

[54] ELECTRICAL CIRCUIT TESTER

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[22] Filed: Mar. 23, 1973

[21] Appl. No.: 344,187

[52] **U.S. Cl.**..... **324/72.5, 339/96**

[51] **Int. Cl.**..... **G01r 31/02**

[58] **Field of Search** 324/72.5, 158 P, 133;
339/108 TD, 96

[56] **References Cited**

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[57] ABSTRACT

An elongated tubular handle of electrically inert material, permanently closed at one end, is apertured at said end to pass an electric wire to connect with a clip

or the like (not shown), and has a removable closure at the opposite end. An elongated rod of electrically conductive material has an end portion rigidly imbedded in said closure, and said end portion terminally protrudes through said closure into the interior of said handle for electrical connection with said electric wire. Said rod also has an opposite end, remote from the handle and sharply pointed. An elongated, tubular sleeve encloses, and has limited, sliding, reciprocable travel longitudinally of said rod. Said sleeve has an end portion slidably received in a socket in said closure. A first spring received in said sleeve reacts between said sleeve and said rod to urge said sleeve toward said handle. A second spring received in said socket reacts against said sleeve to urge said sleeve away from said handle.

Said springs jointly establish a normal position of said sleeve, enclosing substantially the entire length of said rod. Said first spring yields, responsive to said sliding travel of said sleeve, away from the handle, to extend said sleeve beyond the remote end of said rod. Said second spring yields, responsive to the sliding travel of said sleeve, toward the handle, to expose an end portion of the rod for electrical contact. Said sleeve is recessed to receive an electric wire and dispose said wire for electrical contact with said rod when said second spring is allowed to assert its spring tension to urge said sleeve toward said normal position.

