

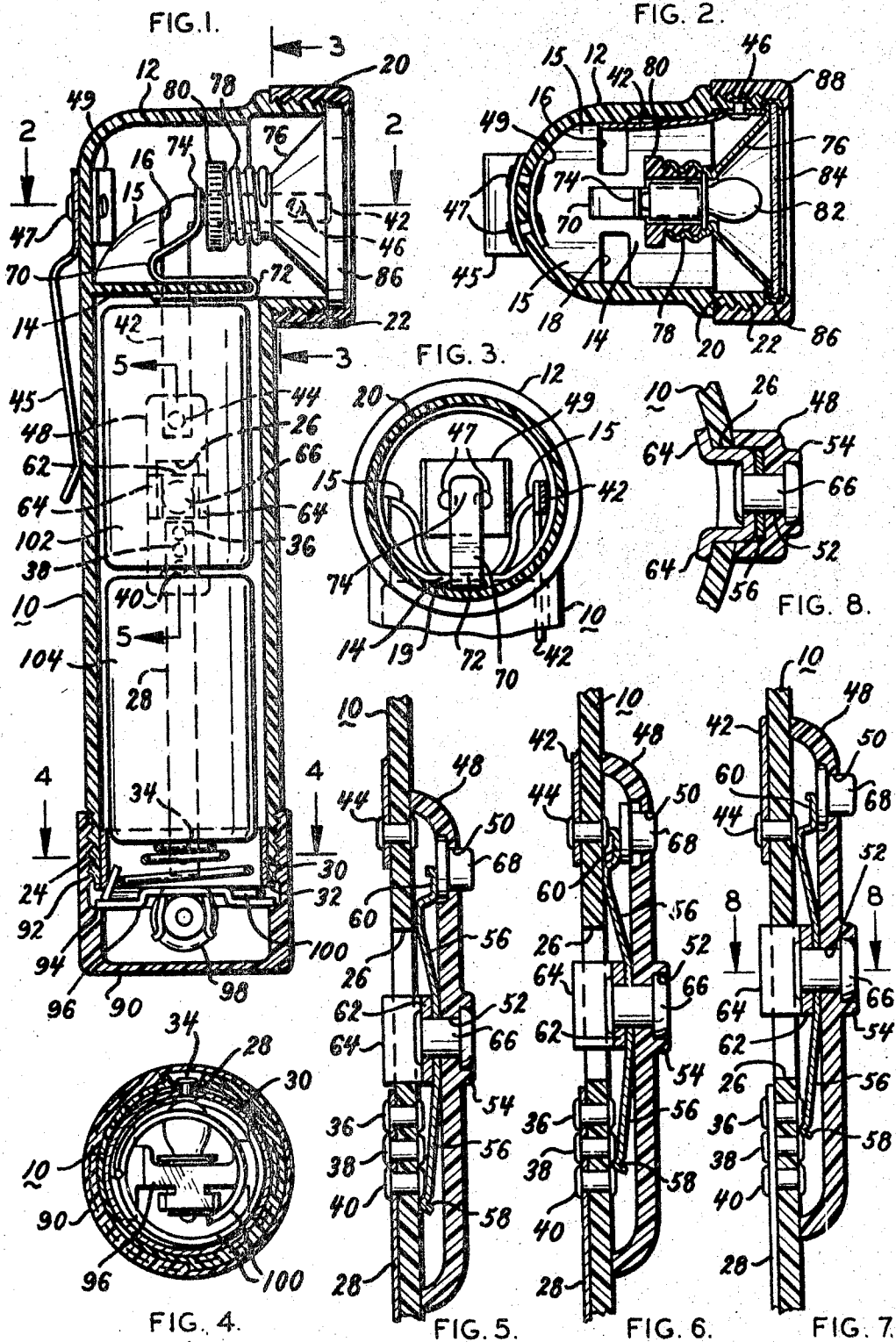
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FLASHLIGHT AND SWITCH THEREFOR

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FLASHLIGHT AND SWITCH THEREFOR
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This invention relates to improvements in molded articles and methods of making same. More particularly, this invention relates to improvements in flashlights which are made of plastic material.

