

- [54] **FRONT-MOUNTED, CLAMP-TO-HOLD ELECTRICAL CARTRIDGE WITH SWING-ASIDE, PUSH-TO-TEST CAP THEREON**
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- [51] Int. Cl. **H01h 9/18**
- [58] Field of Search. **200/167 R, 167 A, 168 C, 168 B, 200/168 R, 168 K; 317/112; 340/366 R, 366 G**

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[57] **ABSTRACT**

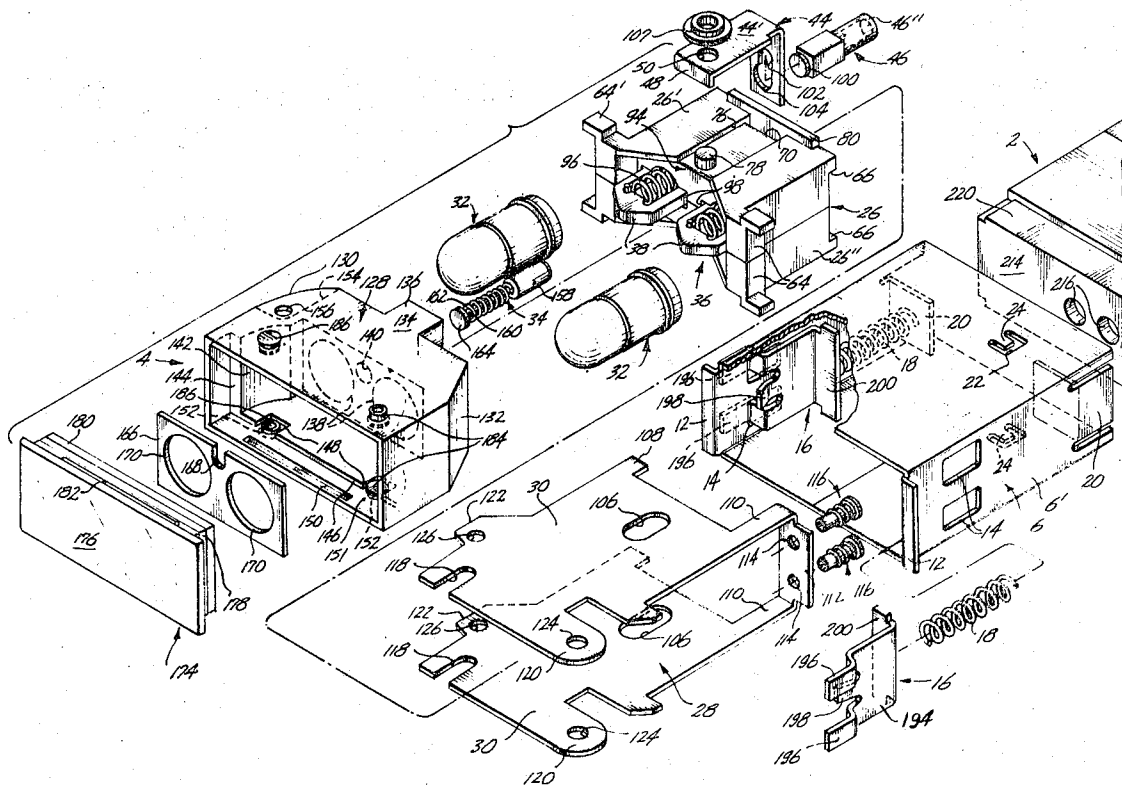
The cartridge is outwardly flanged to abut the rim of an opening in a panel when it is front-loaded in the opening, and has a pair of spring-loaded clamping thumbs contained therein, which are released through a side opening in the cartridge to engage the inverse side of the panel for purposes of clamping the cartridge to the rim. In addition, the cartridge has a cap at the open end thereof, which is shuttle mounted to be reciprocated in relation to the cartridge, for push-to-test operation of an electrical device therebehind, but which is also rotatable about a fixed axis of the shuttle, transverse the longitudinal axis of the cartridge, to be swung aside for access to the clamping thumbs, and/or for other purposes, such as relamping an illuminated legend thereon.

