May 25, 1965 N. J. DRISCOLL 3,185,803

PUSH BUTTON SWITCH WITH FLEXIBLE CONTACT

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Fig. 1.

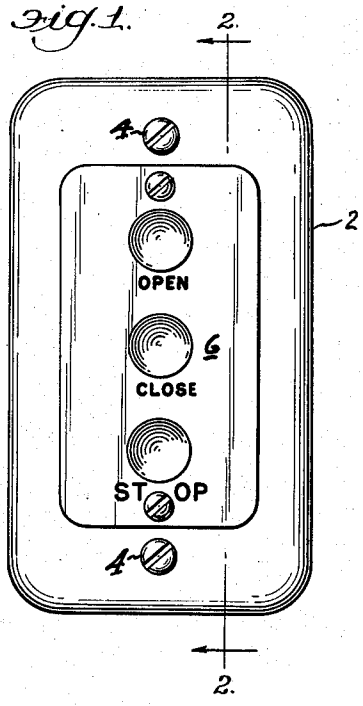


Fig. 3.

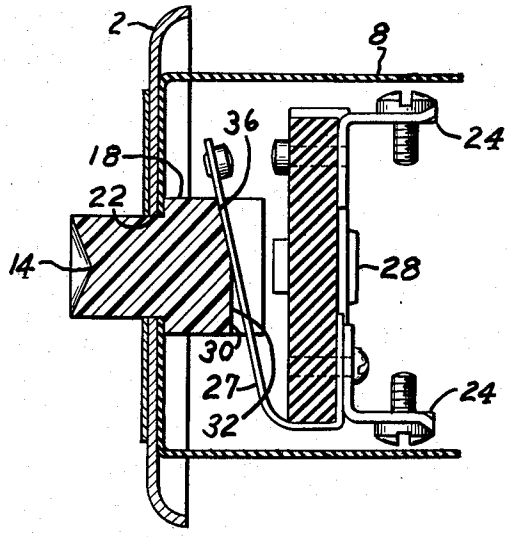


Fig. 2.

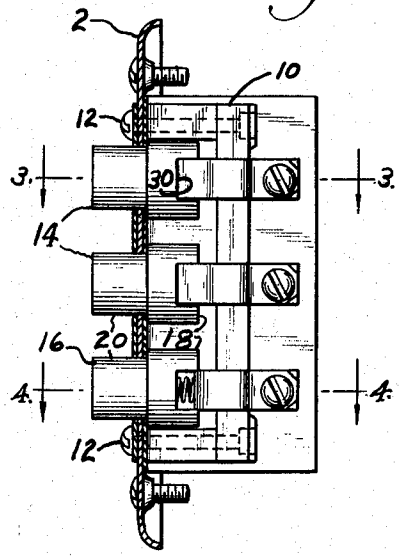
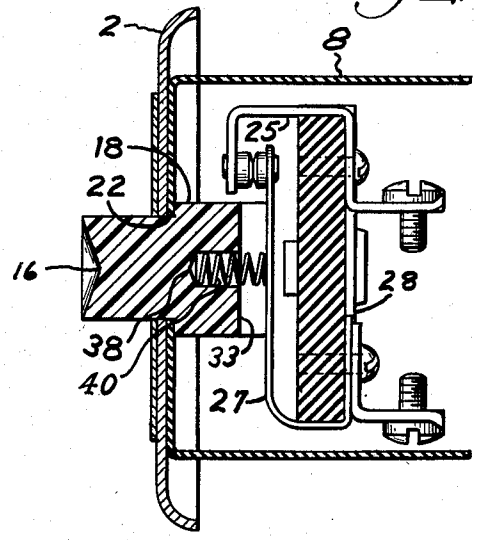


Fig. 4.



