Jan. 9, 1945. J. WICH 2,366,991

POCKET CURRENT TESTER

Filed June 12, 1941

Fig. 1.

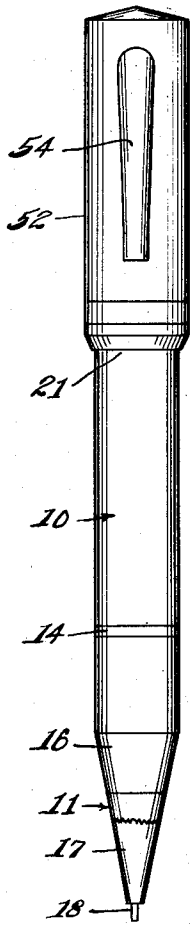


Fig. 4.

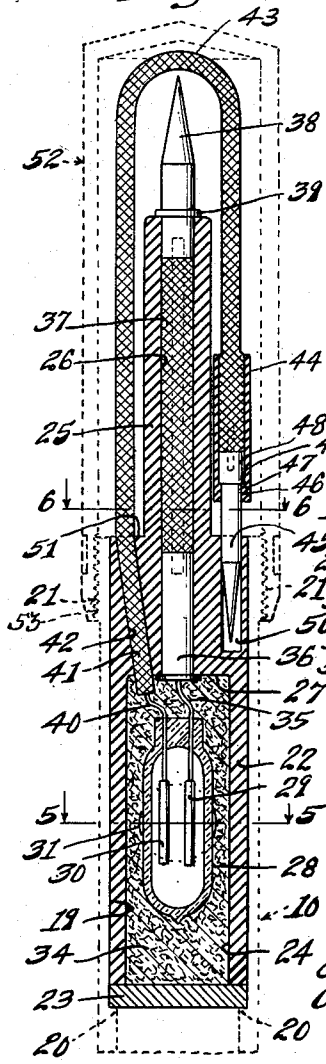


Fig. 3.

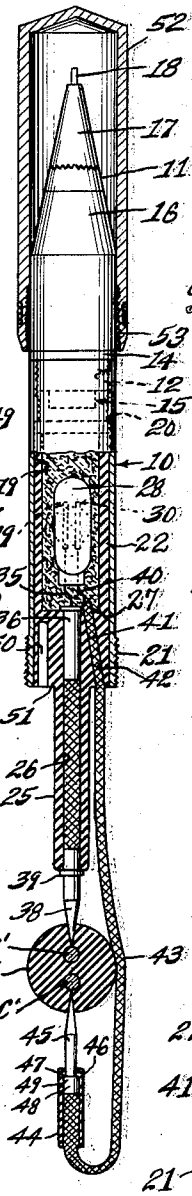


Fig. 2.

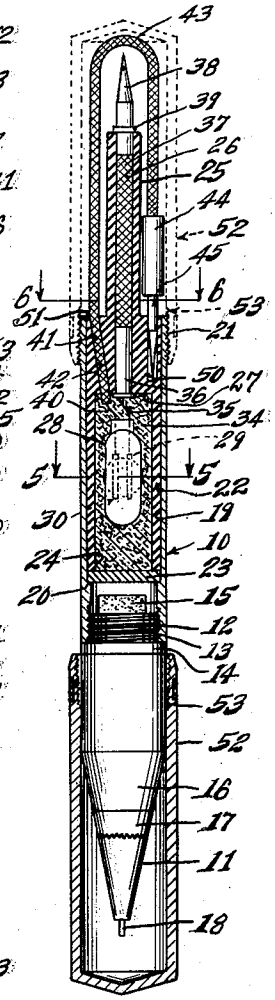


Fig. 5.

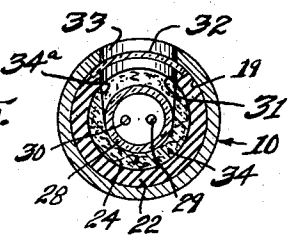
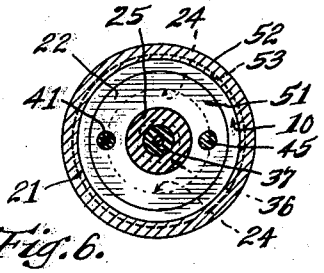


Fig. 6.



