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PORTABLE FLASHLIGHT HAVING CIRCUIT TESTING MEANS AND A ROTATING TELESCOPING HEAD PORTION WITH CUT-OUT FOR EXPOSING A TEST CONTACT

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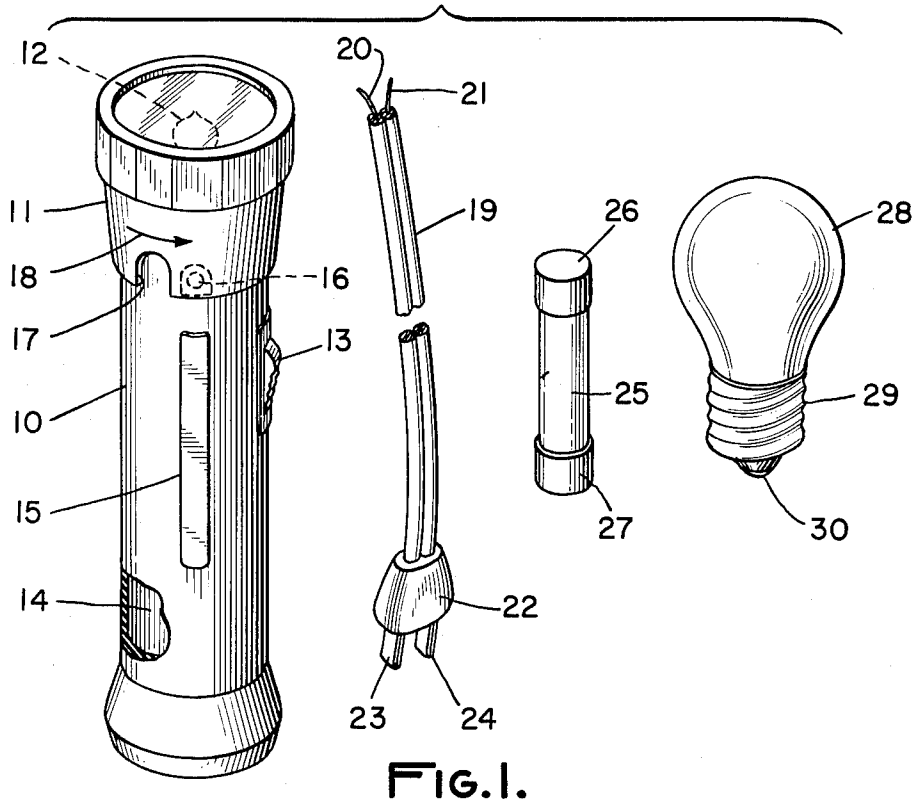


FIG. 1.

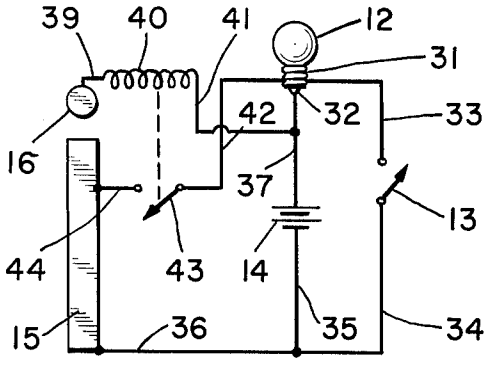


FIG. 3.

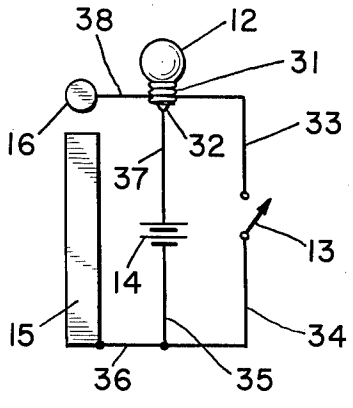


FIG. 2.

