Aug. 24, 1954 E. A. NOYES 2,687,508

COMBINED FLASHLIGHT AND CIRCUIT TESTING DEVICE

Filed Oct. 30, 1951

Fig. 1

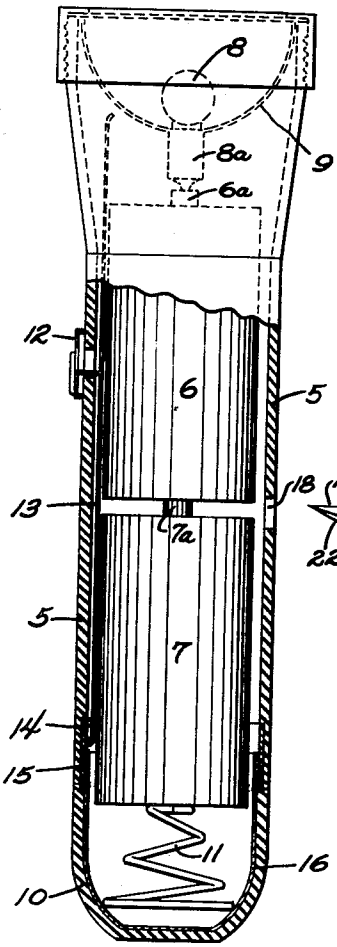


Fig. 3

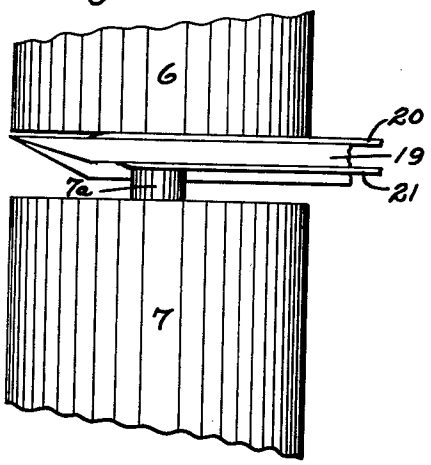


Fig. 2

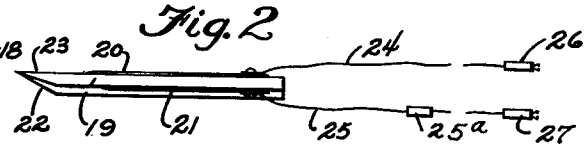


Fig. 4

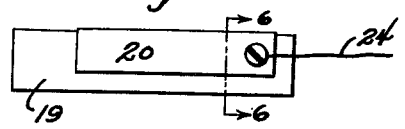


Fig. 5

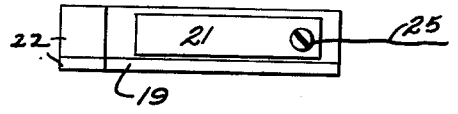
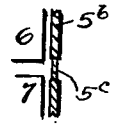


Fig. 6



Fig. 7



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COMBINED FLASHLIGHT AND CIRCUIT TESTING DEVICE

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4 Claims. (Cl. 324—53)

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This invention relates to a combined flash light and circuit testing device.

The primary object of the invention is to provide an article of the nature indicated which is of the utmost simplicity and very low cost, in that it provides for having access to and making contact with the cells of a conventional flash light battery by the mere formation of an opening in the wall of the casing of the flash light, opposite the line of juncture of two of the battery cells, so that a jack may be thrust into the casing, separate the cells, and thereafter connect the battery cells and the flash light bulb, in series. The mere withdrawal of the jack, instantly restores the parts to their normal position, in which they function as a conventional flash light and not as a circuit testing device.

The invention will be best understood by reference to the accompanying drawing, wherein:

Fig. 1 is a view partly in side elevation and partly in section of a flash light which is of conventional form except that it has a slot or opening formed through the wall of its shell or casing, at a point opposite the line of contact between the battery cells;

Fig. 2 is an edge elevation of a jack, dimensioned to enter said opening and lie between the confronting ends of said cells;

Fig. 3 is a magnified edge view of the jack showing it in place between and breaking the normal connection between the battery cells;

Fig. 4 is a plan view of the jack;

Fig. 5 is an underside plan view of the jack;

Fig. 6 is a transverse section upon line 6—6 of Fig. 4; and Fig. 7 is a fragmentary section of a slightly modified casing.

Like reference characters designate corresponding parts throughout the several figures of the drawing.

As stated the flash light itself is largely conventional, comprising a casing 5 of insulating material, a pair of battery cells 6 and 7, a flash light bulb 8, reflector 9, bottom end cap 10, spring 11 which acts between the bottom of cell 7 and the cap 10 to thrust the two cells together and to thrust positive terminal post 6a of cell 6 into contact with the terminal of light bulb 8, and a switch plate 12 which moves a metallic strip 13 endwise. The lower end of this strip is always in contact with a metallic band 14 which constitutes an extension of a threaded ring 15, the latter being fixed in the lower end of casing 5. Bottom cap 10 has a metallic lining 16, an upstanding threaded portion of which screws into threaded ring 15 to secure the cap in place and to compress the spring 11 between metallic lining 16 and the bottom of cell 7. When the switch plate 12 is moved to move the upper end of strip 13 into engagement with the reflector, a circuit is completed through cells 6 and 7, light bulb 8, its socket 8a, a reflector 9, strip 13, band 14, ring 15, end cap lining 16 and spring 11 back to cell 7.

