

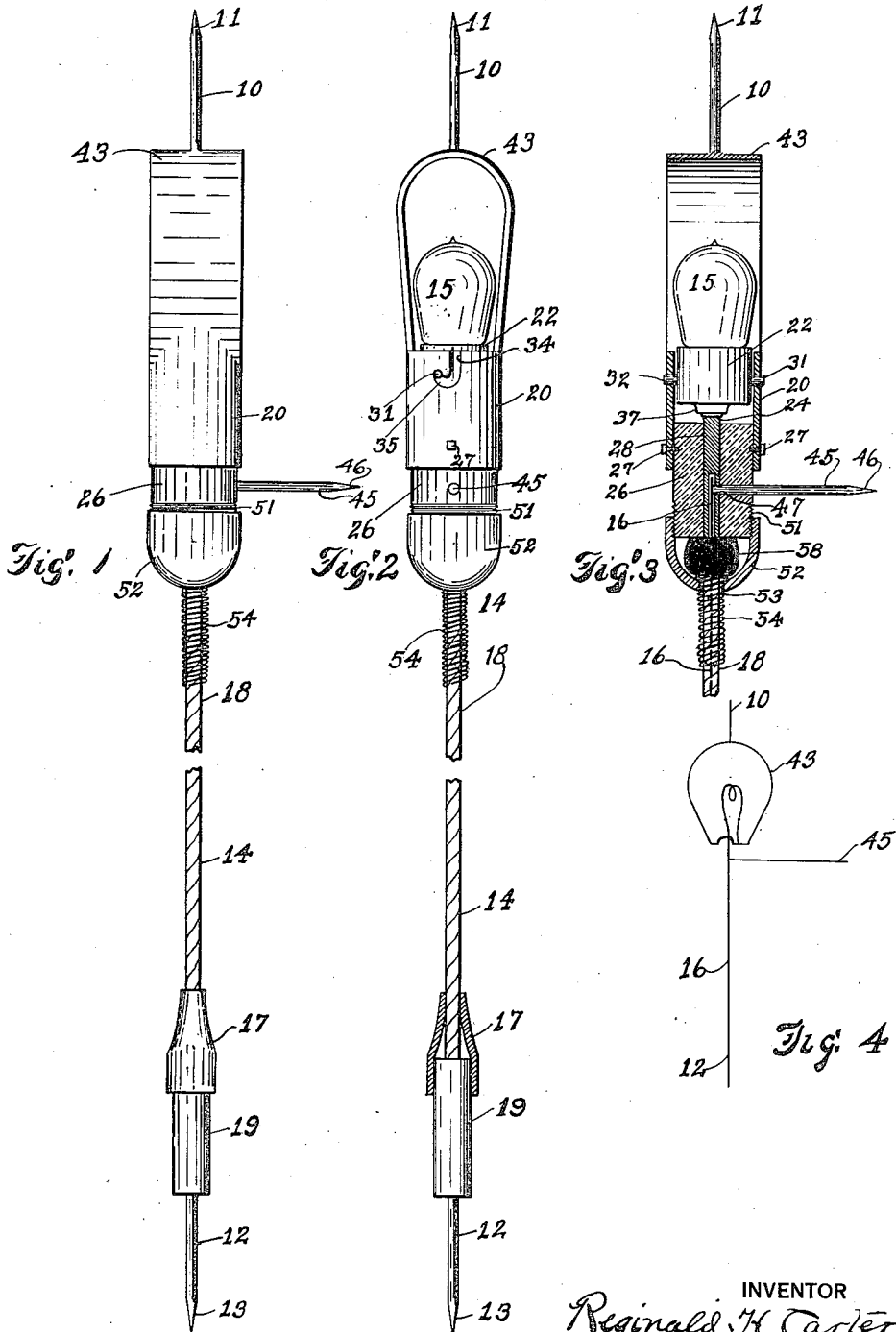
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ELECTRIC TESTING DEVICE

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ELECTRIC TESTING DEVICE.

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To all whom it may concern:

Be it known that I, REGINALD H. CARTER, a subject of the King of Great Britain and Ireland, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Electric Testing Devices, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to portable electric testing devices.

An object of my invention is the arrangement of a current indicator and contact leads in a compact structure particularly adapted to be used in locating troubles and faults in the electric system of automobiles. It will be understood, however, that the device is not limited to use in any special line of testing or repair work but is adaptable to many other fields, as telephone or telegraph systems, aeroplanes, signal circuits, etc., in fact wherever low voltage electric systems are employed.