5 Claims, 7 Drawing Figures

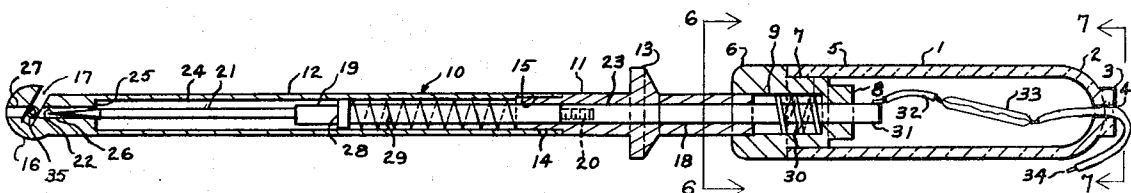


FIG. 1

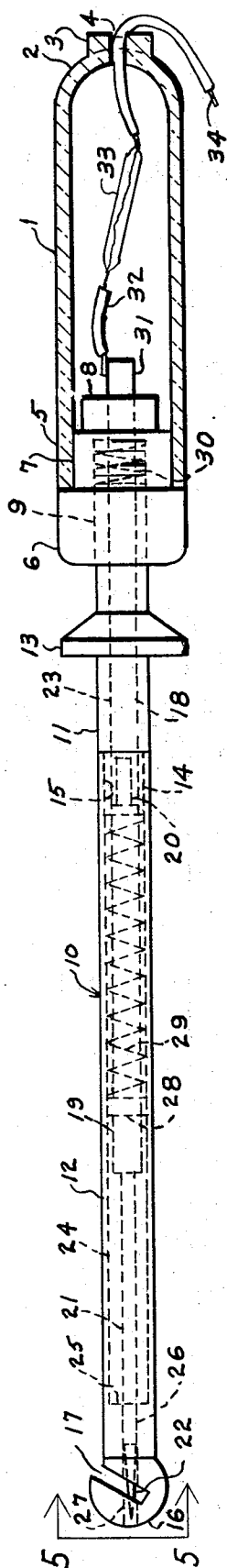


FIG. 2

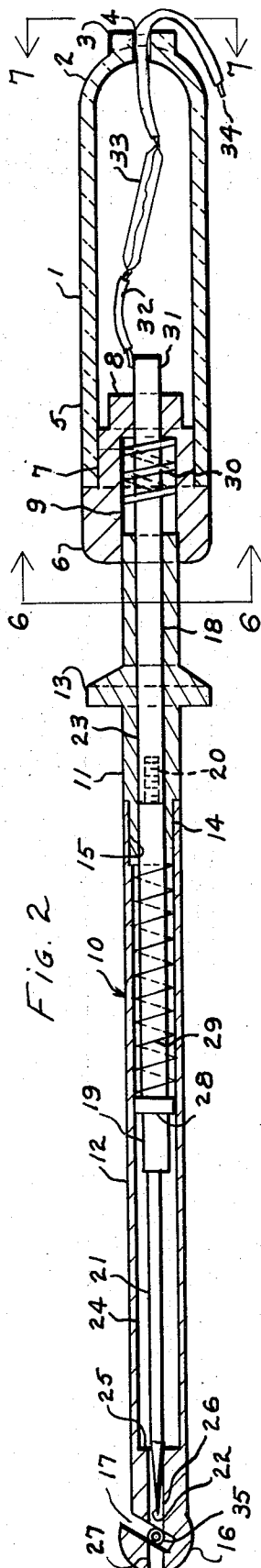


FIG. 3

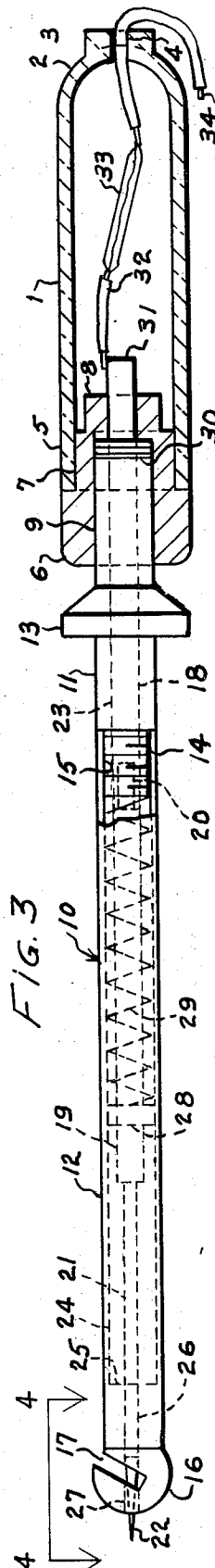


FIG. 4

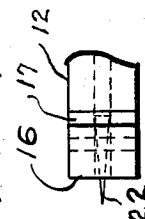


FIG. 5

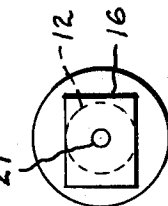


FIG. 6

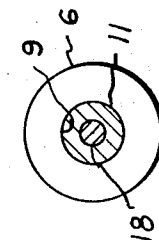
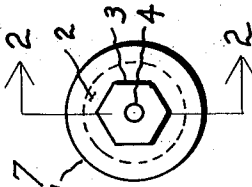


FIG. 7



ELECTRICAL CIRCUIT TESTER

FIELD OF INVENTION

Invention lies in the area of electrical circuit testers in which a two section, pointed prod, or probe, is employed to make one contact of a test circuit, and a clip or other form of electrical contact is employed to complete said test circuit, and wherein a pair of counterbalancing springs maintain the pointed probe in a normal position, completely encased in a two section, non-conductive sleeve, and wherein either spring yields to allow travel of said sleeve relative to said probe to afford use of said probe.

DESCRIPTION OF THE PRIOR ART

The prior art, insofar as it is known to applicant, employs elongated tubular sleeves, usually of non-conductive material, in which there is slidably reciprocable a rod, usually having one end sharply pointed, of electrically conductive material. The end of said rod remote from said pointed end usually makes electrical contact with a wire or the like which wire terminates in another contact device of any convenient nature to complete the test circuit. In the prior art, some devices are spring loaded to maintain a desired relationship between the sleeve and the pointed rod, normally with the pointed end of the rod exposed from the sleeve so the electrical contact may be conveniently made with said pointed end, without adjusting the relationship of the rod to the sleeve.

In addition to making contact with the pointed end protruding from the sleeve, the prior art shows the formation of a recess in the end of the sleeve, to receive a wire disposed transversely to the longitudinal extent of the tool, and provides for slidable relative travel of the sleeve and the rod so that said recess clears the pointed end of the rod to afford disposition of an electrical wire in the recess so that upon reversal of the relative sliding travel of the sleeve and the rod, the wire is carried to the pointed end until the pointed end contacts the wire, piercing insulation, where present, in order to make such contact.

It is the intention of the present invention that its predominant use will be with automobiles, trucks, boats, aircraft, and the like, with circuitry systems employing from 12 to 24 volts. The environment in which such use occurs allows blunting, breaking, and bending of the pointed tip, and there is also a very real possibility that the exposed pointed tip may injure a mechanic or other person using the device.

It is an object of the present invention to provide such an instrument in which the sleeve has a normal position enclosing the entire length of the rod, including the aforesaid sharply pointed end.

It is a further object of the invention to provide a first spring in said sleeve to react between the sleeve and the rod to normally urge the sleeve toward the handle to a retracted position to expose the pointed end to make electrical contact.