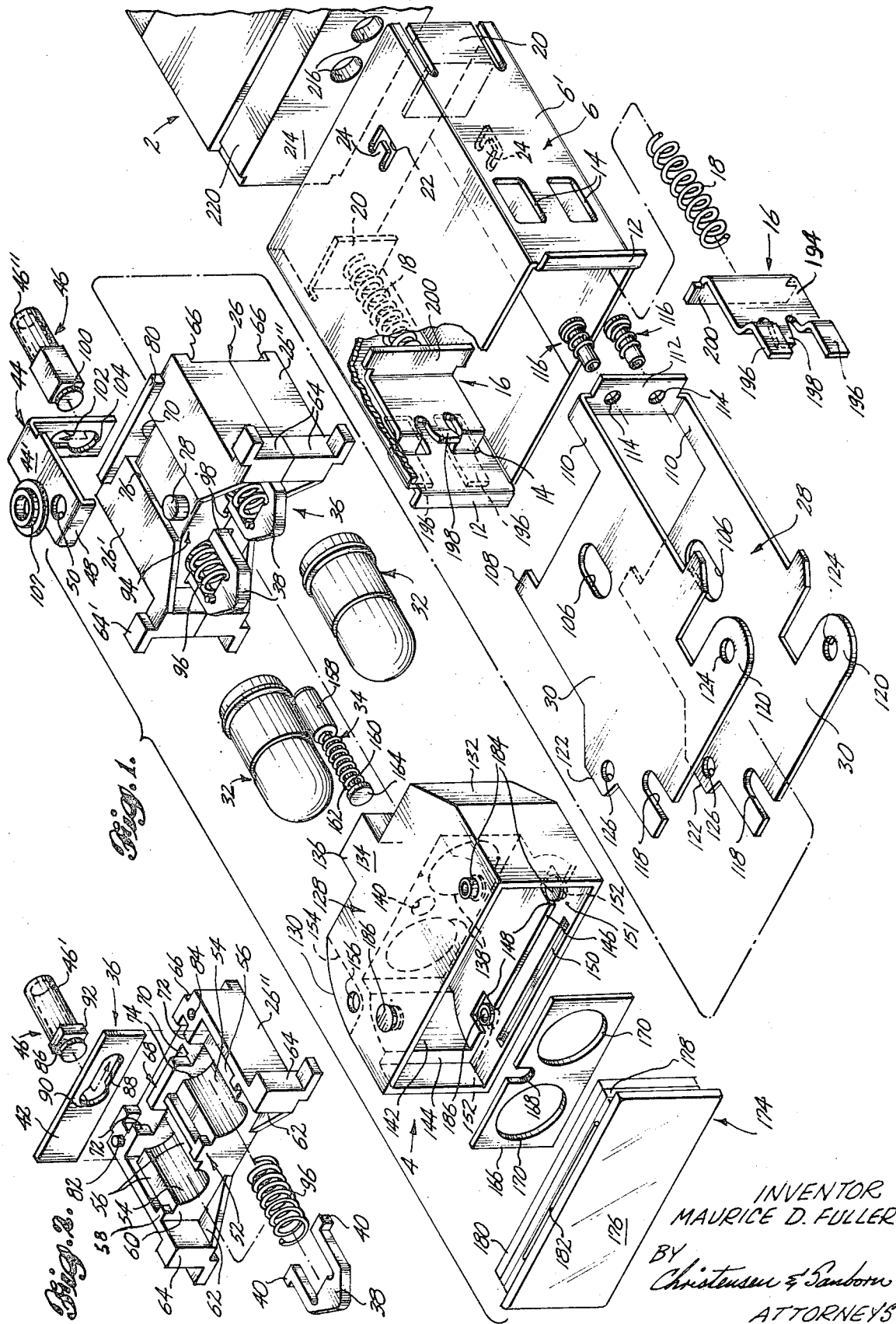
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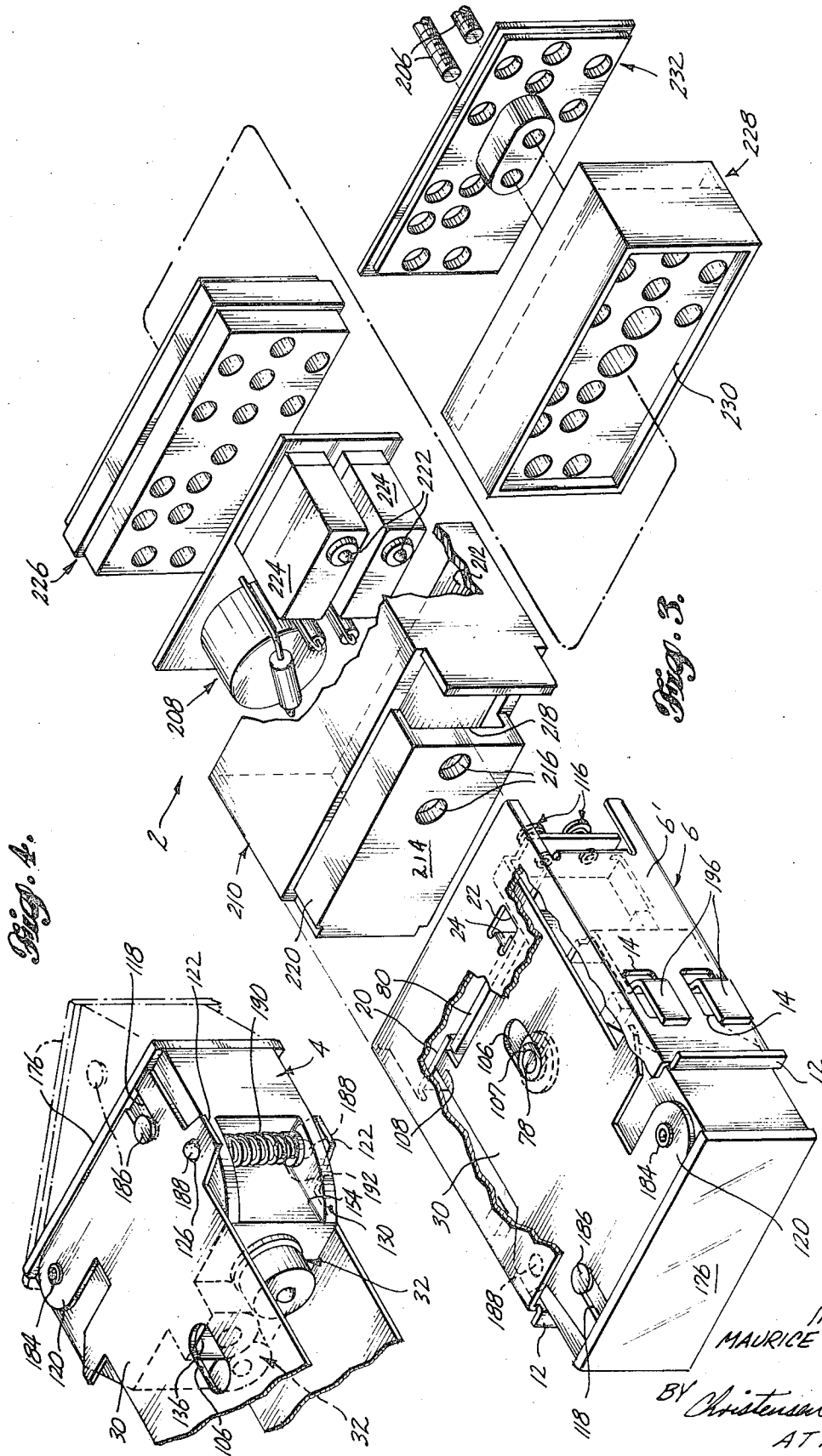
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41 Claims, 8 Drawing Figures