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FIG. 5

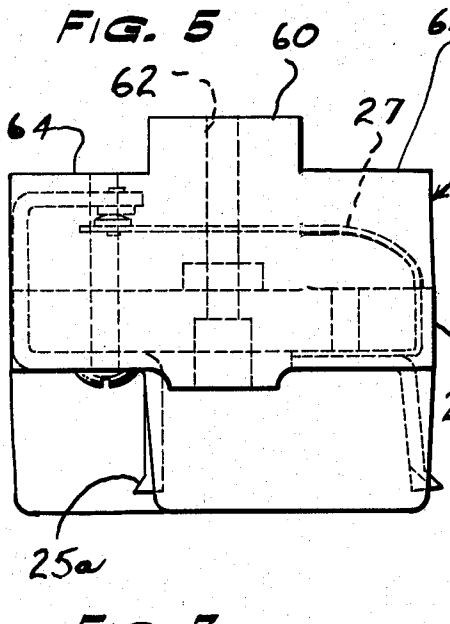


FIG. 6

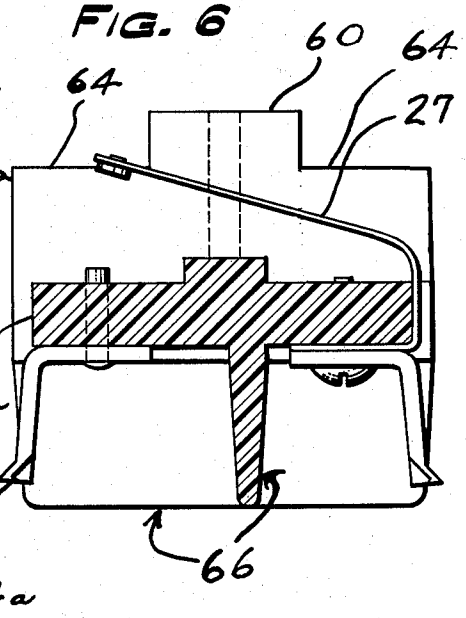
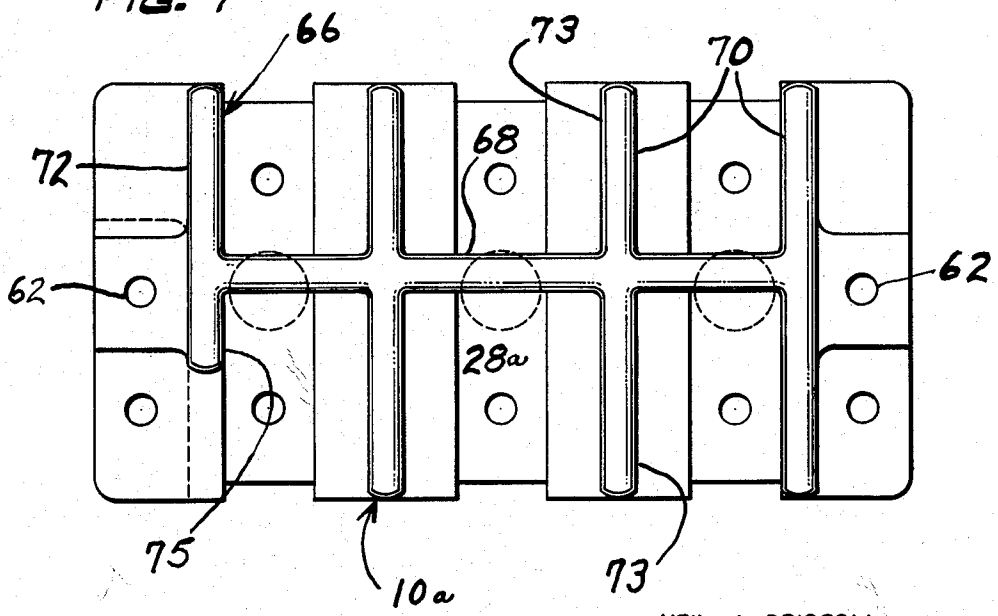