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In carrying out the invention I form in the wall of casing 5 a slot 18 dimensioned to permit the passage of the test jack, therethrough. One form of test jack is illustrated in Figs. 2 to 6 and comprises a strip or plate 19 of relatively stiff insulating material, such as hard rubber, fibre, plastic or the like. Thin metallic contact strips or elements 20 and 21 are secured to the upper and lower faces, respectively of strip 19. The forward end of the strip is preferably beveled, as at 22, to constitute a wedge, to facilitate the entry of the jack between the confronting ends of cells 6 and 7. When the jack is thrust inwardly through slot 18, its flat top 23 rides beneath the flat bottom of cell 6, while its beveled edge acts as a wedge upon the positive terminal post 7a of cell 7, to separate the cells against the action of the spring. When the jack has thus been brought to the position of Fig. 3, the normal and previously described circuit is broken and a new circuit is created which includes contact elements 20 and 21, the insulated test wires 24 and 25 and clips 26 and 27. The wires may be attached to the contact elements in any suitable way. I have shown them attached by screws 20a which screws also bind the contact elements to insulating strip 19. Whenever the clips are applied to a closed circuit the light bulb will light because the cells 6 and 7 are again connected in series, but through and only through the path provided by elements, 20 and 21 the wires and the clips.

Since other forms of plug-in jacks might be devised and since I am the first to conceive the idea of forming an opening in the casing of a flash light, at the line of contact between the positive and negative ends of a pair of cells, to permit, first the separation of the cells by the thrusting in of the jack and then their utilization in series in an external circuit; I wish to claim a flash light having an opening at that particular place, for the purpose stated.

Further, while I have described the invention as comprising a jack sufficiently stout and rigid to thrust the cells apart, as stated, I may if desired make the jack of much thinner and lighter material and unscrew the bottom cap 10 enough to permit the thinner jack to enter between the

cells without great wedging effort, the cap being thereafter tightened to bind the jack between the cells.

In either case the structure is such that the jack will not easily pull out. This is of great benefit because it permits the electrician who is testing out circuits in a maze of wires, to leave the flash light hanging by the clips from a pair of wires, leaving his hands free to bridge wires in the maze with another piece of wire. When the light lights he knows that the wires he is touching are the same as those to which the clips are applied. Very small audible signals in the form of buzzers, are available on the open market. If desired, I may include such an audible signal anywhere in the test circuit. I have indicated such an audible signal at **25***a* in Fig. 2.

Thus an electrician may leave this device hanging by its clips to two wires, in one room, and go into another room to bridge wires of a group, and be apprised by the buzzer when he has contacted the proper wires.

While the device is of particular utility in testing circuits in buildings it is also of value about the home. By its use ordinary plug and cartridge fuses may be tested. It will also be found of use in garages and in testing automobile lighting and ignition circuits. It will also have a wide field of use in marine installations where many wires are installed behind bulkheads and in other inaccessible places.

In Fig. 7 I have shown a casing **5***b* having a weakened section **5***c* which when punched out leaves a jack receiving opening corresponding to opening **18**. Thus flash lights may be put upon the market with sealed, water tight casings and be punched out as described if, and only if they are to be used for testing purposes.

The invention is not limited to the particular form illustrated but includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims.

I claim:

1. The combination with a conventional flash light battery of the type comprising a light bulb, a pair of battery cells disposed in contacting relation end to end, a casing in which said cells are disposed and which casing has an opening formed in its side wall substantially in line with the line of division and contact between the ends of said cells and a spring thrusting one of said cells against the other of said cells; of a test jack comprising an elongated strip of insulating material, a pair of metallic contact elements one upon each side of said strip, the strip and contact elements being dimensioned to complementally enter through the side opening of the casing and enter between the ends of said cells to separate them against the action of said spring, said contact elements engaging and making electrical contact with said cells after their separation and test wires connected to said contact elements.

2. A structure as recited in claim 1 wherein said strip of insulating material is shaped to provide a wedge end which upon initial movement of said strip inwardly into the casing through said opening, acts to thrust the cells apart against the tension of said spring, continued inward movement of said strip bringing the contact elements into electrical engagement with the confronting ends of said cells.

3. In a flash light of the conventional form employing at least two battery cells which contact each other end to end, a casing having a weakened portion adapted to be easily punched out and of a size to leave, when punched an opening substantially opposite the line of contact between the contacting ends of said cells and a jack dimensioned to enter through the opening so formed and comprising an insulating member, contact strips upon the opposite faces thereof, said jack being shaped to thrust the cells apart and the contact strips making contact with the separated cells after they are thrust apart and test wires connected to the contact strips.

4. A combined flashlight and circuit continuity tester comprising in combination, a casing, a pair of contacting battery cells therein which contact end to end, said casing having an opening formed in its wall opposite the line of contact between said battery cells, a jack dimensioned to be thrust endwise through said opening and between said cells, said jack comprising an insulating strip and a pair of conductive contact strips upon the opposite sides of the insulating strip, said jack, as a whole, constituting a wedge to force the battery cells apart by the act of being thrust through said opening, a pair of external test wires, one connected to each of the contact strips, a light bulb, switch connections through which a circuit is completed directly through the battery cells and light bulb when the jack is withdrawn from said opening and through which switch a shunt circuit is established in series through the battery cells, contact strips, and test wires when the jack is thrust into said opening and said test wires are applied to a closed circuit.

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