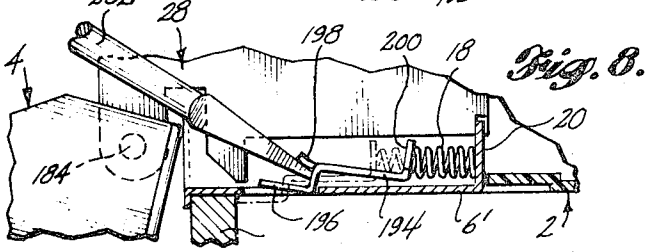
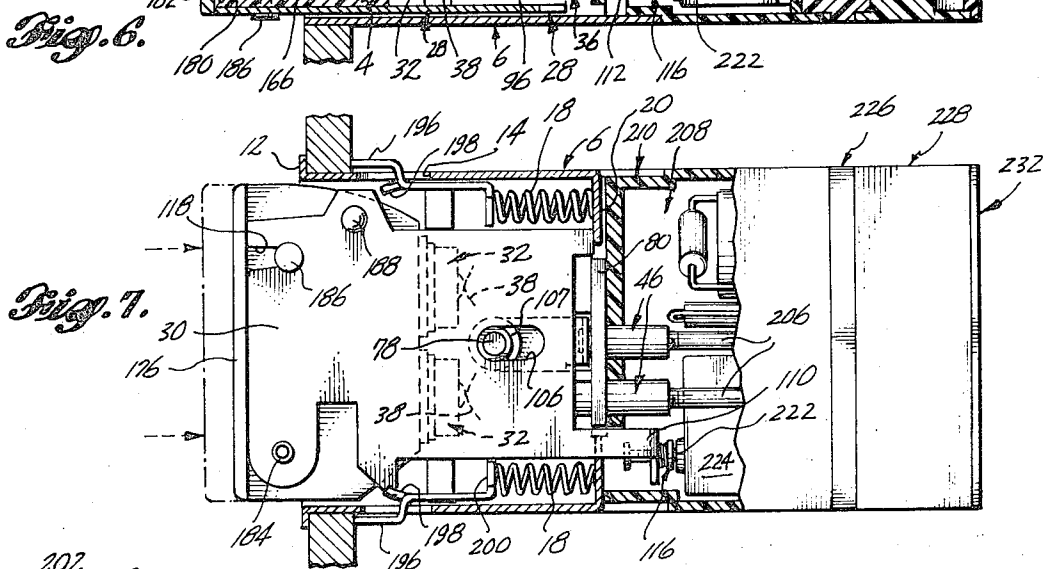
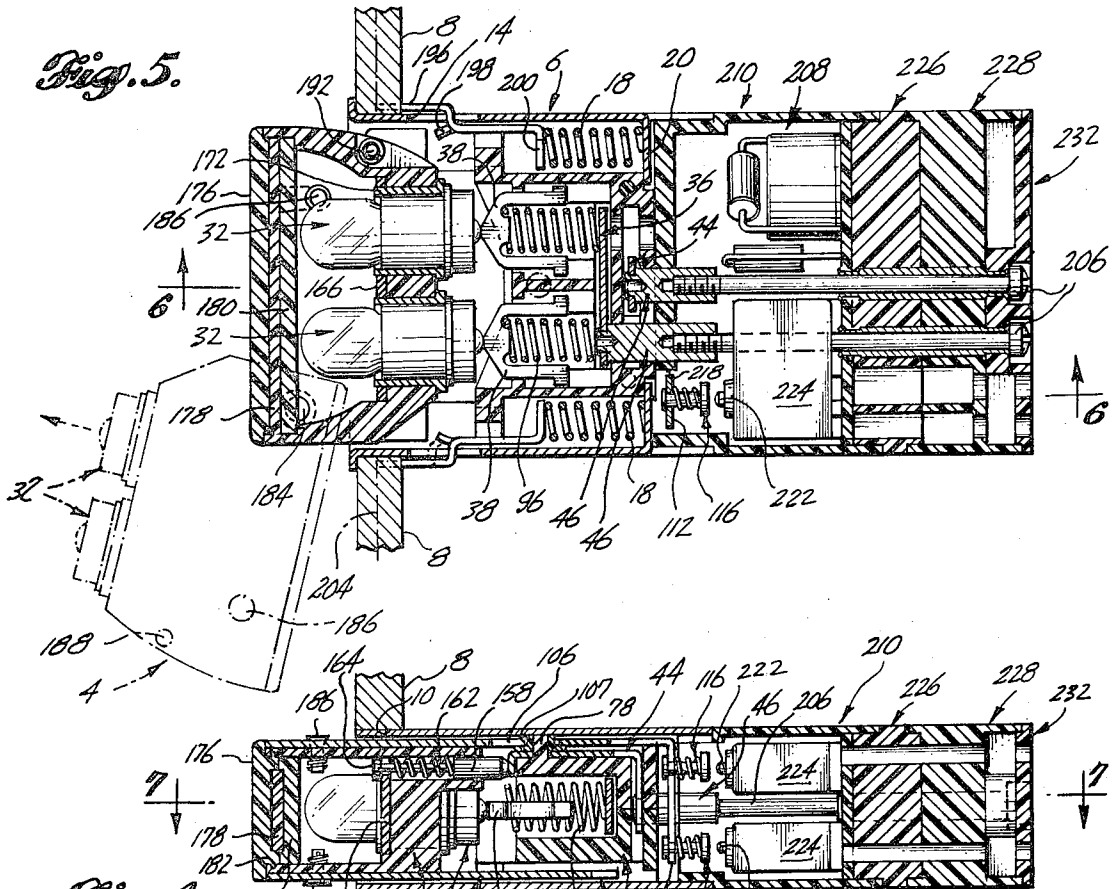


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**FRONT-MOUNTED, CLAMP-TO-HOLD
ELECTRICAL CARTRIDGE WITH SWING-ASIDE,
PUSH-TO-TEST CAP THEREON**

THE INVENTION IN GENERAL

This invention relates to open-ended tube-like cartridges such as those which are employed in housing, carrying or servicing panel-mounted electrical devices, and in particular, those devices which are servo actuated by means of a cap that is reciprocally mounted on the cartridge adjacent the open end thereof.

One object of the invention is to provide a cartridge of this nature which is equipped with a cap that can be swung aside for access to the open end of the cartridge, such as may be needed in mounting the cartridge, or in relamping the cap, or in replacing or servicing an electrical device therebehind. Another object is to provide a cartridge of this nature wherein the cap is latched or otherwise detained against rotation in the closed position thereof, to the extent that it is responsive to inward pressure, regardless of where the pressure is applied on the body of the cap in the reciprocable direction thereof.

