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FLASHLIGHT ELECTRIC TESTERS

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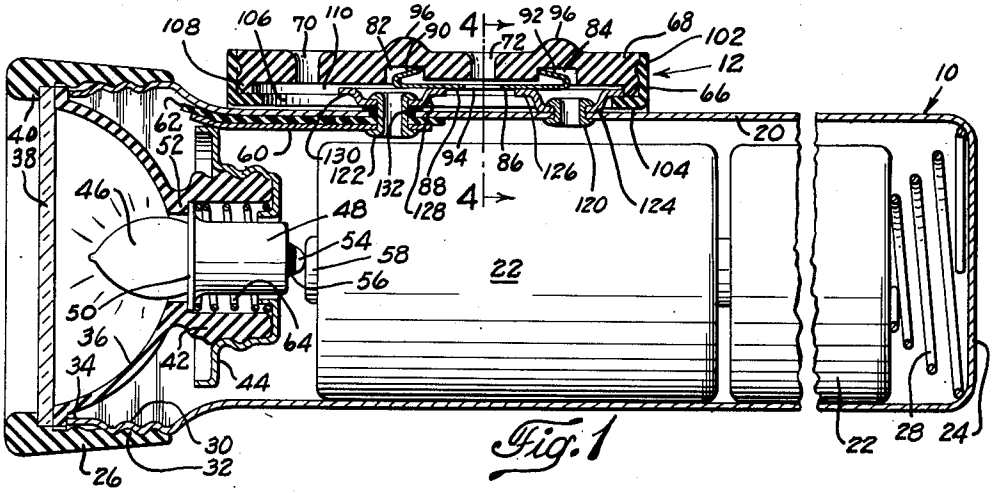


Fig. 1

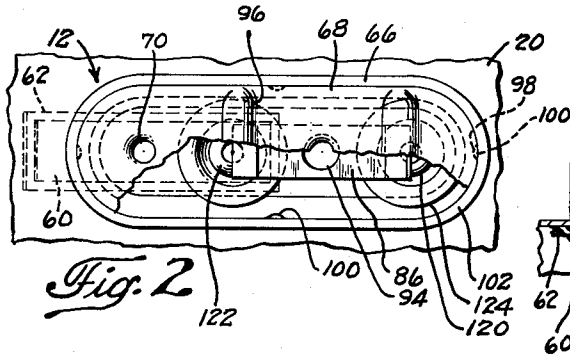


Fig. 2

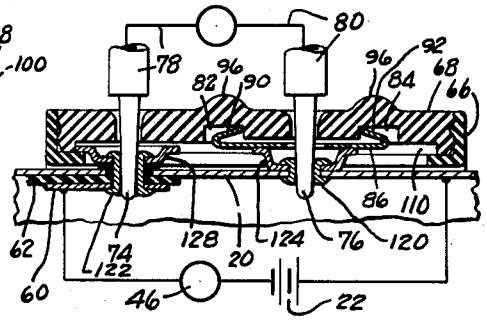


Fig. 3

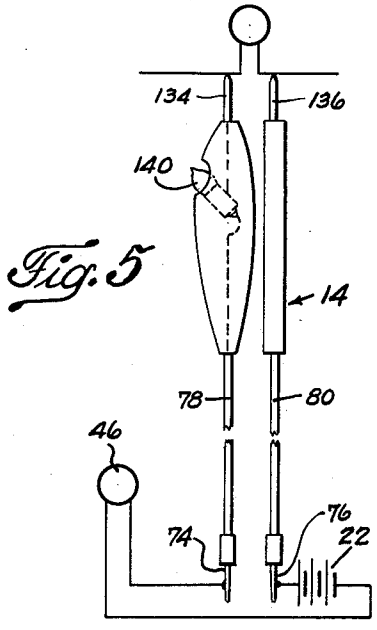


Fig. 5

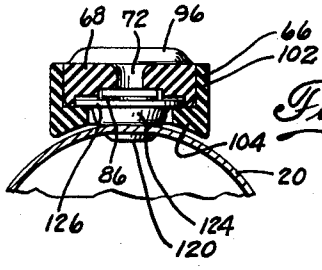


Fig. 4

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FLASHLIGHT ELECTRIC TESTERS

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The present invention relates to improvements in flashlight electric testers.