FIG. 7



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FIG. 8

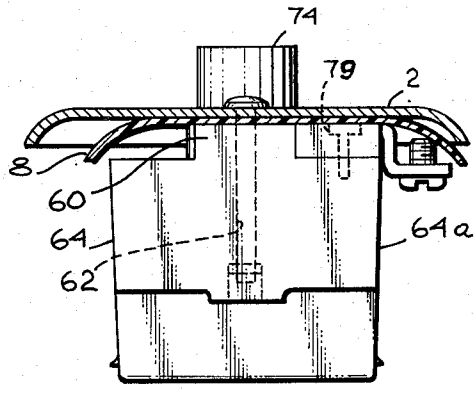
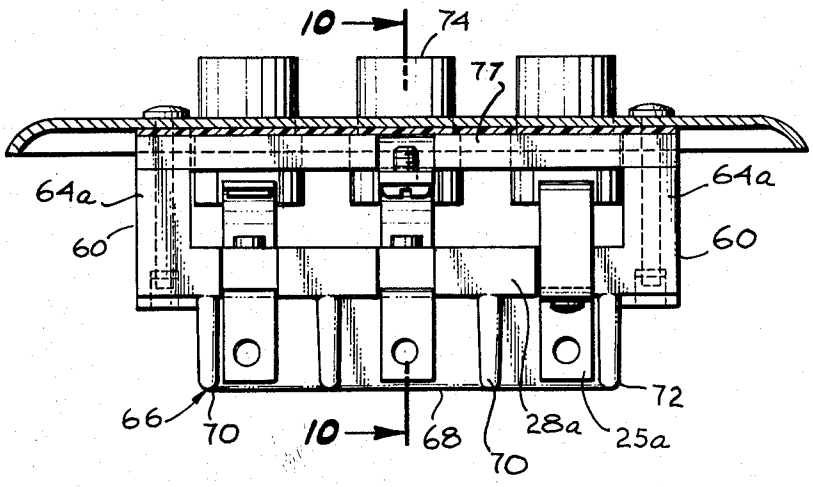


FIG. 9



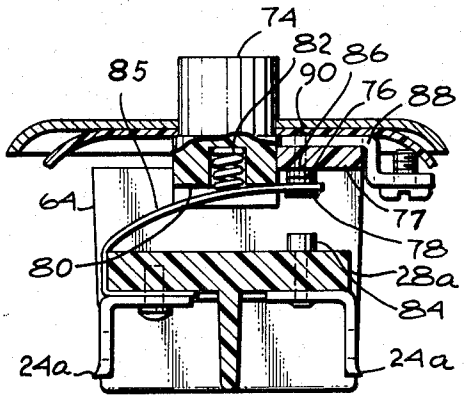


FIG. 10

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PUSH BUTTON SWITCH WITH FLEXIBLE CONTACT

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Filed Sept. 11, 1964, Ser. No. 396,813
18 Claims. (Cl. 200—159)

This application is a continuation-in-part of my copending application Serial Number 228,218, filed October 1, 1962, and now abandoned.

The invention relates to a push button switch with flexible contact and has particular reference to that type of device generally known as a push button control station.

It is an object of the present invention to provide a device of the type described that is economical in first cost, adaptable to existing installations and having design characteristics suitable, at least, for most commercial applications. Additional important functional and commercial feature of the herein disclosed invention, and particularly, the embodiment thereof newly disclosed in this application relates to the fact that the field of use of the invention has been materially enlarged. Thus the invention may be applied to a wider variety of useful applications while yet offering the applicable trade the initial economy and long service life inherent therein.

Accordingly, the invention comprehends a structurally unitary push button station which may variably combine normally open or normally closed contacts, but which, nevertheless, incorporates unique features of cooperation between each push button, its retaining cover and flexible current carrying element.

It is a further purpose of the invention to provide a control device of the type described, incorporating in the operative combination, a unique terminal block having novel structural features importantly contributing to the utility and safety thereof.