It is, therefore, an object of the present invention to provide an improved flashlight which is made of plastic material.

In making a flashlight of plastic material, it is customary to provide a blade-type conductor, adjacent one end of the housing for that flashlight, which can abut and electrically engage a combined reflector and threaded socket for a lamp. That blade-type conductor extends to the switch of the flashlight; and a further blade-type conductor extends from that switch to the other end of the housing for that flashlight. Some difficulty has been experienced with the blade-type conductors which extend from the combined reflectors and threaded sockets for the lamps to the electric switches of flashlights made of plastic material; because those conductors could readily become bent to the point where they were not usable. It would be desirable to provide a flashlight which is made of plastic material and which has a blade-type conductor, between the switch and the combined reflector and threaded socket for the lamp, that is substantially free from the risk of being bent. The present invention provides such a flashlight; and it is, therefore, an object of the present invention to provide a flashlight which is made of plastic material and which has a blade-type conductor, between the switch and the combined reflector and threaded socket for the lamp, that is substantially free from the risk of being bent.

The switches of flashlights which are made of plastic material are frequently unsubstantial in nature and unsatisfactory in use. It would be desirable to provide a switch, for flashlights which are made of plastic material, that is inexpensive but that is sturdy and is reliable in operation. The present invention provides such a switch; and it is, therefore, an object of the present invention to provide a switch for a flashlight, which is made of plastic material, that is inexpensive but that is sturdy and is reliable in operation.

Other and further objects and advantages of the present invention should become apparent from an examination of the drawing and accompanying description.

In the drawing and accompanying description a preferred embodiment of the present invention is shown and described but it is to be understood that the drawing and accompanying description are for the purpose of illustration only and do not limit the invention and that the invention will be defined by the appended claims.

In the drawing:

FIG. 1 is a vertical section through one embodiment of flashlight which is made of plastic material and which is made in accordance with the principles and teachings of the present invention,

FIG. 2 is a sectional view through the flashlight of FIG. 1, and it is taken along the plane indicated by the line 2—2 in FIG. 1,

FIG. 3 is another sectional view through the flashlight of FIG. 1, and it is taken along the plane indicated by the line 3—3 in FIG. 1,

FIG. 4 is still another sectional view through the flashlight of FIG. 1, and it is taken along the plane indicated by the line 4—4 in FIG. 1,

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FIG. 5 is a sectional view, on a larger scale, through the switch of the flashlight of FIG. 1,

FIG. 6 is a sectional view which is similar to that of FIG. 5 but wherein the switch is in the "flash" position,

FIG. 7 is a sectional view which is similar to that of FIG. 5 but wherein the switch is in the "on" position, and

FIG. 8 is a sectional view through the switch that is shown in FIGS. 5—7 and it is taken along the plane indicated by the line 8—8 in FIG. 7.

Referring to the drawing in detail, the numeral 10 generally denotes the body portion of a flashlight housing which is made of plastic material. While different plastic materials could be used, ethyl cellulose is a preferred plastic material. A right-angle offset 12 is provided at the upper end of the body portion 10, and a partition 14 is disposed between the right-angle offset and the body portion 10. The partition 14 is provided with upwardly and inwardly bowed portions 15; and those portions are shown particularly by FIGS. 1 and 3. A slot 16 is provided in one of those upwardly and inwardly bowed portions, and a slot 18 is provided in the other of those upwardly and inwardly bowed portions. Those slots place the right-angle offset 12 in communication with the body portion 10. A narrow slot 19 also is provided in the partition 14, and that slot also places the right-angle offset 12 in communication with the body portion 10. The slot 19 is spaced forwardly of the slot 16, as shown particularly by FIG. 1. The right-angle offset 12 has a cylindrical end 20; and that cylindrical end projects outwardly beyond the slot 19. A helical screw thread 22 is molded onto the exterior of the cylindrical end 20 of the right-angle offset 12.