It is still a further object of the invention to provide a second spring to urge said sleeve away from said handle to an extended position in which the pointed end is enclosed.

It is still a further object of the invention to so predetermine the respective powers and positions of said springs as to establish said sleeve in said normal position.

Still a further object of the device is to construct said rod in two sections, and to provide means of releasably joining said sections together, to facilitate application of a first spring in said sleeve, and a second spring in said socket.

Still a further object is to form said tubular sleeve in two sections, and to provide means to releasably join said sections to further facilitate the installation of said springs.

These and various other objects are attained by the disclosure hereinafter set forth and illustrated in the accompanying drawing, wherein:

FIG. 1 is an elongated elevational view in partial section of the device showing the sleeve in its normal, rod-enclosing position.

FIG. 2 is a vertical, longitudinal, sectional view on line 2—2 of FIG. 7, illustrating the sleeve in its extended position to clear the recess for reception of a wire to be tested.

FIG. 3 is an elevational view similar to FIG. 1, and showing the sleeve in its retracted position to expose the pointed end of said rod.

FIG. 4 is a partial view of the recessed end portion of said tubular sleeve taken on line 4—4 of FIG. 3.

FIG. 5 is an end view of the recessed end of said sleeve taken on line 5—5 of FIG. 1.

FIG. 6 is a partial sectional view taken on line 6—6 of FIG. 2.

FIG. 7 is an end view taken on line 7—7 of FIG. 2.

In these views the reference character 1 generally designates a hollow handle, having a permanently closed end 2. Said closed end is formed with a hexagonal boss 3 which resists rotation of said handle in a die, and said boss is formed with a hole 4, for purposes hereinafter described.

The open end 5 of the handle is fitted with a removable closure having an exterior portion 6, a threaded plug 7 threadedly received interiorly in said open end and an annular boss 8 projecting from said threaded portion concentrically within said hollow handle. The closure is formed with an externally opening socket 9, which may be circular or any other convenient form.

A tubular sleeve, generally designated as 10, has an inner section 11 and an outer section 12. The inner end portion of the inner section 11 is received within said socket, and is formed with an annular flange 13 for manual operation of the device. The reference character 14 designates a male, threaded portion, terminally formed on the inner tubular section 11, while the female threaded portion 15 is formed interiorly and terminally of the outer section 12. Obviously, the threaded interconnection affords conjoining and disassembly of the two sections 11 and 12.

If desired, the outer end portion of the outer section 12 of said sleeve may be enlarged, as at 16. Whether or not the end portion is enlarged, the utility of the device is substantially increased by formation of a recess 17 in the outer section to receive a wire 35, shown in cross section in FIG. 2. It is contemplated, that the handle, the closure, and both sections of the tubular sleeve, will be composed of an electrically inert material.

A rod of electrically conductive material is constructed in two sections, an inner section 18 and an outer section 19. An end portion of said rod is rigidly imbedded in the closure 6, preferably concentric therein, and has its terminal end portion 31 protruding from the aforesaid annular boss 8 to make contact with

an electrical wire 32. A threaded interconnection 20 is provided to conjoin and disassemble the two sections 18 and 19 of said rod. It is to be further noted that the outer end portion 21 of said outer section of the rod is reduced to a smaller diameter, and this section is terminally formed with a sharp point 22.

A hole 23 extends through the inner section 11 of the sleeve 10, and affords a sliding fit on the inner section of said rod. The inner end portion of said sleeve inner section 11 also has a sliding fit in the aforesaid socket 9. A socket 24 extends throughout almost the length of the outer section 12 of said sleeve, and is formed with a bottom surface 25. A hole 26 of smaller diameter, to afford a sliding fit, and support, to the outer end portion 21 of the rod extends from the bottom 25 of said socket to the recess 17. Said hole continues as at 27 through the remaining portion of the enlargement 16 of the sleeve.

An annular shoulder 28, is formed on the rod 19. A first coil spring 29 is received within the sleeve, encircling the rod, and reacts between said annular shoulder 28 and the male threaded portion 14 of the inner section 11 of the sleeve. As the rod is immovable relative to the handle (and to the closure threaded into said handle), the tendency of the first spring 29 is to urge the sleeve toward the handle, and as deeply as it will go into the aforesaid socket. If the spring were allowed its full play, it would tend to maintain the sleeve in the position shown in FIG. 3, with the pointed end of the rod exposed, with the consequent possibility that the point will break or be damaged, as well as the possibility of its causing injury to people using the instrument.