A more specific object of my invention is the provision of a mechanically protected test lamp in series with sharpened leads, or contact points. With this apparatus insulation may be readily punctured and the electrical condition of the conductor within ascertained. Still another feature is the provision of an additional lead whereby an independent short circuit may be obtained. Other features and objects will become more apparent as the description proceeds, and the essential characteristics of the invention are summarized in the claims.

A preferred form of my invention is illustrated in the accompanying drawings, wherein Fig. 1 is a side elevation of my testing device; Fig. 2 is an end elevation; Fig. 3 is a vertical section through the lamp supporting means; and Fig. 4 is a wiring diagram.

In the drawings, the numerals 10 and 12 designate two testing leads or contact points connected at the opposite ends of an insulated conductor, comprising a flexible cable 14 of convenient length, with a test lamp 15 in series therewith. The support for the lamp comprises a socket or casing 20 comprising a sleeve adapted to receive in removable engagement the base 22 of the lamp

15, with one terminal of the lamp in electrical circuit with the casing and the other insulated therefrom.

Below the lamp base 22 there is secured in the sleeve 20, one end of a cylindrical plug 26 of insulating material, such as fiber, tightly fitting within the end of the sleeve and secured therein in any suitable manner as by screws 27. Within the plug 26 is a central opening, which is occupied by a metallic sleeve plug 28, preferably of brass. This plug 28 is preferably solid at its upper end and has a contact head 24 projecting above the top of the insulation 26 adapted to contact with the central contact 37 of the lamp, when the latter is seated within the socket 20. The lower portion of the plug 28 is hollow and constitutes a sleeve adapted to receive the end of a wire 16 or metallic conductor of the cable 14.

The cable 14 comprises an insulated wire 16, having its insulation preferably armored or protected mechanically by metal sheathing 18. The end of the cable remote from the lamp socket terminates in the lead or contact point 12 secured thereto, which is similar to the contact lead 10, and includes a sharpened end 13. The wire 16 and contact lead 12 are connected within a sleeve 19, preferably of insulation, which constitutes an enlarged finger grip or handle for convenience when using the device.

To prevent excessive wear of the cable 15 at its junction with the handle 19, due to abrupt bending of the cable at this point, and which would eventually result in the breaking of the conductor, flexible means is provided to embrace the cable and handle. As shown, this means comprises a short section of rubber tubing 17, surrounding the cable and end of the handle 19, thus preventing sharp or abrupt bending of the cable at this point.

An additional lead or contact point 45 is preferably provided, as shown. The lead 45 terminates at one end in a sharp point 46, while the other end is inserted within a lateral opening in the insulation plug 26, spaced below the casing 20. The inner end of the lead 45 is preferably threaded as at 47 and engages a threaded opening in the sleeve portion of the plug 28 in registry with the lateral opening in the insulation

plug 26. By tightening the contact lead 45 within this threaded opening in the plug 28, the wire 16, inserted in the sleeve portion of the plug 28, is clamped between the wall of the sleeve and the inner end of the lead 45, thus insuring thorough electrical contact between the wire and the contact 24 and lead 45 respectively.

A practicable flexible connection between the cable 14 and contact plug 28 is provided, as illustrated most clearly in Fig. 3. As there shown, the lower end of the fiber insulation 26 is externally threaded as at 51 to receive an internally threaded cup 52. This cup is provided with a central opening 53 in its base to permit the passage therethrough of the cable 14. The insulation and armor is removed from the end of the cable, permitting the bare wire 16 to be inserted in the contact sleeve 28. A helical spring 54 loosely surrounds the cable 14 and passes through the opening 53. The end of the spring 54 within the cup 52 is enlarged to insure its retention within the cup. As will be apparent, this spring will permit the cable 15 to bend freely but not abruptly, adjacent to the cup. To remove the strain on the fastening of the wire 16 by the lead contact 45, a mass of friction tape 58 is preferably secured to the end of the cable 14 within the cup 52.

I have shown a holder or socket 20 and "single contact" lamp 15 with the bayonet lock type of connection. The base 22 of the lamp is provided on its sides with diametrically opposed lugs 31 and 32, which are adapted to be inserted in corresponding L-shaped slots 34 in the sides of the holder or casing 20. When the lamp base 22 is inserted in the holder 20, this construction permits the lugs to be placed in the slots 34, pressed inwardly, rotated a few degrees, and thereby caused to occupy the slightly out-turned ends 35 of the slots.