A helical screw thread 24 is formed on the lower end of the body portion 10, as shown particularly by FIG. 1. A generally rectangular slot 26 is provided in the wall of the body portion 10, intermediate the right-angle offset 12 and the thread 24 at the lower end of that body portion. A blade-type conductor 28 of elongated form is disposed at the inner surface of the body portion 10, and that conductor extends from a point adjacent the lower end of that body portion to a point immediately adjacent the lower portion of the slot 26. A sleeve 30, with a radially-extending annular flange 32, telescopes into the lower end of the body portion 10; and that sleeve underlies the lower end of the blade-type conductor 28, as shown particularly by FIG. 4. A fastener 34 of electrically-conductive material, such as a metal rivet, extends through openings in the body portion 10, the blade conductor 28 and the sleeve 30; and that fastener permanently holds that sleeve and that blade conductor in electrical engagement with each other and in assembled relation with the body portion 10. A small recess is formed in the outer surface of the lower end of the body portion 10; and that recess accommodates the outer end of the fastener 34. That recess keeps the outer end of that fastener from "blocking" the helical screw thread 24. Fasteners 36, 38 and 40 of electrically conductive material, such as metal rivets, extend through openings in the upper end of the blade-type conductor 28 and in the wall of the body portion 10 to hold that upper end of that blade-type conductor in assembled relation with that body portion. The fasteners 36, 38 and 40 are disposed adjacent each other but are physically spaced apart to define indentations therebetween; and all of those fasteners are in electrically-conducting engagement with the upper end of the blade-type conductor 28.

The numeral 42 denotes a blade-type conductor of L-shaped configuration; and the long arm of that conductor is parallel to the axis of the body portion 10, while the short arm of that conductor is parallel to the axis of the right-angle offset 12. The long arm of the conductor 42 extends through the slot 16 and extends toward the

upper edge of the slot 26 in the wall of the body portion 10. The short arm of that conductor extends to, and projects a short distance beyond, the front face of the cylindrical end 20 of the right-angle offset 12. A fastener 44 of electrically-conductive material, such as a metal rivet, extends through an opening in the lower end of the long arm of the conductor 42 and through an opening in the wall of the body portion 10 to fixedly secure that lower end to that body portion. That fastener will be in electrically-conducting relation with that conductor. A fastener 46 such as a rivet, extends through an opening in the forward end of the short arm of the conductor 42 and through an opening in the cylindrical end 20 of the right-angle offset 12 to maintain that short arm in assembled relation with that cylindrical end. The fastener 46 is immediately adjacent the free end of the short arm of the conductor 42, and it will provide full support for that free end. A small recess is formed in the outer surface of the cylindrical end 20 of the right-angle offset 12; and that recess accommodates the outer end of the fastener 46. That recess keeps the outer end of that fastener from "blocking" the helical screw thread 22.

The numeral 45 denotes a clip of standard design; and the upper end of that clip has openings therein to accommodate fasteners 47, such as rivets. A keeper plate 49 is disposed within the right-angle offset 12; and that keeper plate has openings therein to accommodate the inner ends of the fasteners 47. Those fasteners will permanently secure the upper end of the fastener 45 to the flashlight; and, while the lower end of that clip will normally bear against the body portion 10, that lower end can be moved away from that body portion to permit that lower end to telescope over a belt or other portion of the apparel of the user.

The numeral 48 denotes an elongated hollow slide of insulating material; and that slide can be made of the same material of which the body portion 10, the right-angle offset 12, and the partition 14 are made. A generally cylindrical opening 50 is provided in the upper end of the slide 48, and that opening has an enlarged-diameter inner end. A second generally cylindrical opening 52 is provided in the slide 48, adjacent the center of that slide; and an annular rib 54 is provided on the outer face of that slide adjacent that opening. That rib and the opening 52 are preferably concentric.