More particularly, the present invention is concerned with a flashlight tester which is especially well suited and adapted to test and explore electrical circuits which have become defective due to breakage of conductors or other faults.

Heretofore, flashlight testers were provided for low voltage systems and were subject to possible human error. The present invention is particularly useful where it is highly desirable to avoid the human error. Furthermore, the present invention is also particularly useful when it is necessary to test electrical devices in which the resistance has a wide range, and particularly when it is very high, such as broilers, toasters, electric irons, electric heaters and other devices having a high resistance, of the type which is normally used or which can be used for heating purposes.

In the devices known to the prior art, it is possible for the flashlight switch to be in an on-position whereby to light the flashlight bulb while at the same time using the device as a tester. It is evident, that if the device is being used as a tester, and the switch also is in the on-position, a true test is not obtainable. Furthermore, when the flashlight tester is used to test high resistance circuits, the flashlight bulb will not light when it should to provide a necessary indication, and therefore, the flashlight tester fails as a testing device.

It is therefore an object of the present invention to provide a flashlight tester having a control switch for preventing the circuit operation as a flashlight when the circuit is to be used as an electrical tester.

Another object of the present invention is to provide a flashlight tester useful to test all types of devices with a wide range of resistance values, and particularly devices having high resistance values.

The present invention provides for a switch for a flashlight which is especially suited for use with conductive test leads. The test leads are not insertable within contact terminals in the on-position of the flashlight and are insertable within and through bores provided in the switch when in an off-position so as to be in registry with apertures provided in the contact terminals. The testing circuit is completed from one of the test leads through the flashlight circuit including the flashlight bulb which is of the low resistance-high current type and to another test lead having in circuit a bulb of the high resistance-low current type so that the testing circuit can be used to test devices having a high resistance as well as a low resistance.

When the device is not used for testing, it is evident that it may be used as an ordinary hand flashlight or other type of flashlight with the novel switch performing its normal functions. The addition of the test leads renders the circuit useful as as electrical tester having a wider range of utility than the testers heretofore known with no impairment or change in characteristic when used as an illumination device.

Yet another object of the present invention is the provision of an improved flashlight electric tester of the above character which is of simple design and construction, economical to manufacture, and highly efficient in the accomplishment of its intended purpose.

The objects, advantages and nature of the invention will be more fully understood from the following description of the preferred embodiments of the invention,

shown, by way of example, in the accompanying drawings, in which:

FIG. 1 is a longitudinal sectional view of the flashlight illustrating a preferred embodiment of the invention;

FIG. 2 is a partial side view of the flashlight illustrating the switch thereof in the on-position;

FIG. 3 is a partial longitudinal sectional view of the flashlight with portions thereof removed and illustrating the switch thereof in the off-position and with the testing cable pins of a pair of test leads coupled in circuit with the flashlight bulb and power source;

FIG. 4 is a partial vertical sectional view taken along line 4—4 of FIG. 1; and,

FIG. 5 is a partially schematic and partially diagrammatic view of the wiring circuit of the present device.

Referring now to the drawing which illustrates the presently preferred mode of practicing the invention, and more particularly to FIG. 1, there is shown a flashlight **10** provided with a novel control switch **12** for reception of a pair of test leads **14**, see FIG. 5.

Flashlight **10** includes an outer metallic body portion **20** for enclosing a power source indicated by batteries **22** by means of a metallic base closure **24**, which may be integral with casing **20**, and mouth closure **26**. Interposed between the base closure **24** and battery **22** adjacent thereto is a metallic spring **28** for completing an electric circuit from casing **20** to the base of one of the batteries **22**. The mouth closure **26**, which is shown as made of insulating material may also be made of metallic or electrical conductive material by suitably insulating it in a well known manner from casing **20**, is removably coupled to casing **20** by any suitable means, such as complementary threaded portions **30** and **32** on the casing and mouth closure, respectively, so that mouth-closure **26** is insulated from casing **20**.