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PORTABLE FLASHLIGHT HAVING CIRCUIT TESTING MEANS AND A ROTATING TELESCOPING HEAD PORTION WITH CUT-OUT FOR EXPOSING A TEST CONTACT

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This invention relates generally to flashlights and more particularly to an improved portable type battery operated flashlight for use by electricians.

In electrical repair work, it is common practice for electricians to carry a flashlight to illuminate areas in which electrical work is to take place. For example, many fuse boxes are poorly illuminated in their interiors. In other instances, it may be desirable to read the electrical ratings of various motors and the like which are in dark areas of a home. In addition, it is frequently necessary in electrical repair work for the electrician to test fuses, light bulbs, the electrical continuity of electrical wiring and the like. Normally, there is no convenient means for effecting such continuity tests and as a consequence, the electrician will simply replace fuses with fuses in his box which he knows to be in proper working order. The same situation obtains with light bulbs and also electrical wiring.

With the foregoing in mind, it is a primary object of this invention to provide a flashlight which incorporates simple means for enabling an electrician to test for continuity so that fuses, light bulbs, electrical wiring and the like may be very easily and quickly tested to ascertain whether they are faulty.

Another object of this invention is to provide an improved flashlight meeting the foregoing objects which is of the same size and general character of normal flashlights and may be operated in the same manner as a normal flashlight so that no appreciable change in the flashlight is evident over conventional flashlights and so that the electrician need not be burdened with any additional equipment over that which he normally carries.

Still another object is to provide an improved flashlight meeting the foregoing objects which does not incorporate expensive additions nor require appreciably expensive retooling of conventional equipment for manufacturing the flashlight.

Still another important object of this invention is to provide a flashlight capable of continuity testing of various foreign elements and also capable of testing continuity of high resistance elements, all without the need of any auxiliary power source other than that incorporated in the flashlight itself.

Briefly, these and other objects and advantages of this invention are attained by providing a conventional type flashlight in the form of a casing with a lead structure coupled thereto. The casing incorporates conventional battery means and the head structure includes a reflector and bulb. The casing may also be provided with the conventional on-off switch for the flashlight. In accordance with the present invention, the flashlight is also provided with a first contact preferably on the side of the casing and in exposed condition. A second contact is also provided on the casing spaced a given distance from the first contact in such a manner that a foreign element such as a fuse or auxiliary light bulb may be bridged across the first and second contacts. These first and second contacts are electrically connected in series with

the batteries and light bulb of the flashlight so that bridging of the exposed contacts will illuminate the flashlight bulb and thus indicate continuity.

In accordance with a preferred embodiment of the invention, the second contact is disposed beneath a portion of the head structure, the head structure itself including a cut-out such that a small rotation of the head structure will expose the second contact. By this arrangement, there is no possibility of inadvertently having the first and second contacts shorted out if the flashlight is set on a metal table or the like.

In accordance with a still further feature of the invention, the circuitry between the contacts and battery of the flashlight includes a sensitive relay which is responsive to small currents normally of not sufficient magnitude to illuminate the light bulb in the flashlight. This relay in turn closes a circuit directly across the light bulb and battery so that if the relay is energized, the flashlight bulb will be illuminated thereby indicating that a small current at least was received in the relay. This arrangement permits high resistance foreign elements such as conventional household light bulbs to be tested by the flashlight.

A better understanding of the invention will be had by now referring to one embodiment thereof as illustrated in the accompanying drawings, in which:

FIGURE 1 is a cut-away perspective view of the improved flashlight of this invention also showing in exploded positions, various foreign members or elements capable of being tested by the flashlight;

FIGURE 2 is a simple schematic circuit diagram of a first circuit embodiment of the flashlight; and,

FIGURE 3 is a simple schematic diagram illustrating a second circuit embodiment of the flashlight.

Referring first to FIGURE 1, there is shown a flashlight casing **10** including a suitable head structure **11** coupled to its upper end. Normally, the head structure **11** incorporates a bulb **12** and is in threaded engagement with the upper end of the casing **10**, the lower portion of the head structure being telescoped over the upper end of the casing.