An elongated contactor 56 is disposed within the hollow portion of the slide 48; and that contactor has a generally V-shaped reentrant lower end 58 and an offset upper end 60. An opening in the center of the contactor 56 is in register with the opening 52 in the slide 48; and a guide 62, which is generally U-shaped in cross section, has an opening in the closed end thereof that is in register with the opening 52 and with the opening in the contactor 56. Those various openings accommodate the shank of a fastener 66, such as a rivet; and that fastener permanently secures the contactor 56 and the guide 62 to the slide 48. The legs of the guide 62 are dimensioned to fit within the slot 26 in the wall of the body portion 10 of the flashlight; and those legs have feet 64 which project outwardly beyond the sides of the slot 26 to underlie those sections of the wall of the body portion 10 which define the sides of the slot 26. Those feet hold the slide 48, the contactor 56, and the guide 62 in assembled relation with the body portion 10 of the flashlight while permitting reciprocation of that slide, that contactor, and that guide relative to that body portion. A push button 68, with a radially-extending flange at the inner end thereof, is disposed within the opening 50 in the slide 48; and that push button is in register with the offset upper end 60 of the contactor 56. That push button will be disposed within the opening 50 before the contactor 56 and the guide 62 are secured to the slide 48 by the fastener 66.

The numeral 70, adjacent the upper part of FIG. 1, denotes a contact which has a U-shaped clamping portion 72 and a springy end 74. The free end of the U-shaped

clamping portion 72 extends through the slot 19 and underlies the partition 14; and that U-shaped clamping portion is dimensioned to intimately engage that partition, and thereby prevent accidental separation of the contact 70 from the flashlight.

A combined reflector 76 and threaded socket 78 of standard design is dimensioned so the greater portion thereof will fit within the right-angle offset 12 and the cylindrical end 20 of that right-angle offset. However, the outer end of the reflector portion 76 will have a larger diameter than the inner diameter of the cylindrical end 20. A threaded retainer 80 can coax with the threaded socket 78 to releasably hold a lamp 82 in assembled relation with the combined reflector 76 and threaded socket 78. A transparent disc 84 will abut the large diameter portion of the reflector 76 and will thus overlie the lamp 82. A resilient annulus 86 of U-shaped cross section will releasably secure the disc 84 to the reflector 76.

An annular retainer 88 has an internal screw thread which can mate with the external screw thread 22 on the cylindrical end 20 of the right-angle offset 12. That retainer has an inwardly-extending flange which can strongly urge the resilient annulus 86, the disc 84, and the large diameter portion of the reflector 76 toward the free end of the short arm of the conductor 42. As a result, the retainer 88 will coax with the resilient annulus 86 to resiliently hold the large diameter portion of the reflector 76 in electrically-conducting relation with the free end of the conductor 42. Because that free end receives full and immediate support from the fastener 46 and from the adjacent portion of the cylindrical end 20 of the right-angle offset 12, that free end is able to resist bending—despite any tightening forces which might be applied to the annular retainer 88 by a heavy-handed user. This is important; because it assures full electrical engagement between the reflector 76 and the conductor 42 at all times.

The numeral 90 denotes a cup-shaped closure which has an internal screw thread 92 and a shoulder 94 adjacent the lower end of that thread. The internal screw thread 92 can mate with the external screw thread 24 at the lower end of the body portion 10 of the flashlight. A lamp-holding bracket 96 of standard design rests upon the shoulder 94 in the closure 90; and that bracket can hold an extra lamp 98. A spiral spring 100 is dimensioned to fit snugly within the upper portion of the closure 90; and that spring will normally hold the lamp-holding bracket 96 within that closure. However, when desired, that spring can yield sufficiently to permit it to be withdrawn from the closure 90, so the lamp-holding bracket 96 can be removed from that closure to make the extra lamp 98 available for replacement purposes.