To avoid this consequence, a second coil spring 30 is disposed in said socket 9, to react between the bottom of the socket and the inner end face of the sleeve section 11, with a tendency to urge said sleeve section and its associated outer section 12 away from the handle. The forces of the two springs are so predetermined as to counterbalance each other and result in the normal position as shown in FIG. 1 of the drawing, wherein the point of the rod is enclosed, but obstructs the recess 17. Thus, at all times, the sleeve is extended so that the point 22 is protected from damage, and persons using the instrument are protected from inadvertent injury from the point.

The inner terminal end portion 31 of the rod, as aforesaid, makes electrical contact in any conventional and desired manner with an end of a wire 32. In the disclosure presented herewith, a light bulb 33 has electrical connection with the opposite end of said wire 32, and another length of wire 34 extends from its electrical connection with the opposite end of the light bulb through the aforesaid hole 4 to make electrical contact in any manner desired to complete a test circuit. Obviously, when a circuit is completed from a wire to be tested, through the rod 18, 19, the wire 32, the bulb 33, and the remaining wire 34 to the electrical contact (not shown), the light will be energized if current is present in said wire. It is proposed to make the handle of a translucent, or transparent material so that it will be apparent to the user of the device when current is present in an electrical circuit.

Since the device cannot be used when the sleeve is in its normal position, the annular flange 13 is provided to be grasped with the fingers of one hand, while the handle is held with the other hand, and the sleeve may then be forced outwardly from the handle, compressing the

spring 29 so the pointed end 22 of the rod 18, 19 does not obstruct the recess 17. Once a wire 35 is engaged in the recess, the annular flange 13 may be released, and the spring 29 will urge the sleeve inwardly toward the socket and cause the wire 35 to engage the pointed end 22. Should it be desired to make an outside contact, of a junction (as for example) in a fuse box, the aforesaid annular flange 13 may be grasped to slide the sleeve toward the handle, and into the socket, compressing the spring 30, to expose the pointed end 22 so that a desired contact may be made.

A further advantage which may be derived from the device, is that when a wire is engaged in the recess 17, the tool may be allowed, where feasible, to be suspended by the wire affording a mechanic the freedom of both hands to effect what other repairs may be indicated.

What I claim is:

1. The combination with an electrical circuit tester, including
 - a hollow tubular handle having a closed end and an open end,
 - a closure removably applicable to said handle to close said open end,
 - an elongated, electrically conductive rod having a near end portion extending into said handle and a pointed end portion, remote from said handle, and an electrical conductor connected to said near end, within said handle, to make a desired electrical contact, of
 - an elongated, tubular sleeve having an interior elongated slideway extending its full length,
 - a recess in the outer end portion of said sleeve, formed to intersect said slideway, and receive an electrically conductive wire disposed transverse to and in the path of said slideway,
 - said sleeve having a normal position in which its outer end substantially coincides with and encompasses said pointed end, so that said pointed end obstructs said recess,
 - said sleeve having reciprocable, sliding travel longitudinally of said rod, toward said handle to a retracted position exposing said pointed end for desired, selective electrical contact, or away from said handle to an extended position, to withdraw said recess from said pointed end, whereby said recess may receive a wire for physical and electrical contact by said pointed end upon reversal of said sliding travel, toward said normal position of said sleeve,
 - a first yieldably resistance means reacting between said rod and said sleeve to urge said sleeve toward said retracted position, and
 - a second yieldably resistance means reacting between said closure and said sleeve to urge said sleeve toward said extended position,
 - said first and second means resistance, jointly establishing said sleeve in said normal position.
2. The combination as set forth in claim 1,
 - a socket in said closure, said socket having a bottom wall,
 - the near end portion of said rod extending through said bottom wall to terminally project into said handle,
 - said inner end portion of said sleeve extending slidably into said socket,

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said second means being a spring received in said socket to react between said bottom wall and the inner end portion of said sleeve to urge said sleeve in said sliding travel outwardly of said socket and away from said handle.

3. In the combination as set forth in claim 2, said first means being a spring disposed within said tubular sleeve,

means on said rod to engage said spring, and means carried by said sleeve to engage said spring, whereby said last mentioned spring urges said sleeve toward said handle.

4. In the combination as set forth in claim 3, said sleeve comprising an inner section and an outer section,

said inner section having its outward end portion ter-

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minally formed with a male thread, said outer section having its inner end portion terminally formed with a female thread to receive said male thread,

5 said last mentioned spring reacting between said means on said rod and said male threaded portion to urge said sleeve toward said retracted position.

5. In the combination as set forth in claim 4,

said rod consisting of an outer section, and an inner section,

means provided on said inner section and outer section to conjoin said sections of said rod in alignment to afford removal of said outer section to receive said last mentioned spring thereon.

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