Casing **20** is provided with a shoulder portion **34** for receiving and supporting an insulated reflector **36** and a transparent member **38**. Closure **26** is provided with a peripheral edge portion **40** which contacts transparent member **38** for fixedly retaining reflector **36** and transparent member **38** when closure **26** is fixed to casing **20**. Reflector **36** has a threaded center portion **42** upon which is screwed a cup-shaped member **44**. A light bulb **46** having a low resistance-high current characteristic and a conductive socket **48** provided with a flange portion **50** rests against a ring portion **52** of the reflector **36**. A spring **64** is provided which bears at one end on the base of cup-shaped member **44** and at its other end against flange portion **50** for retention thereof in contact with ring portion **52** of the reflector **36**. The socket **48** with its flange portion **50** constitutes a first terminal of the light bulb **46**, and a second terminal **54** thereof is insulated from the socket **48** by an insulating member **56** while the terminal **54** rests against a terminal **58** of one of the batteries **22**.

The novel control switch **12**, which is slidably coupled to casing **20**, electrically connects and disconnects the conductive member **44** and the socket **48** to and from the conductive casing by means of a stationary conductive blade **60** which is insulated from casing **20** by means of a dielectric insulator **62**. Both conductive blade **60** and insulator **62** are fixedly coupled to casing **20** by terminal contact means **122** to be described hereinafter and maintained so that blade **60** is always in contact with cup-shaped member **44**. It will be evident that since blade **60** is not moved during operation of the flashlight, there is little likelihood that it will be bent as a result of use whereby to provide a faulty connection as a result of a decrease in its resiliency with use.

The novel control switch **12** is shown in FIG. 1 in its on-position and comprises a frame portion **66** for receivably holding a finger piece **68** and slidably coupling it to

casing 20. Finger piece 68 is made of electrically insulating material and is provided with a pair of bores 70 and 72 through which are inserted the test pins 74 and 76, respectively of a pair of test leads 78 and 80 when in the off-position of the switch as shown in FIG. 3. A pair of grooves 82 and 84 are provided in the finger piece 68 on opposite sides of bore 72 in a direction transverse to bores 70 and 72 and insulated therefrom for retaining an electrically conductive element 86 between the underside of finger piece 68 and electrically insulated from casing 20. Conductive element 86 is provided with a flat base portion 88 and inturned end lip portions 90 and 92 which are receivably engaged in grooves 82 and 84 respectively, and an opening 94 having a diameter greater than the diameter of bore 72 is provided in the flat base portion 88 and in registry with bore 72 so that test pin 76 may be inserted therethrough and be free of electrical contact with conductive element 86. Finger piece 68 is provided on top with raised portions 96 to facilitate sliding movement along casing 20, and on the sides with dimples 98 for the reception of lug portions 100 on vertical legs 102 of frame portion 66 to fixedly retain finger piece 68 with respect thereto. Frame portion 66, which is made of insulating material, includes a base portion 104 which is shaped to fit the outer contour of casing 20 along which it slides and is provided with an opening or longitudinal slot 106 for a purpose to be hereinafter explained. It will be noted that the bottom of finger piece 68 has rectangular leg portions 108 which rest on top of base portion 104 and extend inwardly a lesser amount than base portion 104 so as to provide a channel 110 between the bottom of finger piece 68 and the base portion 104 for a purpose to be hereinafter explained.