These and other related objects are realized by an open-ended tube-like cartridge of my invention having a shuttle reciprocally guided therein which in turn has a cap thereon that is conjointly reciprocable with the shuttle, adjacent the open end of the cartridge, and disposed about a fixed axis of the shuttle, transverse the longitudinal axis of the cartridge, to rotate in response to forces applied thereon about the axis of the shuttle. The cap is detained against rotation, however, in the angular direction thereof inward of the cartridge, when the component of the forces tangential to the rotational course of the cap, at the point of application of the forces, is parallel to the longitudinal axis of the cartridge. Moreover, when the cartridge has an electrical device associated therewith, there are means on the shuttle for operating the device when the cap is in the detained position thereof and the shuttle is reciprocated in the direction relatively inward of the cartridge at the open end thereof. There are also means operable to bias the shuttle in the direction relatively outward of the cartridge at the open end thereof when the device is operated by the shuttle.

Preferably, the rotational axis of the cap is disposed eccentrically thereof and is offset from the longitudinal axis of the cartridge. Also, the cap detention means are disposed on the opposite side of the longitudinal axis of the cartridge from the rotational axis of the cap. For example, in the presently preferred embodiments of the invention, the cap is in registry with the open end of the cartridge in the detained position thereof, and is reciprocable into and out of the open end of the cartridge with the shuttle. The rotational axis of the cap is disposed adjacent one of the sides thereof which extend generally longitudinally of the cartridge when the cap is in registry with the open end thereof, and the cap detention means are disposed adjacent the other side of the cap which extends generally longitudinally of the cartridge when the cap is in this condition.

It is also preferred to interpose the biasing means between the cartridge and the cap, when the cap is in the detained position thereof. For example, the shuttle may be reciprocally guided on a mandrel which is secured within the cartridge, transversely thereof, and

the biasing means may be interposed between the mandrel and the cap in the detained position thereof. In the aforementioned presently preferred embodiments of the invention, the shuttle takes the form of a yoke-like carriage, which is slidably guided on the mandrel, to reciprocate longitudinally of the cartridge, and which has the cap trunnioned between the arms thereof to register with the open end of the cartridge at a point opposite a spring-loaded biasing element on the mandrel. The cap detention means includes detent means on the cap and the arms of the carriage, which are cooperatively engageable with one another when the cap reaches this point.

In addition, where the cap has electrically operated means therein, the guide mandrel may have electrical contacts thereon through which the electrical means in the cap are operated. These contacts may include the biasing means, and where the electrical device is mounted on the cartridge by fastening it to the mandrel on the opposite side thereof from the cap, the contacts may also include the means whereby the device is fastened to the mandrel.

Another object of the invention is to provide an open-ended tube-like cartridge which can be front-loaded in an opening in a panel, and secured to the panel from the front while in the opening. A further object is to provide a cartridge of this nature which can be secured to the panel by clamping it to the rim of the opening containing the same.

These and other similar such objects are realized by other features of the invention wherein the cartridge has means thereon defining a pair of fixed stops which are transversely offset from the longitudinal axis of the cartridge, at locations that are removed relatively lesser and greater distances from the axis, so that the stops pass within and abut the rim of the opening in the panel, respectively, when the cartridge is inserted in the opening. The stops, moreover, are offset from one another in the axial directions of the cartridge, adjacent the open end thereof; and there is a third stop reciprocally mounted in the cartridge adjacent the axis thereof, on the opposite side of the lesser offset stop from the greater offset stop, which is yieldably biased in the direction of the open end of the cartridge, along a course parallel to the axis thereof. This third stop has means thereon which are rotatable against the bias thereof, about an axis transverse the course thereof, and which are operatively retractable to a point adjacent the lesser offset stop, to be rotated between the opposing sides of the lesser offset stop, to and from an abutting condition therewith, on the side thereof adjacent the greater offset stop, for purposes of clamping the cartridge to the rim of the opening.

Preferably, the travel of the third stop, in the direction of the bias thereon, is limited to a point disposed within the cartridge, between the point of rotation of the clamping means and the open end of the cartridge, so that the stop and the clamping means are retained in the cartridge when not in use.

In the presently preferred embodiments of the invention, such as those mentioned above, the fixed stops are defined by the open end portion of the cartridge and an outturned flange thereon. The cartridge has a slotted opening in one longitudinally extending side wall thereof, at the point of rotation of the clamping means,

and there is a jamb wall in the cartridge, spaced transversely apart from the one side wall thereof, and the third stop is disposed to reciprocate in the space between the walls of the cartridge, and adapted to abut the jamb wall at the limit point in the travel thereof. For example, the body of the third stop may be L-shaped in configuration, to abut the jamb wall, and the clamping means may include an outturned finger on the forward end portion thereof, which is also L-shaped in configuration.

Preferably, the third stop also has means thereon transverse the body thereof, for engagement with a tool capable of retracting the stop against the bias thereon. The tool engaging means may include an inturned finger on the stop, between the respective L-shaped configurations of the outturned finger and the body thereof.

Still another object of the invention is to provide an arrangement wherein the cartridge can be used in mounting electrical devices that in turn can be removed and replaced and/or serviced from the front of the panel. A further object is to provide an arrangement of this nature wherein the cartridge can be equipped with a cap on the open end thereof, and if desired, the cap can be mounted on a reciprocable shuttle without the shuttle interfering with the readily removable and replaceable nature of the electrical device, nor preventing the use of electrically operated means in the cap that are powered through the device.

These and other such objects are realized by additional features of the invention wherein together with means for clamping it to the rim of an opening in a panel, the cartridge has an electrical device thereon which is adapted to pass within the rim when the cartridge is inserted in the opening, and which includes a pair of mounting members having an electrical subassembly sandwiched therebetween, the resulting laminar assembly of which is clamped together and connected to the cartridge by means of fasteners passed through the assembly and secured on the cartridge. Where a shuttle is used, it is preferably slidably guided in the cartridge, on a mandrel connected transverse thereof, and the fasteners are preferably secured to the mandrel. Moreover, where a cap is mounted on the shuttle, adjacent the open end of the cartridge, the cap may be equipped with electrically operated means that are powered through the fasteners.

BRIEF DESCRIPTION OF THE DRAWINGS

These features will be better understood by reference to the accompanying drawings which illustrate one of the preferred embodiments of the invention as it is employed to mount a push button operated switch unit.