Specifically, the disclosed invention comprehends a control station having a terminal block comprising a generally planar segment with upstanding posts integrally formed at opposed ends thereof. The respective posts are appropriately apertured longitudinally thereof to accommodate fixed connection of the terminal block to the station enclosure cover. In this manner the mentioned planar segment is in generally spaced parallel relationship to the cover. Flexible current carrying fingers are secured to the planar segment and interposed between same and the cover. In this position the fingers biasingly support a plurality of shouldered push buttons against the underside of the cover, the latter extending through appropriate cover apertures. The opposed side of the planar segment is provided with a plurality of integrally formed upstanding walls which define therebetween a plurality of cavities, the latter receiving metallic wiring terminals which, in turn, are fixedly secured to the planar segment. Additionally, the mentioned posts are each provided with opposed shoulders extending outwardly thereof and generally perpendicular to the long axis of the planar segment to to the opposed edges of the latter. It will be apparent to those skilled in the art, that, with the construction described, the operating fingers of the control station are effectively shielded, during the operation thereof, from interference by station connected wires which are contained in the enclosure. Further, the mentioned cavity defining upstanding walls prevent wiring terminal puncture of the enclosure contained wires thereby eliminating any possibility of electrical short due to this contingency.

The mentioned shoulder structure provides the station with an additional novel feature in that it accommodates the mounting of an appropriate electrical contact and additional wiring terminal in predetermined relationship to a selected finger thereby adding double throw capacity to that finger.

The invention will be more clearly understood by reference to the associated drawings and the following specification, wherein:

FIGURE 1 is a front elevational view of a typical embodiment of the structure,

FIGURE 2 is a central vertical sectional view, partly in elevation, and taken substantially along line 2—2 of FIGURE 1,

FIGURE 3 is a sectional view of a typically normally open contact and taken along line 3—3 of FIGURE 2,

FIGURE 4 is a sectional view of a typical normally closed contact and taken along line 4—4 of FIGURE 2,

FIGURE 5 is an end elevational view of an alternate terminal block construction which may be employed, the block being here shown with the cover and button structure removed,

FIGURE 6 is a sectional view, similar to FIGURE 3, illustrating the terminal block embodied in FIGURE 5, again with the cover and button structure removed,

FIGURE 7 is a bottom plan detail of the alternate terminal block of FIGURE 5,

FIGURE 8 is an end elevational view of an alternate construction of the herein disclosed control station,

FIGURE 9 is a side elevational view of the structure of FIGURE 8, and

FIGURE 10 is a sectional view taken along line 10—10 of FIGURE 9.

To specifically understand the invention it will be noted that the number 2 indicates a cover which is normally fastened via screws 4, 4 to any conventional station enclosure such as a box, not shown. The cover is generally planar in form, that is, of relatively shallow depth as compared to the width dimension thereof.

A nameplate 6 and an insulating barrier 8 are respectively mounted on the front and rear of the cover 2 and a base or terminal block 10 is brought into appropriate juxtaposition, as shown, the arrangement being securely fastened to the cover 2 by the screws 12.

The base 10 is, of course, formed of any suitable electrical terminal block material, while the cover 2 is preferably metallic for cost reasons. The barrier 8 is composed of any suitable electrically insulating flexible material, and, it should be noted, is selectively a part of the combination and may be dispensed with if use voltage so dictate.

Push buttons 14, 14 and 16, preferably of heat resistent material, each comprise a relatively larger radiused lower section or segment 18 and a smaller radius upper section or segment 20, the latter section being movably received within appropriate appertures 22, 22 in the cover 2.

For purposes of station power connection, conventional wire mounting angle mounts or terminals 24, 24 are preferably employed in association with the normally open contacts shown. In a typical normally closed contact a formed mount 25 extends upwardly toward the cover 2 to provide contact location.

An important point in the invention are the fingers 27, 27 which are interposed between the angle mounts 24 and base 10, as shown, for mounting and locating purposes. Each finger 27 extends around carrying or plate portion 28 of base 2 and is disposed in between or intermediate said base plate portion and the underside of the cover 2. The fingers 27 are formed of flexible current carrying material, a functional feature of the flexibility being hereinafter described.

Initial consideration will be given to a typical normally open contact as shown in FIGURE 3. It will be seen that the finger 27 is here flexibly biased upwardly and is received within a complementing elongated slot 30

formed in the lower section 18 of the associated button 14. In usual practice, the normally open buttons 14 are of a green color, while the closed push button 16 is red.

Each slot 30 comprises a first flat segment, here designated 32 and an angled segment which abuts the associated finger 27 to accommodate the biasing pressure of said flexible finger 27 and maintain the button in its proper appearing condition on the face of the cover 2. This will be apparent when consideration is given to the fact that the obvious direction of finger force application may be reduced to two right angle components, the vertical of which maintains green button position.

