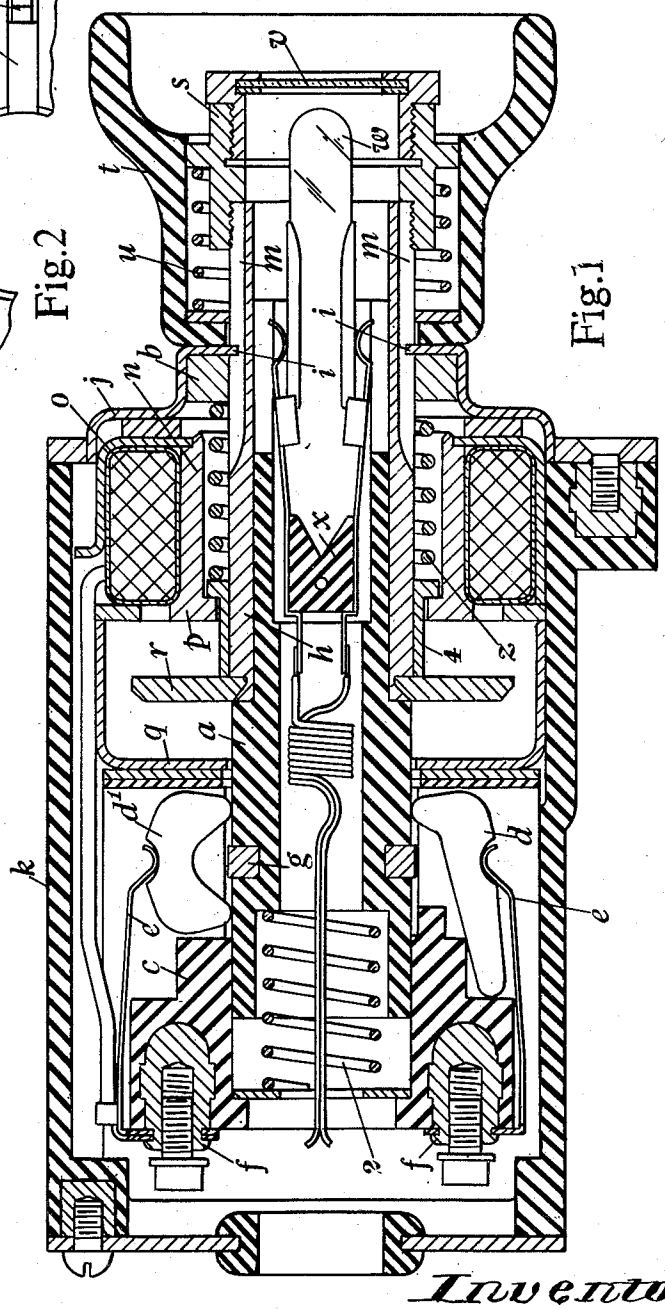


Fig.1

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COMBINED MAGNETIC AND MANUAL SWITCH

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3 Claims. (Cl. 200—87)

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This invention relates to electric switches of the push-pull type, and has for its object to provide an improved construction wherein an electromagnet is employed for holding the switch in either of its operative positions.

The invention comprises the combination of an axially slidable contact actuating member, an annular electromagnet winding surrounding the said member, a pair of pole pieces associated with the winding and spaced at any appropriate distance apart, and an armature located between the pole pieces and carried by the slidable member.

In the accompanying drawings:

Figure 1 is a longitudinal section illustrating one embodiment of the invention.

Figure 2 is a fragmentary end view of a member carrying the movable contact pieces.

Referring to the drawings, the axially slidable member *a* is of hollow cylindrical form and is made mainly of insulating material. This member is carried by a pair of annular supports *b*, *c* in the body of the switch. The support *c* is of cylindrical form and is made from insulating material. Also it is formed with a number of radial slots (see Figure 2) in which are accommodated free metal contact pieces *d* and d^1 which rest on the outer surface of the slidable member *a* and which are loaded by spring blades *e* connected to terminals *f* on one end of the said support. Also on the adjacent part of the slidable member is embedded or otherwise mounted an annular contact piece *g*, the arrangement being such that when the slidable member is moved from its neutral position to one of its end positions the contact piece *g* can bridge the contacts *d* and some of the contact pieces d^1, and when moved in the opposite direction to its other end position it can bridge the other contact pieces d^1. To meet this condition each contact piece *d* is shaped as shown to an L-form, and has one limb situated at one side of the annular contact *g*, so that the latter is brought into contact with the said limb when moved from its neutral position in one direction only. Also each contact piece d^1 is shaped as shown to a shallow U-form, and spans the adjacent part of the annular contact *g*, so that movement of the latter in either direction from its neutral position brings it into contact with a limb of each contact piece d^1. Any desired number of contact pieces are provided, each being accommodated in its own slot in the part *c*.