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POCKET CURRENT TESTER

John Wich, Chicago, Ill.

Application June 12, 1941, Serial No. 397,725

8 Claims. (Cl. 175—183)

My invention relates to a tester for electrical current and the object thereof is to provide a convenient pocket tester with a neon or other gas bulb for indicating the presence or non-presence of current in a line wire or conductor and to show whether the same is A. C. or D. C. current and the polarity thereof and also for R. F. or radio frequency and to render the device safe to carry without injury to the person or danger to children as well as around loose, swinging or exposed electrical wiring or parts charged with current.

Another and important object of the invention is to provide a pocket neon tester for electrical current or energy which is small and compact and simulates an ordinary fountain pen, pencil or combination of both and includes a writing implement in its structure for handy use and also includes an insulated flexible conductor or cable which, when not in use, is entirely enclosed and protected as well as prevented from dangling from the instrument which may be clipped in a pocket to the material of a garment just like an ordinary writing or marking instrument.

Another object of the invention is to provide a tester which can be readily carried in one's pocket and has a casing or barrel with a removable cap which encloses two terminals, one of which is rigid with the casing and the other of which is carried by a flexible insulated wire or cable so that connection may be made to various electrically charged parts while still permitting proper exposure or best possible visibility of the neon or other light to permit the operator to determine the nature as well as the presence or non-presence of electrical current, particularly low voltages or voltages of A. C. current from 65 to 125 volts and D. C. current from 90 to 125 volts or whether A. C., D. C. or R. F., for live wires, grounded wires, open circuits, shorts, polarity, to locate blown fuses, defective spark plugs, cables, distributor caps and similar ignition parts and the like.

Another object of the invention is to provide a tester of the character stated employing a neon or other gas lamp in which the same is thoroughly protected against electrical contact with the user and the lamp from breakage as well as to provide a protective resistance for the sensitive lamp or neon tube to prevent injury thereto or destruction thereof by surges of electrical current and in general, to simplify and improve devices of this character.

Other objects and advantages will appear hereinafter and be brought out more fully in the following specification, reference being had to the accompanying drawing, wherein:

Fig. 1 is an elevation of a pocket current tester constructed in accordance with the invention;

Fig. 2 is a longitudinal axial sectional view of the tester with the clip cap applied to the end of the barrel having a pencil or other marking or writing instrument;

Fig. 3 is a sectional elevation of the instrument in the reverse position and showing the tester applied to a cable as in one use thereof;

Fig. 4 is an enlarged fragmentary sectional view similar to Fig. 2 with the pencil end omitted; and

Figs. 5 and 6 are cross sections taken on the planes of the lines 5—5 and 6—6 of Figs. 2 and 4 with the outer barrel and cap in position in solid lines.

Referring to the drawing more particularly, the instrument constituting the pocket current tester of the present invention includes an outer cylindrical barrel 10 which is of tubular form and like most of the casing parts of the instrument may be made of any suitable material but preferably of some insulation material or dielectric such as "Bakelite," hard rubber or other molded plastic but is not confined thereto as other suitable material may be employed. The instrument also includes a writing or marking instrument 11 shown in the form of a pencil and preferably of a magazine feed or retracting lead type, but may be a pen, stencil or the like. This instrument constitutes a plug for closing one end of the barrel 10 such as by internal threads 12 which forms a removable connection for the externally threaded reduced end portion 13 of the plug formed by the writing instrument 11. The threaded portion 12 constitutes the small bore end of the barrel or casing 10 engaged by the reduced threaded end 13 which is normally of metal and has an annular flange or collar 14 engaging the end of the pencil barrel which is normally of hard rubber, Bakelite or the like and forms a shoulder around the threaded portion 13 against which the end of the barrel 10 at the threaded portion 12 seats. The ring or flange 14 is stationary but may be removed for obtaining access to the interior of the writing instrument which may be a pen, pencil or a marking instrument of any suitable character. As shown, the pencil has an eraser 15 fitted in the reduced bore of the threaded end 13 and the opposite end is tapered as shown at 16 with a rotatable portion 17. This portion is preferably of metal and swivelled to the remaining part of the pencil so that

either may be turned for feeding or retracting the lead 18.