The numerals 102 and 104 denote primary batteries which can be inserted into the body portion 10 through the sleeve 30 adjacent the lower end of that body portion. The central contact of the battery 102 will engage the U-shaped portion 72 of the contact 70, and the central contact of the battery 104 will engage the bottom of the casing of the battery 102. The bottom of the casing of the battery 104 will engage the spring 100; and that spring will engage the flange 32 on the sleeve 30.

The annular retainer 88 will hold the center contact of the lamp 82 in electrically-conducting engagement with the springy end 74 of the contact 72. Also, that annular retainer will hold the reflector 76 in electrically-conducting engagement with the free end of the short arm of the conductor 42. This means that whenever the batteries 102 and 104 are in position, and whenever the annular retainer 88 and the closure 90 are in position, a continuous circuit is provided from the fastener 44 via conductor 42, reflector 76, threaded socket 78, lamp 82, contact 70, primary battery 102, primary battery 104, spring 100, sleeve 30, and conductor 28 to the fasteners 40, 38 and 36.

The reentrant lower end 58 of the contactor 56 will always engage one or more of the fasteners 40, 38 and 36;

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and, whenever the offset upper end 60 of that contactor is moved into engagement with the fastener 44, as shown by FIG. 7, the circuit within the flashlight will be completed and the lamp 82 will be illuminated. At such time, the reentrant lower end 58 of the contactor 56 will be lodged within the recess between fasteners 36 and 38 and will resist shifting of the contactor 56 out of the "on" position of FIG. 7. In the "off" position of the slide 48, shown by FIG. 5, the offset end 60 of the contactor 56 is longitudinally displaced from the fastener 44. As a result, even if the "flash" button 68 were to be pushed inwardly, to bend the offset end 60 of the contactor 56 inwardly, that offset end could not be caused to engage the fastener 44. At such time, the reentrant lower end 58 of the contactor 56 will engage the lower face of the fastener 40 and resist accidental shifting of the slide 48 upwardly away from the position shown in FIG. 5. However, whenever desired, the user of the flashlight can shift the slide 48 upwardly until the reentrant lower end 58 of the contactor 56 comes to rest in the recess between the fasteners 38 and 40; and, at such time, that reentrant lower end will tend to hold the slide 48 in the position shown by FIG. 6. This means that the offset end 60 of that contactor will be in register with the fastener 44; and the user of the flashlight can illuminate the lamp 82 by pressing inwardly on the "flash" button 68. The "flash" position of that button is shown by FIG. 6; and the normal position of that button is shown by FIGS. 5 and 7.

The reentrant lower end 58 of the contactor 56 will hold the slide 48 in its "off," "flash" or "on" positions as long as desired; and it will thereby avoid accidental shifting of the slide 48. However, the V-shaped configuration of that reentrant lower end enables the outer faces of that lower end to act as inclined planes, and thereby ease that lower end out of the recesses between the fasteners 36, 38 and 40 whenever the user of the flashlight wishes to shift the slide 48.

Whereas the drawing and accompanying description have shown and described a preferred embodiment of the present invention it should be apparent to those skilled in the art that various changes may be made in the form of the invention without affecting the scope thereof.

What I claim is:

1. In a flashlight which has a housing with an opening at one end thereof, a lamp adjacent the other end of said housing, a switch, a blade-type conductor extending from said switch toward said lamp, and a second blade-type conductor extending from said switch toward said one end of said housing; the improvement which comprises:

- (a) a fastener which secures one end of the first said blade-type conductor to said housing adjacent said switch,
- (b) a plurality of fasteners securing one end of said second blade-type conductor to said housing adjacent said switch,
- (c) all of said fasteners being electrically conductive,
- (d) said fasteners of said plurality of fasteners being aligned and being closely adjacent each other,
- (e) a slide for said switch,
- (f) an elongated resilient contactor for said switch which is secured to and movable with said slide,
- (g) said contactor having a reentrant end which is selectively disposable in recesses intermediate and defined by said fasteners of said plurality of fasteners,
- (h) said reentrant end coacting with said fasteners of said plurality of fasteners to prevent accidental shifting of said slide and said contactor,
- (i) said contactor having an offset adjacent the other end thereof,
- (j) said other end of said contactor being selectively movable into register with the first said fastener to permit a flash button carried by said slide to press said other end of said contactor into engagement with the first said fastener,
- (k) said reentrant end of said contactor being lodged