In the drawings, FIG. 1 is an exploded perspective view of the embodiment;

FIG. 2 is the same of one subassembly therein;

FIG. 3 is an assembled view of the cap and cartridge, with the switch unit exploded in position therebehind;

FIG. 4 is an operational part perspective view of the cap and cartridge assembly;

FIG. 5 is a longitudinal cross-sectional view of the entire assembly when the cap is swung aside;

FIG. 6 is a similar view, but 90° apart, when the cap is closed but unpushed;

FIG. 7 is a part plan, part cross-sectional view when the cap is closed and pushed; and

FIG. 8 is a similar view of the operation by which the cartridge is clamped to a panel.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings it will be seen that the switch 2 and the illuminated push button cap 4 for the same are mounted on, and in, the relatively rearward and forward end portions, respectively, of a low profile, rectangular open-ended metal tube cartridge 6, which in turn is mounted on and behind a panel 8 having a complementary opening 10 therein for the forward end portion of the cartridge 6. This latter end portion has a pair of outturned flanges 12 on the vertical end edges thereof, as well as pairs of slotted openings 14 in the side walls 6' therebehind, the individual openings of which are juxtaposed in similar proximity to the flanges 12 and oriented longitudinally of the walls 6' to enable a pair of bifurcated spring-loaded clamping thumbs 16 to be swung in and out of the cartridge against the bias of their springs 18 for purposes of clamping the cartridge to the rim of the opening 10 in the panel, as shall be explained more fully hereinafter. The springs 18 and the thumbs 16 are seated inside the cartridge, on a pair of inturned ears 20 kerfed and inwardly bent from the vertical rear end edges thereof; and inboard from the ears, in the wider dimensional top and bottom walls 6'' of the cartridge, there are oppositely disposed U-shaped slots 22 from which a pair of tabs 24 are inwardly bent to cooperate with the ears 20 in securing within the cartridge, a generally rectangular mounting block 26 serving as a guide mandrel for a bent U-shaped sheet metal bracket 28 that functions as a yoke-like shuttle carriage for the cap 4 in servo-operating the switch unit 2. The body of the bracket 28 is prostrated on one side and straddled about the block 26 from the rear, so that the block is exposed at the front, between the flat "gingerbread" shaped arms 30 of the bracket, to enable the bulbs 32 and ground 34 of the cap to contact an intermediate contact assembly 36 (FIGS. 1 and 2) in the block 26 through which the bulbs are energized from the switch unit. The contact assembly 36 includes a pair of thick stamped U-shaped sheet metal contact elements 38 with outturned flanges 40 on the ends thereof, which are spring loaded within the mounting block 26 in conjunction with another pair of more rearwardly disposed contact elements 42 and 44 that have plain rectangular, and bent L-shaped keyholed configurations, respectively, and which are equipped with front necked, square-collared cylindrical nuts 46 in the keyhole slots thereof. The L-shaped element 44 also has a depending lip 48 on the forwardly extending leg 44' thereof, and a circular hole 50 in the body of this leg, just behind the lip 48.

The low-profile rectangular body construction of the block 26 is split into mating upper and lower sections 26' and 26'', each of which is characterized with numerous structural alterations in the respective faces thereof. Viewed from the side adjacent the mating face thereof, each section has a front recessed, twice part-cylindrically grooved saddle 52 in the center body thereof, the two grooves 54 of which extend front to rear of the section, in spaced parallel relationship to

one another, and are edge rabbeted from above to have coplanar benches 56 at either side thereof, the forward ends of which are interrupted, however, by shoulders 58 projecting partway thereacross, flush with the bottom plane of the front recess 60 in the section. The recess 60 in turn is traversed by fillets 62 at the bottom, and flanked by jackboot-like jambs 64 at the sides, that are laterally outstanding from the side walls of the section at the front end thereof. The side walls are rabbetted at the rear corners 66 thereof, and the corners are joined across the back by a crenelated bulkhead 68 which has a slot 70 therein that is oriented transversely of the section and interposed between the crenels 72 of the bulkhead. The crenels 72 open onto a moat-like groove 74 which extends on a parallel to the slot 70 crosswise of the section, between the saddle 52 and the front face of the bulkhead 68.

Viewed from the side opposite the mating face thereof, each section has a groove 76 extending front to rear thereof, which has doweling 78 upstanding therein at a point near the front, and which terminates flush with the bottom plane of the recess 60 at the front, and flush with the slot 70 in the bulkhead at the rear. Also, upstanding across the center rear end edge of the section, there is a transversely oriented rib 80 on the opposite side of the slot 70 from the groove 76, and the upper surface of the rib 80 is coplanar with the raised feet 64' of the jambs 64, so that the block 26 slidably engages with the inside of the cartridge 6 at each of these three points on each side of the block, when the block is inserted in the cartridge.

Beforehand, the sections 26' and 26'' of the block are mated and registered with one another by means of complementary pins 82 and holes 84 on the ends of the bulkheads 68, and simultaneously therewith, the U-shaped contact elements 38, and the plain rectangular contact element 42, are sandwiched therebetween, the latter element 42 being interposed in the grooves 74 with the neck 86 of the longer-collared nut 46' inserted in the slot 88 of the keyhole 90 thereof, and the nut 46' projected to the rear of the sections so that the collar 92 thereof is received in the complementary right-hand crenels 72 of the bulkheads 68. Likewise, the two U-shaped elements 38 are slidably engaged by their flanges 40 between the benches 56 of the saddles 52 of the sections, and are projected toward the front of the sections, into the filleted vestibule 94 (FIG. 1) formed by the combined recesses, the springs 96 of the same meanwhile being caged between the elements 38 and the plain rectangular element 42 to the rear thereof, in the laterally benched cylindrical bores 98 thus formed by the saddles 52. In addition, the L-shaped element 44 is inserted downwardly through the slot 70 in the bulkhead 68 of the upper section 26', and the neck 100 of the short-collared nut 46'' is engaged in the slot 102 of the keyhole 104 thereof, before the element 44 is further inserted into the slot 70 of the lower section 26'', leaving the upper leg 44' of the element engaged in the groove 76 of the upper section 26', with the hole 50 therein engaged over the doweling 78, and the lip 48 thereon depending within the vestibule 94 against the bottom of the recess 60 in the upper section 26'.