The other, *b*, of the above mentioned supports consists of a hollow metal ring carried by the body of the switch.

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On the slidable member *a* is secured an iron sleeve *h* which is held against rotation by key pieces *i* on a part *j* secured to the body or housing *k* of the switch, the said pieces *i* engaging longitudinal grooves *m* in the sleeve *h*. Around the sleeve *h* there is mounted in the body an annular iron core part *n* forming part of an electromagnet and carrying an exciting winding *o*. At one end of the part *n* is formed a flange *p* forming a pole of the magnet, and extending from this is another (and cup shaped) iron part *q* forming a second pole of the same polarity as *p*. Between the parts *p*, *q* there is secured to the sleeve *h* an iron ring *r* serving as the armature of the magnet.

On the outer end of the sleeve *h* is secured a push-piece *s*, and slidable on the sleeve is provided a pull-piece *t*, a spring *u* being arranged between the parts *s*, *t*. In the push-piece *t* may be provided a window *v* which can be illuminated by a lamp bulb *w* when the switch is in either of its operative conditions, a holder *x* being provided in the interior of the member *a* for carrying the bulb. The circuit through the lamp bulb may be controlled by any one of the contact pieces d^1 and the contact piece *g*. The circuit of the electromagnet may be controlled either by the contact pieces *d*, d^1, *g* or by a separate switch.

The mode of action of the switch is as follows:

On pushing the push-piece *s* inwards against the springs *u*, *z*, the contact piece *g* is caused to bridge the contact pieces d^1 which are thereby encountered by the piece *g*, and the member *a* is then held against return movement by the interaction of the magnet parts *r*, *q*. The return of the member *a* to its neutral position is effected by the springs *u*, *z*, after interrupting the circuit of the winding *o* by a separate switch, or by exerting a sufficient pull on the pull-piece *t* to separate the parts *r*, *q*. The member *a* is then held in its neutral position by the springs 2, *z*.

To close other circuits associated with the switch, the pull piece *t* is pulled outwards into contact with the inner end of the push piece *s* against the spring *u*. In this action the contact piece *g* is caused to bridge the contact pieces *d*, d^1 which are encountered by the piece *g* in this movement. Also the magnet part *r* is moved into contact with the part *p*, for holding the switch in this condition. During the outward movement of the member *a* the spring *z* is compressed by the part *r* through the medium of a sleeve 4 on the part *h*. Return of the member *a* is effected by the spring *z* after interrupting the circuit of the winding *o* or by exerting sufficient pressure on the push piece *s* to separate the parts *r*, *p*.

By this invention electromagnetic retention of the slidable member in either of the opposite operative positions of the slidable member is effected in a very simple and convenient manner, and when a lamp is included, the condition of the switch is indicated by the lamp.

The invention is not, however, restricted to the example described, as subordinate constructional details may be modified to suit different requirements.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. An electric switch of the push-pull type, comprising in combination an axially slidable contact-actuating member, an annular contact piece on said member, a stationary annular electromagnet surrounding said member and having a pair of pole pieces of the same polarity arranged in axially spaced relationship around said member, an armature secured on said member and movably located between said pole pieces so that the latter can serve by magnetic interaction with said armature to retain said member in two different positions, and spring-loaded contact pieces shaped and arranged so that in each of said positions of said member at least some of said spring-loaded contact pieces are bridged by said annular contact piece.

2. An electric switch as claimed in claim 1 and having a push piece secured on one end of said

contact actuating member, a pull piece slidably mounted on said contact actuating member at a position adjacent to said push piece, and a spring located between and acting on the push and pull pieces to permit relative movement thereof.

3. An electric switch as claimed in claim 1 and having an iron sleeve secured on said contact actuating member, an iron annulus secured on said sleeve and forming said armature, and a spring opposing movement of said armature in one direction and arranged between said sleeve and said electromagnet.

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