Turning to the normally closed contact and the associated red button 16, it will be noted that the related finger 27 is here, by virtue of its inherent upwardly biasing action, in contact closed position with the formed mount 25. Again a slot, here 33, in button section 18 embraces the finger 27 to maintain button position. However, the button 16, unlike the buttons 14, is provided with an axial cavity 38 which receives a button supporting spring 40, the latter being in pressured engagement with the cooperating finger 27.

Attention is now directed to FIGURES 5, 6 and 7 which illustrate an alternate terminal block construction that may be employed in the operative structure previously shown. Note also that for purposes of clear disclosure the cover and push button structure has been deleted from FIGURES 5 to 7 inclusive, it being understood that the structure to be employed is identical to that shown in the first described embodiment.

In this construction the terminal block is designated by the numeral 10*a* and comprises a base portion 28*a* which serves as the carrying structure for the wiring terminals 24*a* and 25*a* much the same as in the previous embodiment. The current carrying finger elements 27 also are similarly mounted.

The block construction of FIGURES 5 to 7 inclusive is further provided with mounting posts 60 at opposed ends thereof. These posts are apertured as at 62, 62 for screw mounting of the block to the related cover (not shown). Such mounting mode is illustrated at 12 in the prior embodiment. The posts 60 are here preferably oppositely shouldered as at 64, 64 in FIGURES 5 and 6. The shoulders 64, 64 add structural strength to the posts 60 and additionally act to embrace the operating parts of the control and prevent accidental wire entanglement therewith during control installation and use.

The base or carrying portion 28*a* is also provided with integrally formed and projecting wall means indicated generally at 66. As best seen in FIGURE 7, the wall means 66 comprises longitudinal wall 68 integrally formed with transverse walls 70, 70 and 72. The wall 72 is transversely forshortened to provide access to the formed mount or wiring terminal 25*a*. It will be noted that the wall means 66 defines six cavities 73, 73 and 75 whereby the wall means embracingly receives the wiring terminals 24*a* and 25*a*. Note also that the wall means 66 projects a greater distance from base plate 28*a* (FIGURES 5 and 6) than the wiring terminals thereby protecting the latter from accidental wire engagement during device installation and use. The wall means 66 further provides the additional feature of adding strength and rigidity to the terminal block. It will thus be apparent that the block structure of FIGURES 5 to 7 inclusive, not only improves the functional utility of the device but also materially adds to its operating capacity and safety characteristics.

Attention is now directed to FIGURES 8 through 10 inclusive, which illustrates another alternate mode of construction of the herein disclosed control station. In those features where the structure of this embodiment are identical with the heretofore described embodiments, identical numerals are used.

Specifically, it will be noted that the shoulders 64*a*, formed on a common side of the posts 60, 60, serve to

support the longitudinally extended member 77. The member 77, in turn is secured to the respective shoulders 64*a* via screws 79 or in any other suitable manner.

It will be recalled, that in the earlier described structures certain of the push buttons were identified as normally open or normally closed. In certain field applications, circuit requirements may dictate that a given button offer both a normally open wiring terminal and a normally closed wiring terminal. With this in mind, attention is directed to the illustrative central push button here designated 74. Associated with button 74 is the current carrying finger 85 having at the terminus thereof upper and lower contacts 76 and 78, respectively. The button 74 is provided on the underside thereof, with transverse slot 80 which receives the finger 85. Cavity mounted spring 82 maintains button 74 in desired position. A first contact 84, normally open, is operatively associated with contact 78 and a second contact 86, normally closed, is operatively associated with contact 76. The member 77 is transversely slotted in the area of contact 86 to receive one end of the wiring terminal 88, said one end being physically connected to contact 86 for electrical association therewith, as at 90. To prevent grounding, the terminal 88 is positioned below and in surface abutment with the insulating barrier 8. It will thus be seen that any selected push button may be provided with both normally open and normally closed contacts thereby adding double throw capability to the control station. Those skilled in the art will understand that the structure disclosed greatly enhances the usefulness and circuit capabilities of the station in field installations.