A conventional switch means as shown at **13** may be disposed on the side of the casing **10** for completing a circuit between batteries **14** incorporated within the casing **10** to the light bulb **12**.

The elements described above for the flashlight are entirely conventional. In accordance with the instant invention, there is provided a first elongated exposed contact **15** on the casing **10**. Also provided is a second contact **16** on the upper end of the casing in a position to be eclipsed by the lower telescoping portion of the head structure **11**. This lower telescoping portion as shown includes a cut-out **17** such that the head structure **11** may be rotated in the direction of the arrow **18** to position the cut-out **17** over the contact **16** and thus expose this contact.

In the operation of the flashlight as described thus far, the flashlight itself may be used in a conventional manner, the bulb being illuminated by operation of the switch **13**. If it should now be desired to test the continuity of some foreign element such as wiring, the first and second contacts **15** and **16** are electrically bridged by the element. These contacts, as will become clearer as the description proceeds, are connected in series between the batteries **14** and light bulb **12** so that a circuit will be completed by the bridging thereof provided that the bridging member is electrically continuous. The

light bulb **12** will thus be illuminated to indicate continuity.

As an example, there is shown an electrical household cord **19** incorporating wires **20** and **21** connecting respectively to a plug **22** and prongs **23** and **24**. To test the continuity of the wires, the prong **23** may be disposed in engagement with the first contact **15** and the wire **20** then touched to the second contact **16**. If the wire is continuous, the light bulb **12** will be illuminated. The same procedure may then be repeated for the prong **24** and the wire **21**. In this respect, it will be clear that it is an easy manner to determine which wire corresponds to which prong, assuming that both are continuous should the wire be twisted or covered by a sheaving in which it is not possible to associate one wire with one particular prong.

In FIGURE 1 there is also shown a cylindrical type fuse **25** having end contacts **26** and **27**. To test this fuse, it is only necessary to dispose the contact **26** against the second contact **16** on the flashlight casing and the contact **27** on the elongated first contact **15**. By making this first contact **15** elongated as shown, various length fuses may readily be accommodated. Again, if the fuse is not faulty, a circuit will be completed through the contacts to the light bulb **12**.

Finally, FIGURE 1 illustrates a conventional household light bulb **28** including the usual threaded contact portion **29** and tip **30**. Household light bulbs of this type have very high resistance filaments and normally bridging of the contact areas **29** and **30** to the contacts **15** and **16** would not result in illumination of the bulb **12** were a simple direct series connection to the bulb effected. Accordingly, the present invention contemplates a relay circuit which is responsive to very small currents for completing the circuit to the light bulb so that bulbs such as indicated **28** may readily be tested.

The foregoing will become clear by referring to the simple schematic circuit diagrams of FIGURES 2 and 3. In the circuit diagram of FIGURE 2, a first terminal of the flashlight bulb **12** is indicated at **31** and the tip or second terminal of the light bulb is indicated at **32**. As shown, the terminal **31** connects through a lead **33** and the normal flashlight switch **13** to a lead **34** and thence to a lead **35** to one side of the battery **14**. This side of the battery **14** is also connected by a lead **36** to the first contact **15**. The other light bulb terminal **32** connects through a lead **37** to the other side of the battery **14**. The second contact **16** connects by a lead **38** to the terminal or threaded portion **31** of the light bulb **12**.

Disregarding for the moment the switch **13** and associated electrical leads **33** and **34**, it will be noted that the contacts **15** and **16** are effectively connected in series with the battery **14** and light bulb **12**. It will thus be evident that if these contacts **15** and **16** are bridged, a circuit will be completed from the battery **14** to the light bulb to illuminate the same. Considering now the circuit with the switch **13** in place, it will be evident that effectively the switch **13** is connected in parallel with the contacts **15** and **16** so that closing of the switch will serve to light the bulb **12** regardless of whether or not the contacts **15** and **16** are shorted. The flashlight may thus be used in a conventional manner.