Contact terminals 120 and 122 of electrically conductive material are coupled to casing 20 in spaced relation to each other. Terminal 120 comprises an apertured rivet and electrically couples to the casing 20 a cup-shaped member 124 having a peripheral flange 126 which is received within channel 110 for sliding contact with conductive element 86 in the on-position and off-position of switch 12. Contact terminal 122 also comprises an apertured rivet for coupling a cup-shaped member 128 having a peripheral flange 130 to casing 20 and conductive blade 60 and insulator 62. Positioned between the base of cup-shaped member 128 is an insulator 132 to insulate contact terminal 122 from casing 20. It will be seen that blade 60 and cup-shaped member 128 are electrically coupled to contact terminal 122 while being insulated from casing 20 by means of insulators 62 and 132. Insulator 132 has a cylindrical leg portion which fits between the opening in casing 20 and the shaft portion of the rivet of the contact terminal 122 and a washer shaped base portion which fits between the underside of the base of the cup shaped member 128 and casing 20 and part of the shaft portion of the last-mentioned rivet to provide the required insulation to insulate casing 20 from cup-shaped member 128. Peripheral flange 130 is also received within channel 110 and together with flange 126 provide guide tracks for slidable movement of finger piece 68 and frame portion 66 along casing 20. In the on-position, the top of peripheral flanges 126 and 130 are mechanically engaged with the base portion 88 of conductive element 86 for electrically completing the circuit to light bulb 46, and in the off-position flange 130 is not in contact with conductive element 86 and is electrically insulated therefrom to prevent completion of the circuit to light bulb 46.

Accordingly, it is only in the off-position of switch 12 that the apertures in rivets 120 and 122 are in registry with bores 70 and 72 for the reception of test pins 76 and 74 respectively. Hence, it is not possible for bulb 46 to be lit when the test pins are inserted into the contact terminals as a result of an inadvertent closing of the switch 12. Coupled to one of the test leads, for example, test lead 78 is a bulb 140 having a high resistance-low current characteristic, as shown in the circuit diagram of FIG. 5. Coupled to the other ends of test leads 78 and 80 are testing cable prongs 134 and 136 coupling a device or object to be tested in circuit with bulbs 46, 140 and power source 22 so that bulb 140 will light when a high resistance is being tested.

Ordinary test leads can be used with the circuit tester described hereinbefore to test rapidly all types of fuses, automobile bulbs, switches, outlets and other related devices. The novel control switch 12 will prevent a false reading by preventing energization of bulb 46 when it is to be used in the circuit tester. It is not possible to use the test leads unless bores 70 and 72 are in registry with the apertures in contact terminals 122 and 120, and when the bores are in registry with the apertures, conductive element 86 is prevented from engaging flanges 126 and 130 to complete the circuit from contact terminal 120 to contact terminal 122. In order to test a high resistance device, such as a broiler or electric iron, the test leads 14 disclosed herein employing the high resistance-low current bulb 140 which may be a General Electric Company type No. 48 or 49 bulb or equivalent are used in circuit with the ordinary flashlight bulb 46 such as a standard Type PR–2 having as its primary purpose to provide a good beam. Bulb 140 will light to indicate absence of a short circuit in a high resistance device under test, but such bulb would not be suitable in a flashlight since the light emitted thereby is insufficient.

It will also be evident that finger piece 68 may easily be removed from frame portion 66 to replace or repair the various components of the contact terminals and the control switch. Lugs 100 are effective to couple and fixedly retain finger piece 68 relative to frame portion 66 upon engagement with the dimples 98.

While there has been shown what is at present considered a preferred embodiment of the invention, it is apparent that many changes and modifications may be made therein without departing from the invention, and it is, therefore, intended in the accompanying claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

Having thus described the invention, what I claim is:

1. The combination with a flashlight having a casing, a flashlight bulb and a flashlight battery within the casing, and of a control switch for said bulb comprising a movable switch member slidably coupled to said casing for movement between a closed-circuit position in which said movable switch member is in electrical circuit with said bulb and said battery, and an open-circuit position in which said movable switch member is out of electrical circuit with said bulb and battery, said control switch comprising also independent contact terminals fixedly coupled to said casing in spaced relation to each other, said independent contact terminals being electrically insulated from each other through said casing and being operatively associated with said movable switch member, said movable switch member having a conductive element for electrically coupling said independent contact terminals in said closed-circuit position and having apertures providing access to said independent contact terminals in said open-circuit position only, so that in said open circuit position an electrical current is adapted to pass from a first one of said independent contact terminals to a second one of said independent contact terminals, through a conductive object, and from said second one of said contact terminals through said battery and light bulb, to said first one of said contact terminals.