It will thus be understood that the disclosed control device structural features not only provide unique construction but also offer the advantages of economy, long service life and continued safe operation. It will further be apparent that a generic feature of the invention relates to the unique mounting of and cooperation between the flexible current carrying finger 27 and the finger embracing associated button 14 or 16 as the case may be. With specific reference to the normally open contacts, it will likewise be apparent, a secondary feature of the invention is embodied in the angle engagement of the functionally joined green button and finger and operative to maintain button position and proper guidance therefor.

The invention as shown and described is by way of illustration and not limitation as will be understood by reference to the following claims.

What is claimed is:

1. In a control device, the combination of an apertured cover, a base carried by the cover and having a supporting element in spaced relation to the cover, a flexible contact carrying finger secured to the element and normally biased in the direction of the cover, a push button having an upper segment received within the cover aperture and a lower segment below said cover, said button being movable transversely of the cover, and means operative to properly position the push button in all positions of movement thereof, said means comprising a slot formed on the bottom side of the lower segment and receiving said finger, said finger being biased upwardly to engage said button within said slot in all positions of button movement, said slot comprising two surface portions in angular relation to each other, said finger engaging one of said portions in the maximum upward button position and engaging the other of said portions in the maximum downward button position.

2. In a control device, the combination of a cover having a plurality of apertures therein, a base element fixedly carried by the cover and having a carrying portion in spaced relation thereto, a plurality of operative electrical contact arrangements carried by said base element, each arrangement including a flexible contact carrying finger and a push button, and a flexible electrical insulating barrier carried by and interposed between the

base element and the cover, said barrier having a plurality of openings therein complementing the apertures in the cover and aligned therewith, said push buttons being received within said openings and apertures, each of said buttons being mounted in said apertures and openings for manual movement therein, a shoulder on each button engageable with the barrier at the upper button position, means operative to properly position the respective push buttons in all positions of movement thereof, said means comprising a slot formed at the bottom of each of said push buttons and receiving the related finger, at least one of said fingers being biased upwardly toward the cover to directly engage the related button in all positions of button movement, at least one of said slots comprising two surface segments in angular relation to each other, the related finger engaging one of said segments in the maximum upward button position and engaging the other of said segments in the maximum downward button position.

3. A control device according to claim 2, and including a hole in at least one of said buttons, and spring means disposed in the hole and in pressured interposition between the related button and finger.

4. In a control device, a generally planer cover having aperture means therein, means to demountably attach the cover to an enclosure, a terminal block having a base plate, spaced posts engaging the terminal block and interposed between the cover and the plate to maintain the latter in spaced relation to the cover, means securing the plate and posts directly to the cover, electrically conductive resilient finger means secured to the plate and arranged to dispose a major segment thereof intermediate the plate and the cover, said major segment being in determined alignment with said aperture means, electrical contact means carried by the finger means, other electrical contact means carried by the plate and in operative relationship to the finger means carried contact means, wiring terminal means electrically connected to the finger means and other contact means, moveable push button means disposed in said aperture means to extend therethrough, said push button means having a lower segment engaged by the resilient finger means, abutment means on said push button means, said finger means being in flexible pressured engagement with said lower segment to pressure bias the abutment means into engagement with the cover when said electrical contact means are in open position, said push button means being manually moveable to flex said finger means and bring said contact means to closed position.

5. The control device according to claim 4, wherein said wiring terminal means are carried by the plate on a side thereof remote from said cover.

6. A control device according to claim 5, and including wall means projecting from said remote side of said plate and defining cavities receiving said wiring terminal means.