The arms 30 of the bracket 28 correspond to one another in "gingerbread" configuration and extend in spaced parallel relationship to one another, at a

distance and breadth adapted to enable the rear end portions of the same to fit slidably over the block 26, between the feet 64' of the jambs 64 and the ribs 80 of the sections. The arms 30 are also equipped with longitudinally oriented slotted openings 106 in the rear end portions thereof, to accommodate the doweling 78 of the sections, after flanged bushings 107 are added thereabout; and have rearwardly projecting tongues 108 and 110 on the rear end edges thereof, which are spaced apart from one another to accommodate the ribs 80 therebetween, the right-hand tongues 110 being interconnected, moreover, by the unbent saddle 112 of the bracket, which is operationally positioned to the rear of the block 26 and has a pair of vertically aligned holes 114 therein, accommodating a pair of spring-loaded rivet-like buttons 116 which are peened into a captive state on the saddle, to act as yieldable actuators when the bracket is employed as the servo-operating carriage for the cap.

The cap 4 is trunnioned on a vertical axis between the forward end portions of the arms 30, and is detentably latched in the closed position thereof, as well as limited in the extent of its inswing between the arms when it assumes this position. The arms 30 have mutually opposing, deeply indented U-shaped notches 118 in the forward left-hand end edges thereof, and tongues 120 on the right-hand side of which are rounded and disposed at the forward right-hand corners of the arms, while the tongues 122 on the left-hand side thereof are double mitered and disposed to the rear of the forward left-hand corners. Both sets of tongues 120 and 122 have rounded holes 124 and 126 therein, and as shall be explained, the holes 124 in the rounded tongues 120 serve as the pivot points for the cap, whereas the holes 126 in the mitered tongues 122 serve as detents for the latch means on the cap.

The cap 4 comprises a front-recessed generally parallelepipedal housing 128 having rounded and chamfered corners 130 and 132 at the base 134 thereof and an embossed nose 136 therebetween at the top center edge of the base 134. In the base, there is a pair of sockets 138 for the bulbs 32 and a small diameter bore 140 passing between the sockets, out the rear of the housing through the nose 136. The front recess 142 of the housing is rabbetted to form a shoulder 144 on each vertical side wall thereof, as well as a slighter shoulder 146 along each horizontal side wall thereof. In addition, each of these latter walls has a pair of notches 148 removed therefrom at the opposite ends of the shoulders 146, as well as a groove 150 removed crosswise the rabbetted portion 151 thereof. The notches 148 have apertures 152 therein, which open on the outside of the housing.

The housing 128 is also recessed at the rounded back corner 130 thereof, the pocket 154 thus formed having mutually opposing apertures 156 in the side walls thereof.

The ground 34 of the cap 4 includes an elongated pin 158 having a reduced diameter neck 160 along the forward end portion thereof, about which a spring 162 is coiled in a captive state between the flanged head 164 and the greater diameter rear end portion of the pin. The pin 158 is carried in the bore 140 of the cap, and is interconnected with the bulbs 32 through an apertured bus bar 166 having a U-shaped notch 168 between the

apertures 170, in the upper edge thereof. The bus bar 166 is seated and registered with the sockets 138 in the bottom of the front recess 142 of the housing, with the notch 168 thereof straddled about the neck 160 of the pin 158 so that the flanged head 164 of the pin acts to retain the pin in the bore 140. In addition, each of the sockets 138 is lined with a metal sleeve 172 (FIG. 5), and the forward ends of the sleeves 172 are inserted through the apertures 170 in the bus bar 166, and peened over the rims thereof, to provide a common ground for the bulbs 32.

The cap 4 is otherwise completed by a lens assembly 174 of three plastic plates 176, 178, 180, one 176 of which is flanged to serve as a cover, and another 178 of which is colored to provide contrast for the third plate 180 which carries a legend thereon. The three plates are assembled in the foregoing order, and the assembly is inserted in the rabbetted portion 151 of the recess 142, there being transversely oriented ribs 182 outstanding on the waist portion of the cover 176 to engage in the grooves 150 of the housing.

The cap 4 is sized to insert between the arms 30 of the bracket 28, and is trunnioned at the forward end of the same by means of a pair of rivets 184 which are passed outwardly through the apertures 152 in the right-hand notches 148 of the recess 142, and thence through the apertures 124 in the rounded tongues 120 of the bracket 28, outside of which they are peened over exteriorly of the arms 30. In addition, two other rivets 186 are passed inwardly through the apertures 152 in the left-hand notches 148 of the recess 142 and peened over at a distance from the heads thereof, so that the heads can act as simple slide latches in conjunction with the left-hand notches 118 of the bracket 28. Also, a pair of center-collared, round-tipped pins 188 (FIG. 4) are inserted outwardly through the apertures of the pocket, and a coiled spring 190 is interposed in the pocket 154 between the pins 188 on the necks 192 of the same, to yieldably bias the tips of the pins 188 into the apertures 126 in the left-hand tongues 122 of the bracket, for purposes of detentally retaining the cap in the closed position thereof, when it is swung into the cartridge.

The block 26 is retained in the cartridge, with the bracket 28 and the cap 4 conjointly reciprocally engaged thereon, by bending the ears 20 of the cartridge into position behind the block, in the rabbetted rear end corners thereof, and then bending the top and bottom tabs 24 of the cartridge into position in front of the ribs 80 of the block, leaving the block captive between the ears and the tabs. At the same time, the thumbs 16 and the coiled springs 18 are added to the assembly, between the ears 20 and the jambs 64 of the block, so that the cartridge is mountable on the panel as indicated. The thumbs 16 have L-shaped configurations, and on the forward ends of the longer legs 194 of the same, there are three forwardly projecting fingers 196, 198 and 196, the outer 196 of which are bent into corresponding L-shape configurations, and the intermediate 198 of which is considerably shorter and is simply bent over to the other side of the longer leg 194 of the respective thumb. In the assembly, the remaining shorter end flanged leg 200 of each thumb is engaged behind the jamb 64 on that side of the mounting block 26 under the compression of the spring or springs 18

therebehind, (only one being shown) whereas the longer leg 194 is passed between the feet 64' of the block, to leave the fingers 196 projecting to the front therefrom adjacent the slotted openings 14 in the adjacent side wall 6' of the cartridge. Each thumb 16 is thus depressible to the rear against the bias 18 thereon, for purposes of passing the L-shaped fingers 196 thereof to and fro through the openings 14 by rocking the thumb about a crosswise axis thereof, again against the bias thereon. See FIG. 8. The operation is accomplished by swinging the cap 4 into the open position thereof, and inserting a screwdriver 202 or the like into the mouth of the cartridge, to the point at which it can be employed to depress, and then rock the thumb, in the manner of FIG. 8, the intermediate finger 198 assisting in engaging the screwdriver as shown.