The lugs 31 and 32 constitute one terminal of the lamp illustrated and are in electrical connection, through engagement with the walls of the slots 34, with the holder 20. The other terminal of this lamp comprises the central post 37 projecting below the base 22 and adapted to abut the terminal contact 24 of the cable 14 when the lugs 31 and 32 are seated in fixed position within the slots 34.

A shield for the lamp 15 is provided and as shown, comprises a U-shaped plate 43 embracing the lamp, and having its ends rigid with the holder 20 at opposite sides. The loop in this plate is large enough to receive readily a lamp of a size adapted for use with a system of the highest voltage that is desired to be tested. A lead or contact point 10 preferably of hardened steel, and sharpened as at 11, is secured to the protecting plate 43 and is in continuous electrical

contact with the lugs 31 and 32 through the arms of the plate and the holder 20.

The electrical circuit through my apparatus is indicated in the diagram constituting Fig. 4. The current may pass through the contact lead 10, divide through the arms of the protecting plate 43, unite in the base of the lamp 15 and pass through the filament, and thence be led through the conductor 16 to the contact lead 12. The contact lead 45, being connected to the conductor 16, is in circuit with the leads 10 and 12.

My testing device is adapted for many uses and in many circumstances. Its use in several classes of testing may be briefly explained.

In testing the electrical condition of certain parts, as for example, an insulated wire over which current is supposed to be passing, the leads or contact points 10 and 12 may be readily pushed through the insulation by means of the sharpened ends 11 and 13 and brought into contact with the conductor inclosed within. If the lamp 15 then fails to become illuminated, it is apparent that the conductor being tested is not broken or disjoined, but is continuous and presents a path of low resistance compared to the high resistance shunt path constituted by the contact leads and test lamp. If, however, the conductor being tested is broken or disconnected between the contact leads 10 and 12, the entire current will flow through the test lamp and its illumination will indicate the broken circuit.

Again, to determine the location of a break in an otherwise closed circuit, such as for a headlight of an automobile, for example, one of the leads 10 or 12 may be brought into contact with a portion of the circuit such as the frame of the automobile, and the other inserted through the insulation at various points along the wire wherein the break is thought to have occurred. When thus connected, illumination of the lamp 15 shows that the portion of the circuit thus bridged is intact. By shifting the position of the lead along the conductor until the lamp fails to become illuminated when contact is made, the position of the break or disconnection in the conductor may be accurately located.

If, on the other hand, a ground is suspected and it is desired to ascertain definitely its location, the leads 10 and 12 will be applied to various portions, until the exact location of the ground may be determined by the behavior of the test lamp. Thus, for example, if the headlight of an automobile will not burn though the circuit be closed, the wire leading from the battery to the light may be in contact with the frame. To locate the ground, the light may be disconnected and the test leads 10 and 12

used to bridge the fuse gap. If there is a ground beyond this point the test lamp 15 will become illuminated and the wire may be shifted or tightened until the ground is removed, as evidenced by the extinguishment of the lamp 15.

Still another class of testing often requires the establishment of a temporary short circuit between two conductors. For example, in testing spark plugs to determine whether or not a cylinder corresponding to a given plug is functioning, it is customary to short circuit the plug and note the result, if any, on the motor. My testing device lends itself readily to this purpose by use of the leads 45 and 12, one being applied to each of the parts across which a short circuit is desired to be formed. Thus in the example mentioned a suspected spark plug may be short circuited, and if the motor runs differently it will be understood that the spark plug thus removed from the circuit is functioning, whereas, if no change in the motor is observed it may be safely assumed the plug in question requires changing.

From the foregoing description of the structure and method of use, it will be apparent that my device comprises a very useful and handy portable testing device. It is also very simple and compact and may be cheaply constructed.

Having described my invention, I claim:

1. In a testing device, a lamp socket comprising a hollow cylindrical member, a lamp, a plate rigid with said member and extending over the lamp to form a guard, a contact lead rigid with said plate and electrically connected with one terminal of the lamp, and a second contact lead in the socket electrically connected to the other contact of said lamp, and an insulation plug in said sleeve for insulating said leads.