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within a recess between two of said fasteners of said plurality of fasteners whenever said other end of said contactor is in register with the first said fastener,

- (l) said other end of said contactor being movable into abutting engagement with the first said fastener to turn said switch "on,"
 - (m) said reentrant end of said contactor being lodged within a recess between two of said fasteners of said plurality of fasteners whenever said other end of said contactor is in abutting engagement with the first said fastener,
 - (n) the outer faces of said reentrant end of said contactor acting as inclined planes to ease said reentrant end out of said recesses defined by said fasteners of said plurality of fasteners,
 - (o) said contactor being elongated and arcuate and being secured to said slide adjacent the center thereof,
 - (p) a combined reflector and holder for said lamp,
 - (q) a recess in said housing adjacent said other end of said housing which can accommodate said combined reflector and holder for said lamp,
 - (r) a helical screw thread at the exterior of said housing adjacent said other end of said housing,
 - (s) the other end of the first said blade-type conductor extending to and projecting a short distance beyond said other end of said housing,
 - (t) said other end of said housing having an opening therein intermediate the ends of said helical screw thread and having a recess surrounding said opening,
 - (u) the first said blade-type conductor having an opening therein in register with said opening in said other end of said housing,
 - (v) a securing fastener that is disposed within said opening in the first said blade-type conductor and within said opening and said recess in said other end of said housing,
 - (w) said securing fastener and said opening in the first said blade-type conductor being closely adjacent said other end of said first said blade-type conductor so said other end of said first said blade-type conductor receives full support from said other end of said housing and is thus strongly resistant to bending,
 - (x) said recess in said other end of said housing keeping said fastener from blocking said helical screw thread,
 - (y) said other end of said housing being offset at a right-angle from the rest of said housing,
 - (z) a partition intermediate said one end and said other end of said housing which has slots therein, and
 - (aa) a resilient contact that has a U-shaped reentrant end and a springy end,
 - (ab) one of said slots in said partition accommodating part of the first said blade-type conductor,
 - (ac) another of said slots accommodating part of said U-shaped reentrant end of said resilient contact,
 - (ad) said U-shaped reentrant end of said resilient contact intimately engaging said partition and preventing accidental separation of said resilient contact from said housing,
 - (ae) said springy end of said resilient contact being adapted to receive the center contact of said lamp.
2. In a flashlight which has a housing with an opening at one end thereof, a lamp adjacent the other end of said housing, a switch, a blade-type conductor extending from said switch toward said lamp, and a second blade-type conductor extending from said switch toward said one end of said housing; the improvement which comprises:
- (a) a fastener which secures one end of the first said blade-type conductor to said housing adjacent said switch,
 - (b) a plurality of fasteners securing one end of said second blade-type conductor to said housing adjacent said switch,
 - (c) all of said fasteners being electrically conductive,