Thus it is possible to insert the cartridge through the opening 10 of the panel 8 from the front, then simply engage the flanges 12 of the cartridge against the rim of the opening, and while the cartridge is so held, depress and rock each thumb 16 through the openings 14 of the cartridge in the manner of FIG. 8, so that when the fingers 196 thereof are released outside of the cartridge, they are driven against the inverse side of the panel, by the springs 18, with the effect that the cartridge is clamped to the rim of the opening 10 in the panel, regardless of the panel's thickness (see the dot-dash line 204 of FIG. 5).

Beforethen, of course, the switch unit 2 is attached to the rear of the cartridge, and in the case of the illustrated unit, this is accomplished by means of elongated cap screws 206 (FIG. 3) which are threaded into the sockets of the nuts 46 after the switch unit 2 is assembled as shown. The unit comprises a built-up assembly of back-to-back components, including a printed circuit mounted electrical subassembly 208, and a back-recessed parallelepipedal housing 210 within which the subassembly is enclosed in the deeply counterbored rear cavity 212 thereof. The housing 210 is rabbetted about the front end 214 thereof, to snugly engage in the rear end of the cartridge, behind the inturned ears 20 thereof; and in addition, the front end 214 is double-apertured at 216 to pass the cap screws 206 therethrough, for engagement with the nuts 46. Moreover, there is wide slot 218 removed from the front end 214 of the housing, to the depth of the rabbett 220, and the slot 218 is adapted to accommodate the saddle 112 of the carriage bracket 28, so that the actuator buttons 116 can operate the inboard spring-loaded actuator posts 222 of the switch modules 224 in the subassembly 208, when the cap and carriage bracket are depressed to the rear.

The remainder of the switch unit 2 includes a pair of multiapertured carrier blocks 226 and 228 for the leads (not shown) to the subassembly, the more forward 226 of which blocks is end edge rabbetted at the front to interengage with the back recess 212 of the housing 210, when the subassembly 208 is enclosed therein, and end edge rabbetted at the back, to engage with a front recess 230 in the rearward 228 of the two blocks, the back face of which is also recessed to accommodate a front edge rabbetted and front embossed end plate 232 for the unit 2.

What is claimed is:

1. In combination, an open ended tube-like cartridge having an electrical device associated therewith, a shuttle reciprocally guided in the cartridge, and having a cap thereon which is conjointly reciprocable therewith adjacent the open end of the cartridge, and which is disposed about a fixed axis of the shuttle transverse the longitudinal axis of the cartridge, to rotate in response to forces applied thereon about the axis of the shuttle, means operable to detain the cap against rotation in one angular direction thereof when the component of the forces tangential to the rotational course of the cap, at the point of application of the forces, is parallel to the longitudinal axis of the cartridge, means on the shuttle for operating the device when the cap is in the detained position thereof and the shuttle is reciprocated in one reciprocable direction thereof, and means operable to bias the shuttle in the other reciprocable direction thereof when the device is operated by the shuttle.

2. The combination according to claim 1 wherein the rotational axis of the cap is disposed eccentrically thereof and is offset from the longitudinal axis of the cartridge.

3. The combination according to claim 2 wherein the cap detention means are disposed on the opposite side of the longitudinal axis of the cartridge from the rotational axis of the cap.

4. The combination according to claim 2 wherein the cap registers with the open end of the cartridge in the detained position thereof, and is reciprocable into and out of the open end of the cartridge with the shuttle.

5. The combination according to claim 4 wherein the rotational axis of the cap is disposed adjacent one of the sides thereof which extends generally longitudinally of the cartridge when the cap is in registry with the open end thereof.

6. The combination according to claim 5 wherein the cap detention means are disposed adjacent the other side of the cap which extends generally longitudinally of the cartridge when the cap is in registry with the open end thereof.

7. The combination according to claim 1 wherein the biasing means is interposed between the cartridge and the cap when the cap is in the detained position thereof.

8. The combination according to claim 7 wherein the shuttle is reciprocally guided on a mandrel secured within the cartridge, transversely thereof, and the biasing means are interposed between the mandrel and the cap in the detained position thereof.

9. The combination according to claim 8 wherein the shuttle takes the form of a yoke-like carriage which is slidably guided on the mandrel, to reciprocate longitudinally of the cartridge, and which has the cap trunnioned between the arms thereof, to register with the open end of the cartridge at a point opposite a spring-loaded biasing element on the mandrel.

10. The combination according to claim 9 wherein the cap detention means includes detent means on the cap and the arms of the carriage which are cooperatively engageable with one another when the cap reaches the aforesaid point of registry.

11. The combination according to claim 8 wherein the cap has electrically operated means therein, and the guide mandrel has electrical contacts thereon

through which the electrical means in the cap are operated.

12. The combination according to claim 11 wherein the electrical contacts include the biasing means.

13. The combination according to claim 1 wherein the electrical device is mounted on the cartridge.

14. The combination according to claim 11 wherein the electrical device is fastened to the mandrel on the opposite side thereof from the cap.

15. The combination according to claim 14 wherein the electrical contacts on the mandrel include the means for fastening the device thereto.

16. The combination according to claim 1, wherein the cartridge has means thereon defining a pair of fixed stops which are transversely offset from the longitudinal axis of the cartridge, at locations that are removed relatively lesser and greater distances from the axis of the cartridge, so that the stops pass within and abut the rim of an opening in a panel, respectively, when the cartridge is inserted in the opening, and which moreover, are offset from one another in the axial directions of the cartridge, adjacent the open end thereof, and a third stop which is reciprocally mounted in the cartridge adjacent the axis thereof, on the opposite side of the lesser offset stop from the greater offset stop, and yieldably biased in the direction of the open end of the cartridge, along a course parallel to the axis thereof, and which moreover, has means thereon that are rotatable against the bias thereof, about an axis transverse the course thereof, and operatively retractable to a point adjacent the lesser offset stop, to be rotated between the opposing sides of the lesser offset stop, to and from an abutting condition therewith, on the side thereof adjacent the greater offset stop, for purposes of clamping the cartridge to the rim of the opening.