2. The combination as claimed in claim 1, in which said first contact terminal comprises a conductive member insulated from and coupled to said casing and provided with an aperture for receiving a testing cable pin, and in which said second contact terminal comprises a conductive member provided with an aperture for receiving a pin of a second testing cable and conductively coupled to said casing.

3. The combination as claimed in claim 2, in which said movable member comprises a first insulating member fixed to said conductive members of said first and second contact terminals for slidable movement with respect thereto and said casing, a second insulating member removably coupled to said first insulating member and having a pair of bores in spaced relation to each other and equal to the spacing of said contact terminals, and a conductive element operatively associated with said second insulating member, said movable member having two operative positions and slidable from one to the other to position said bores in registry with said apertures and insulate said conductive element from said contact terminals in one of said operative positions and to position said conductive element in contact with said contact terminals removing said bores from registry with said apertures in the other of said operative positions.

4. The combination as claimed in claim 3, in which said bores and said apertures when in registry are each adapted to receive a testing cable pin, and including a pair of test leads including coupled between the ends thereof a high resistance-low current bulb.

5. The combination of a flashlight and a circuit tester, the flashlight having a conductive casing, a flashlight bulb and a source of current adapted to light the bulb, the circuit tester having a pair of electrically conductive test leads with a testing cable pin and a testing cable prong on opposite ends thereof, and a control switch comprising a switch member slidably coupled to said casing and movable from an on-position lighting the flashlight bulb to an off-position for coupling the testing cable pins to the source of current and the flashlight bulb, said control switch also comprising first and second contact terminals fixedly coupled to the casing in spaced relation with each other and insulated from each other through said casing, said first terminal being coupled to and electrically insulated from the casing, said second terminal being electrically coupled to the casing, and said movable switch member overlying said first and said second terminals and including means electrically coupling said first and second terminals together in the on-position and electrically decoupling said first and second terminals in the off-position, said movable switch member preventing access to said first and second terminals in the on-position and providing access to said first and second terminals for the testing cable pins in the off-position, so that an electrical current is adapted to pass in the off-position through a first circuit from said first terminal to said second terminal through a conductive object and from said second terminal through the casing, the battery and the light bulb to said first contact terminal and in the on-position through a second circuit from said first terminal to said second terminal through said electrically coupling-decoupling means and from said second terminal through the casing, the battery and the light bulb to said first contact terminal.

6. The combination of a flashlight and a circuit tester, the flashlight having a conductive casing, a flashlight bulb and a source of current adapted to light the bulb, the circuit tester having a pair of electrically conductive test leads with a testing cable pin and a testing cable prong on opposite ends thereof, and a control switch comprising a switch member slidably coupled to said casing and movable from an on-position lighting the flashlight bulb to an off-position for coupling the testing cable pins to the source of current and the flashlight bulb, said control switch also comprising first and second contact terminals fixedly coupled to the casing in spaced relation with each other and insulated from each other through said casing, said first terminal being coupled to and electrically insulated from the casing, said second terminal being electrically coupled to the casing, said movable switch member overlying said first and said second terminals and comprising a finger piece having a pair of spaced grooves, a frame piece including a base portion having a longitudinal slot and vertical side portions extending from said base portion, for receivably holding said finger piece, a lug coupled to one of said vertical side portions engaging said finger piece for the fixation thereof to said frame piece, and means electrically coupling said first and second terminals together in the on-position and electrically decoupling said first and second terminals in the off-position, said coupling-decoupling means comprising a conductive element provided with an opening and having a pair of lip portions engaging said grooves, for coupling said conductive element to said finger piece, said movable switch member preventing access to said first and second terminals in the on-position and providing access to said first and second terminals for the testing cable pins in the off-position, so that an electrical current is adapted to pass in the off-position through a first circuit from said first terminal to said second terminal through a conductive object and from said second terminal through the casing, the battery and the light bulb to said first contact terminal and in the on-position through a second circuit from said first terminal to said second terminal through said electrically coupling-decoupling means and from said second terminal through the casing, the battery and the light bulb to said first contact terminal.