- (d) said fasteners of said plurality of fasteners being aligned and being closely adjacent each other,
- (e) a slide for said switch, and
- (f) an elongated resilient contactor for said switch which is secured to and movable with said slide, 5
- (g) said contactor having a reentrant end which is selectively disposable in recesses intermediate and defined by said fasteners of said plurality of fasteners,
- (h) said reentrant end coacting with said fasteners of said plurality of fasteners to prevent accidental shifting of said slide and said contactor, 10
- (i) said contactor having an offset adjacent the other end thereof,
- (j) Said other end of said contactor being selectively movable into register with the first said fastener to permit a flash button carried by said slide to press said other end of said contactor into engagement with the first said fastener, 15
- (k) said reentrant end of said contactor being lodged within a recess between two of said fasteners of said plurality of fasteners whenever said other end of said contactor is in register with the first said fastener, 20
- (l) said other end of said contactor being movable into abutting engagement with the first said fastener to turn said switch "on," 25
- (m) said reentrant end of said contactor being lodged within a recess between two of said fasteners of said plurality of fasteners whenever said other end of said contactor is in abutting engagement with the first said fastener, 30
- (n) the outer faces of said reentrant end of said contactor acting as inclined planes to ease said reentrant end out of said recesses defined by said fasteners of said plurality of fasteners, 35
- (o) said contactor being elongated and arcuate and being secured to said slide adjacent the center thereof.
- 3. In a flashlight which has a housing with an opening at one end thereof, a lamp adjacent the other end of said housing, a switch, a conductor extending from said switch toward said lamp, and a second conductor extending from said switch toward said one end of said housing; the improvement which comprises: 40
- (a) a fastener which secures one end of the first said conductor to said housing adjacent said switch, 45
- (b) a plurality of fasteners securing one end of said second conductor to said housing adjacent said switch,
- (c) all of said fasteners being electrically conductive, 50
- (d) said fasteners of said plurality of fasteners being aligned and being closely adjacent each other,
- (e) a slide for said switch,
- (f) a contactor for said switch which is secured to and movable with said slide, 55
- (g) said contactor having a reentrant end which is selectively disposable in recesses intermediate and defined by said fasteners of said plurality of fasteners,
- (h) said reentrant end coacting with said fasteners of said plurality of fasteners to prevent accidental shifting of said slide and said contactor, 60
- (i) the other end of said contactor being selectively movable into register with the first said fastener to permit a flash button carried by said slide to press said other end of said contactor into engagement with the first said fastener, 65
- (j) said reentrant end of said contactor being lodged within a recess between two of said fasteners of said plurality of fasteners whenever said other end of said contactor is in register with the first said fastener. 70

- (k) said other end of said contactor being movable into abutting engagement with the first said fastener to turn said switch "on,"
- (l) said reentrant end of said contactor being lodged within a recess between two of said fasteners of said plurality of fasteners whenever said other end of said contactor is in abutting engagement with the first said fastener,
- (m) the outer faces of said reentrant end of said contactor acting as inclined planes to ease said reentrant end out of said recesses defined by said fasteners of said plurality of fasteners,
- (n) said contactor being elongated and being secured to said slide adjacent the center thereof.
- 4. In a flashlight which has a housing with an opening at one end thereof, a lamp adjacent the other end of said housing, a switch, a conductor extending from said switch toward said lamp, and a second conductor extending from said switch toward said one end of said housing; the improvement which comprises:
- (a) one end of the first said conductor being adjacent said switch,
- (b) a plurality of fasteners securing one end of said second conductor to said housing adjacent said switch,
- (c) said fasteners being electrically conductive,
- (d) said fasteners being closely adjacent each other,
- (e) a slide for said switch,
- (f) a contactor for said switch which is secured to and movable with said slide,
- (g) said contactor having a reentrant end which is selectively disposable in recesses intermediate and defined by said fasteners,
- (h) said reentrant end coacting with said fasteners to prevent accidental shifting of said slide and said contactor,
- (i) the other end of said contactor being selectively movable into register with said one end of the first said conductor to permit a flash button carried by said slide to press said other end of said contactor into engagement with said one end of said first said conductor,
- (j) said reentrant end of said contactor being adjacent, and having movement thereof limited by, one of said fasteners whenever said other end of said contactor is in register with said one end of said first said conductor,
- (k) said other end of said contactor being movable into abutting engagement with said one end of said first said conductor to turn said switch "on,"
- (l) said reentrant end of said contactor being adjacent, and having movement thereof limited by, another of said fasteners whenever said other end of said contactor is in abutting engagement with said one end of said first said conductor,
- (m) the outer faces of said reentrant end of said contactor acting as inclined planes to ease said reentrant end past said fasteners.

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