17. In combination, an open-ended tube-like cartridge having a shuttle reciprocally guided therein, which in turn has a cap thereon that is conjointly reciprocal with the shuttle, adjacent the open end of the cartridge, and disposed about a fixed axis of the shuttle offset from and transverse the longitudinal axis of the cartridge, to rotate in response to forces applied thereon about the axis of the shuttle, means operable to detain the cap against rotation in one angular direction thereof when the component of the forces tangential to the rotational course of the cap, at the point of application of the forces, is parallel to the longitudinal axis of the cap, and means operable to bias the shuttle in the direction relatively outward of the cartridge at the open end thereof, when the cap is in the detained position thereof and the shuttle is reciprocated in the direction relatively inward of the cartridge at the open end thereof.

18. The combination according to claim 17, wherein the rotational axis of the cap is disposed eccentrically thereof, and the cap detention means are disposed on the opposite side of the longitudinal axis of the cartridge from the rotational axis of the cap.

19. The combination according to claim 17, wherein the cartridge has means thereon for clamping the same to the rim of an opening in a panel.

20. The combination according to claim 19, wherein the cartridge has an outturned flange on the open end portion thereof, and a slotted opening in the longitu-

dinally extending side wall thereof, offset from the flange in the relatively rearward axial direction thereof, and the clamping means includes a thumb which is reciprocally mounted in the cartridge and yieldably biased in the direction of the open end thereof along a course parallel to the axis thereof, opposite the opening in the side wall thereof, and which moreover, has means thereon that are rotatable against the bias thereof, about an axis transverse the course thereof, at the opening, to be rotated to and fro through the opening, to and from an abutting condition with the side wall of the cartridge, on the outside thereof, opposite the flange, for purposes of clamping the cartridge to the rim of the opening.

21. An open-ended tube-like cartridge having means thereon defining a pair of fixed stops which are transversely offset from the longitudinal axis of the cartridge, at locations that are removed relatively lesser and greater distances from the axis, so that the stops pass within and abut the rim of an opening in a panel, respectively, when the cartridge is inserted in the opening, and which moreover, are offset from one another in the axial directions of the cartridge, adjacent the open end thereof, and a third stop which is reciprocally mounted in the cartridge adjacent the axis thereof, on the opposite side of the lesser offset stop from the greater offset stop, and yieldably biased in the direction of the open end of the cartridge, along a course parallel to the axis thereof, and which moreover has means thereon that are rotatable against the bias thereof, about an axis transverse the course thereof, and operatively retractable to a point adjacent the lesser offset stop, to be rotated between the opposing sides of the lesser offset stop, to and from an abutting condition therewith, on the side thereof adjacent the greater offset stop, for purposes of clamping the cartridge to the rim of the opening.

22. The cartridge according to claim 21 wherein the travel of the third stop, in the direction of the bias thereon, is limited to a point disposed within the cartridge, between the point of rotation of the clamping means and the open end of the cartridge.

23. The cartridge according to claim 22 wherein the fixed stops are defined by the open end portion of the cartridge and an outturned flange thereon.

24. The cartridge according to claim 23 wherein the cartridge has a slotted opening in one longitudinally extending side wall thereof, at the point of rotation of the clamping means.

25. The cartridge according to claim 24 wherein the cartridge has a jamb wall therein spaced transversely apart from the one side wall thereof, and the third stop is disposed to reciprocate in the space between the walls of the cartridge, and adapted to abut the jamb wall at the limit point in the travel thereof.

26. The cartridge according to claim 25 wherein the body of the third stop is L-shaped in configuration.

27. The cartridge according to claim 26 wherein the clamping means on the third stop include an outturned finger on the forward end portion of the body thereof.

28. The cartridge according to claim 27 wherein the finger is L-shaped in configuration.

29. The cartridge according to claim 26 wherein the third stop has means thereon disposed transverse the body thereof, for engagement with a tool capable of retracting the stop against the bias thereon.

30. The cartridge according to claim 29 wherein the tool-engaging means includes an inturned finger on the third stop between the respective L-shaped configurations of the outturned finger and the body thereof.

31. The cartridge according to claim 21, having a cap thereon adjacent the open end thereof, which is rotatable about an axis transverse the longitudinal axis of the cartridge.

32. The combination according to claim 31, wherein the rotational axis of the cap is disposed eccentrically thereof and is offset from the longitudinal axis of the cartridge.

33. The combination according to claim 32, wherein the cap registers with the open end of the cartridge and is mounted to reciprocate into and out of the open end of the cartridge.

34. The cartridge according to claim 21 having an electrical device thereon.

35. The cartridge according to claim 34 wherein the device is defined within the bounds prescribed by the distance of the lesser offset stop, and is removably connected to the cartridge to be inserted and withdrawn therewith, through the opening in the panel.

36. The cartridge according to claim 35 wherein the device includes a pair of mounting members having an electrical subassembly sandwiched therebetween, the resulting laminar assembly of which is clamped together and connected to the cartridge by means of fasteners passed through the assembly and secured on the cartridge.

37. The cartridge according to claim 36 wherein a shuttle is slidably guided in the cartridge on a mandrel connected within the cartridge, transverse thereof, and the fasteners are secured to the mandrel.

38. The cartridge according to claim 36 wherein there is a cap on the open end thereof, which is equipped with electrically operated means that are electrically powered through the fasteners.

39. In combination, an open-ended tube-like cartridge having means thereon for clamping the cartridge to the rim of an opening in a panel when the cartridge is inserted therein, and an electrical device on the cartridge which is adapted to pass within the rim of the opening when the device is inserted therein, and which includes a pair of mounting members having an electrical subassembly sandwiched therebetween, the resulting laminar assembly of which is clamped together and connected to the cartridge by means of fasteners passed through the assembly and secured on the cartridge.

40. The combination according to claim 39 wherein a shuttle is slidably guided in the cartridge on a mandrel connected within the cartridge, transverse thereof, and the fasteners are secured to the mandrel.

41. The combination according to claim 39 wherein there is a cap on the open end of the cartridge, which is equipped with electrically operated means that are electrically powered through the fasteners.

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