2. An electric testing device comprising a metallic holder, a lamp secured therein having one terminal in electrical contact therewith, said holder embracing said lamp and having a U-shaped portion serving as a guard therefor and terminating in a contact point, and a second contact point connected by an electrical conductor with the other terminal of said lamp.

3. A testing device comprising a metallic holder, a lamp supported therein, two pointed leads in contact with one terminal of the lamp and insulated from said holder, and a third pointed lead in electrical contact with the holder and the other terminal of said lamp.

4. In a testing device, a lamp socket comprising a hollow cylindrical member, a lamp detachably supported therein, a U-shaped plate rigid with said member and embracing said lamp, a contact lead rigid with said plate, a second contact lead rigidly mounted in the socket but insulated there-

from, and a third contact lead spaced from said lamp and connected thereto by a flexible conductor.

5. A testing device comprising a metallic lamp socket, insulation in one end thereof, a terminal contact carried by the insulation, a conductor having one end connected to said terminal contact, a lamp in said socket, means for securing it in place, a U-shaped plate rigid with the walls of the socket and embracing the lamp, and test leads secured to the closed end of said plate and the ends of said conductor respectively.

6. A testing device comprising a metallic cylindrical holder, insulation in one end thereof, a conductor having one end embedded in said insulation and spaced from said holder, slots in said holder at opposite sides, a lamp having lugs on opposite sides of its base adapted to engage said slots, said slots being arranged whereby inadvertent removal of the lamp from the holder is prevented, a protector for the lamp comprising a U-shaped extension of the walls of the holder and embracing the lamp, and test leads connected to the end of said protector and the end of said conductor respectively.

7. In a testing device having test leads connected therewith, an open-ended sleeve, a current indicator in one end of said sleeve, insulation in the other end, a contact member secured in said insulation adapted to engage one contact of said current indicator, a conductor secured to said contact member, a flexible member surrounding the conductor adjacent to said contact member, and a cup-shaped member embracing said flexible member and secured to said insulation, a contact member on the end of said conductor, and a contact member electrically connected to the other contact of said indicator.

8. In a testing device, having test leads connected therewith, a lamp socket comprising a sleeve, and insulation plug in one end of said sleeve, a hollow contact member secured in said plug adapted to engage one contact of a lamp seated in the socket, a conductor inserted in said contact member and constituting a test lead, a clamp therein, a flexible member surrounding the conductor adjacent to said contact member, said flexible member having an enlarged end and a cup-shaped member embracing said enlarged end, and secured to said insulation, and a test lead electrically connected to the other contact of said lamp.

9. In a testing device having test leads connected therewith, a lamp socket comprising an open-ended sleeve, a lamp seated in one end thereof, a plug of insulating material secured to and projecting from the other end of said sleeve, a central opening in said plug, a hollow contact member occupying said opening with one end engaging one contact of said lamp, a conductor having its

end stripped of insulation and inserted in said hollow member, said conductor comprising a test lead, a screw clamping said conductor therein, extra insulation secured to said conductor adjacent to said stripped end, and a cup-shaped member surrounding said conductor and extra insulation and secured to said plug, and a test lead connected to the other contact of the lamp.

10 10. In a testing device, a lamp holder comprising a sleeve, a lamp supported therein, a protecting plate embracing said lamp, a contact lead secured thereto, an insulation plug in said sleeve below said lamp, a hollow metallic member in contact with said lamp, a conductor having an end clamped in said hollow member, said clamping means comprising a second contact lead projecting laterally from said plug, and a third contact lead connected to the other end of said conductor.

11. In a testing device, a lamp holder comprising a sleeve, a lamp supported there-

in, a protecting plate embracing said lamp, a contact lead secured thereto, an insulation plug in said sleeve below said lamp, a hollow metallic member in contact with said lamp, a conductor having an end clamped in said hollow member, said clamping means comprising a second contact lead projecting laterally from said plug.

12. In a testing device, a lamp socket having a contact point electrically connected therewith and comprising a hollow sleeve carrying a conductor therein, insulated from conducting portions of said sleeve, a flexible conductor connected with said last named conductor, an insulating member surrounding said flexible conductor adjacent the point of connection, a cup insulatingly carried by said sleeve and abutting said insulating member, and a contact member on said flexible conductor.

In testimony whereof, I hereunto affix my signature.

REGINALD H. CARTER.