7. The combination as claimed in claim 6, in which said first and second terminals each comprise a cup shaped member having an aperture in the base thereof and a peripheral flange coupled to the top thereof and a rivet having a central aperture coupling said cup-shaped member to the casing, said flanges having one portion thereof receivable between said frame portion and said finger piece and having another portion thereof engageable with said conductive element in the on-position for completing the circuit through the flashlight bulb.

8. The combination as claimed in claim 7, in which said flashlight bulb is of the low resistance-high current type, and one of said electrically conductive tests leads includes a high resistance-low current bulb in circuit, said finger piece having first and second bores in spaced relation, said second bore being positioned between said grooves and in registry with said opening, said finger piece in the off-position places said first and second bores in registry with the apertures in said first and second terminals to permit completion of said first circuit.

9. A control switch for a flashlight having a casing provided with a flashlight bulb and a source of electrical current in the casing, comprising first and second contact terminals fixedly coupled to said casing in spaced relation to each other each adapted to receive a contact pin of a testing cable, said first terminal including a conductive member and a fastening member having an aperture therethrough conductively coupling said conductive member to said casing, said second terminal including a conductive member and a fastening member having an aperture therethrough conductively coupling said last-mentioned conductive member to said flashlight bulb but insulated from said first terminal, an insulating slidable member having a pair of bores in spaced relation and slidable on said conductive members of said first and second terminals between an off-position of the flashlight with said bores in registry with said apertures to permit said contact terminals to receive the contact pins of the testing cable and an on-position of the flashlight with said bores removed from registry with said apertures to prevent said contact terminals from receiving the contact pins of the testing cable, and a conductive element coupled to said insulating member to couple electrically said conductive members in the on-position and decouple said conductive members in the off-position.

10. A control switch for a flashlight having a casing provided with a flashlight bulb and a source of electrical current in the casing, comprising first and second contact terminals fixedly coupled to said casing in spaced relation to each other each adapted to receive a contact pin

of a testing cable, said first terminal including a conductive member and a fastening member having an aperture therethrough conductively coupling said conductive member to said casing, said second terminal including a conductive member and a fastening member having an aperture therethrough conductively coupling said last-mentioned conductive member to said flashlight bulb but insulated from said first terminal, an insulating slidable member having a pair of bores in spaced relation and slidable on said conductive members of said first and second terminals between an off-position of the flashlight with said bores in registry with said apertures to permit said contact terminals to receive the contact pins of the testing cable and an on-position of the flashlight with said bores removed from registry with said apertures to prevent said contact terminals from receiving the contact pins of the testing cable, and a conductive element coupled to said insulating member to couple electrically said conductive members in the on-position and decouple said conductive members in the off-position, said insulating member comprising a finger piece having a pair of spaced grooves and a frame piece coupled to said conductive members of said first and second terminals, and said conductive element comprising a pair of inturned lip portions engaging said grooves and removably coupling said conductive element to said finger piece.

11. A control switch as claimed in claim 10, in which said finger piece is provided with a dimple at each end thereof, said frame piece comprising a base portion provided with a longitudinal slot, vertical side portions extending from said base portion, said finger piece being receivable within said side portions and engageable with said base portion, and a lug coupled to two of said side portions facing each other, said lugs being engageable with said dimples for fixedly coupling said finger piece to said frame piece.

12. A switch as claimed in claim 11, in which each said conducting members comprises a cup-shaped member having a peripheral flange, the base of said cup-shaped members being coupled to said casing and said flanges having one side slidably coupled to said base portion and another side slidably associated with said conductive element.

13. A switch as claimed in claim 12, in which said conductive element is provided with an opening between said lip portions, the diameter of said opening being greater than the diameter of said aperture of said first contact terminal, said opening being in registry with said aperture of said first contact terminal with said other side of said associated flange in conductive relationship with said conductive element and said flange of said second conductive terminal being insulated from said conductive element in the off-position.

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