7. In a control device, the combination of a cover means to demountably attach the cover to an enclosure, opening means formed in the cover, a terminal block having a base plate, posts at longitudinally opposed ends of the base plate projecting therefrom toward the underside of the cover, means to secure the posts and plate to the cover to maintain the latter in spaced relation to the cover, electrically conductive resilient finger means secured to the plate on a side of the latter remote from said cover and formed to dispose a major segment intermediate the plate and the cover, electrical contact means carried by the finger means adjacent the terminus of said major segment, other electrical contact means carried by the base plate and in operative relation to the finger means carried contact means, wiring terminal means operatively connected to the finger means and other contact means, and movable push button means disposed in said opening means to extend therethrough, and slot means formed in the end of the push button means to receive the finger means intermediate the base plate and cover, whereby, the cooperative reception of the finger means by the slot means guides the push button means during movement thereof and permits relative movement between the push button means longitudinally of the finger means.

8. A control device according to claim 7, and including flexible electrical barrier means carried by the cover and interposed between the posts and the cover, said barrier means including aperture means in alignment with the opening means to admit reception of said push button means, said barrier means including opposed side portions extending in generally angular relation to the cover to embrace the said terminal block.

9. A control device according to claim 8, wherein said wire terminal means are secured to the base plate on a side thereof remote from said cover, said terminal means projecting from the plate in generally angular relation thereto, and wall means projecting from the plate a distance greater than the projection of the terminal means, said wall means comprising wall portions extending both transversely and longitudinally of the base plate to embrace the terminal means and prevent wire entanglement therewith.

10. A control device according to claim 9, wherein said posts are provided with shoulders on at least one side thereof, said shoulders extending transversely of the base plate and having upper surfaces in spaced relation to the barrier means, a longitudinal member carried by the shoulders in spaced relation to the base plate, second contact means carried by the member and in operative electrical relationship to the first mentioned contact means, said contact means carried by the finger means being in normally closed connection with said second contact means and in normally open connection with said other contact means, and other wiring terminal means carried by the longitudinal member and connected to said second contact means.

11. A control device according to claim 10, wherein the other wiring terminal means are interposed between the member and the barrier means and engaging the latter.

12. A control device according to claim 11, wherein said shoulders extend from both sides of the respective posts and transversely of the base plate, said shoulders embracing and shielding the finger means and preventing wire entanglement therewith.

13. A control device according to claim 7, and wherein said wire terminal means project from the base plate, and wall means projecting from the base plate to embrace the said terminal means.

14. In a control device, the combination of a cover, means to demountably attach the cover to a circuit wire receiving enclosure, opening means formed in the cover, a terminal block having a base plate, posts formed at longitudinally opposed ends of the base plate and projecting therefrom toward the undersurface of the cover, means connecting the terminal block via the posts to the cover with the base plate in spaced relation to the undersurface of the cover, electrically conductive resilient finger means carried by the plate and having at least a segment thereof intermediate the plate and undersurface, electrical contact means on the finger means and the base plate in operative relation to each other, wiring terminal means carried by the base plate on a side thereof remote from said undersurface and electrically connected to the contact means on the base plate, movable push button means disposed in said opening for movement therein, said push button means being in operative association with the finger means whereby upon manual manipulation of the button means the electrical contact means may be opened and closed and wall means formed on the base plate on said remote side thereof and projecting from the surface of the base plate, said wall means defining cavity means receiving the terminal means and operative to shield said terminal means from short circuit contact with the circuit wire.

15. A control device according to claim 14, and including shoulders formed on opposed sides of said posts and extending transversely of the plate, said shoulders embracing said finger means and inhibiting circuit wire interference with the operation thereof.

16. A control device according to claim 15, and including barrier means carried by the device and interposed between the posts and the cover, said barrier means including aperture means accommodating said movement of the push button means, said barrier means having flexible side portions to embrace said terminal block.

17. A control device according to claim 16, and including a longitudinally extended member carried by certain of the shoulders in spaced relation to the plate, other wiring terminal means carried by the member, other electrical contact means carried by the member and electrically connected to the other wiring terminal means, said

other contact means being operatively associated with certain of the first mentioned electrical contact means whereby said finger means is provided with both normally open and normally closed electrical contact means.

18. A control device according to claim 17, wherein said posts are formed with and connected to the plate on opposed sides and outboardly of said wall means as seen in side elevational view.

References Cited by the Examiner

UNITED STATES PATENTS

1,499,370	7/24	James	200—129
3,073,934	1/63	Oakman et al.	200—159

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