The circuit of FIGURE 2 may be incorporated in a flashlight and serves to enable testing of the continuity of fuses, electrical wires, and the like. In the event, however, that it is desired to test relatively high resistance foreign elements such as the light bulb **28**, it is necessary to modify the circuit of FIGURE 2.

FIGURE 3 shows such a modified circuit wherein various like elements are designated by the same numerals. The only addition to the circuit of FIGURE 3 is the provision of a lead **39** from the contact **16** including a sensitive relay coil **40**, the other side of which is connected by a lead **41** to the battery lead **37**. Also included is a lead **42** connecting from the threaded portion **31** of the light bulb **12** through a relay switch arm **43** and thence to a lead **44** connecting to the first contact **15**. The switch arm **43** is responsive to energization of the relay coil **40** to close and thus connect the threaded portion of the light bulb **31** directly to the first contact **15** and thus to the other side of the battery.

In the operation of the circuit of FIGURE 3, a foreign element even if it has a high resistance bridging the first and second contacts **15** and **16** will provide a small current through the relay coil **40** which is sufficient to throw the relay switch arm **43** and thus complete a circuit through the contact **15** between the battery **14** and bulb **12**, thereby illuminating the same. Thus, lighting of the bulb **12** will occur whenever the relay coil **40** draws sufficient current to become energized. When a light bulb such as the bulb **28** of FIGURE 1 thus bridges the contacts **15** and **16**, even though it has a relatively high resistance, there will still result enough current through the relay coil **40** to energize the same and close the switch arm **43**, even though this current in and of itself would not be sufficient to light the bulb **12**. However, with the arm **43** closed, there is provided a direct circuit between the bulb **12** and battery **14** so that the bulb will light.

It should also be evident that the circuit of FIGURE 3 may be employed for straight continuity testing, the same as the circuit of FIGURE 2.

From the foregoing description, it will be evident that the present invention has provided a greatly improved flashlight which is of considerable value to electricians and similar maintenance men when working on electrical equipment. It will be evident to those skilled in the art that the principles of the invention are applicable to different types of flashlights other than the conventional cylindrical type shown. Further, it should be understood that any equivalent current responsive switching device such as a transistor or diode may be substituted for the relay coil **40** and switch arm **43**. The invention is therefore not to be thought of as limited to the exact embodiment set forth merely for illustrative purposes.

What is claimed is:

1. A flashlight comprising: a casing incorporating battery means; a head structure telescoped over and coupled to the upper end of said casing and incorporating a light bulb; an exposed first conducting contact surface on said casing; a second contact surface on the upper portion of said casing beneath the portion of said head structure telescoped thereover, said head structure including a cut-out in its telescoping portion such that rotation thereof exposes said second contact through said cut-out; and connecting means for connecting said first and second contacts with said battery means and light bulbs so that short-circuiting of said first and second contacts lights said light bulb whereby fuses and the like may be tested by bridging the same across said first and second contacts.

2. A flashlight according to claim **1**, including switch means on the side of said casing connected in parallel with said first and second contacts whereby said bulb may be illuminated by closing of said switch means.

3. A flashlight according to claim **1**, in which said connecting means includes a current responsive switching device connected between said second contact and one terminal of said battery means, one terminal of said light bulb being connected to said first contact in response to current through said current responsive switching device, the other terminal of said light bulb connecting to said one terminal of said battery means, and the other terminal of said battery means connecting to said first contact whereby energization of said current responsive device to close the circuit to said light bulb illuminates said bulb, said device being responsive to a current less than that necessary to light said light bulb whereby the continuity of high resistance electrical devices may be tested by bridging the same across said first and second contacts.

4. A flashlight according to claim 3, in which said current responsive switching device comprises a relay coil and associated switch arm to complete the circuit to said light bulb upon energization of said relay coil.

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