The casing or outer barrel 10 has an enlarged longitudinal bore 19 from the reduced portion in which the threads 12 are provided, forming a stop or shoulder 20 facing the enlarged bore and an externally threaded freely open end 21. An inner casing or barrel 22 also of cylindrical form, is fitted within the bore 19 of the outer barrel 10 and has a closure 23 at said end shown in the form of a plate, disk or plug which sets against the shoulder 20. This disk closes said end, but when the inner barrel is removed, renders it possible to obtain access to the chamber formed by the inner barrel which is counterbored at 24 for this purpose to accommodate the lamp bulb such as a neon or other gas lamp of the fluorescent or similar type, neon being employed because of its ability to be colored and its higher visibility as well as operation on a very small current flow such as one-tenth milleampere. The inner barrel 22 at its opposite end has a reduced elongated axial tubular portion or extension 25 which has considerable wall thickness and is comparatively rigid and strong but has a small axial bore or passage 26 and forms an end wall or annular shoulder 27 with the bulb chamber 24 around the inner end of the bore or passage 26. Disposed within the chamber 24 is a neon or similar gas or fluorescent bulb 28 having filaments or electrodes 29 and 30 shown in the form of terminals which are used in testing. The inner tube or barrel 22 has an aperture, window opening or hole 31 adjacent the electrodes of the bulb 28 and confronting the same while the outer barrel 10 or the inner barrel 22 may have a transparent window 32 of glass, mica or other plastic or fireproof material which is non-combustible. A hole 33 is provided in the outer barrel in alignment with the hole 31 and thus the window may be provided in either hole which forms a sight opening but as shown, the window is held in position in a seat in the inner sight opening by a bezel or by the outer barrel though it may be frictionally held, mounted or otherwise anchored. In order to protect the bulb and the electrodes or filaments from injury or breakage from shock, an asbestos or soft fibre insulation packing or cushion compound 34 may be provided in the chamber 24 around the bulb but left open at the space 34a aligning with the sight opening either when packing the same or cutting or gouging out this portion so that the tube is readily visible with better light density and clear observation.

A disconnectible lead or conductor 35 leads from one of the electrodes shown as the filament or the electrode 29, and this may be arranged to plug removably in position as well as forming a terminal of the lamp or plug into a protective resistance 36 which is removably held in the adjacent end of the small bore or passage 26 and if desired, flanged against the end wall 27. Any suitable material may be used for this protective resistance such as is well known in the art, for instance, carbon or other suitable resistance to protect the neon tube, lamp or bulb electrodes or filaments 29 and 30 against shock from surging current. The disconnectible lead 35 is preferably an insulated conductor and a similar conductor in the form of an insulated conductor wire or cable 37 is provided to snugly fit in the passage 26 and connects to the opposite end of the protective resistance 36 shown in the form of a cylinder although the wire 37 need not be insulated since it remains in the passage 26 which is formed in the reduced portion 25 of insulating material. At its free end, the conductor 37 connects to one end of a rigid tapered or pointed terminal 38 of some suitable good conducting metal such as polished brass or the like and which is made relatively sharp to pierce an insulated cable or other conductor or to make good electrical connection with parts to be tested such as line wires, fuses, spark plugs, cables, distributor caps or other ignition parts or the like. The pointed terminal 38 may have an annular flange or shoulder 39 to produce a stop against the end of the reduced portion 25 of the inner barrel when the adjacent end of the rigid terminal 38 is fitted in the end of the passage 26 in proper electrical connection with the conductor 37. The wire 37 is shown fitted in a socket in the end of the terminal 38 and the parts may be suitably anchored or connected frictionally, by soldering or otherwise and this also applies to the electrical connection of the lead or conductor 35 with the neon electrode 29 and the protective resistance 36 as well as the connection of the latter with the conductor wire 37 which, as previously stated, may be left spaced and uninsulated within the wall of the bore or passage 26 with a space around shank 25.

The other electrode 30 is provided with a conductor or lead 40 forming the other terminal of the lamp bulb and connects to an insulated cable or conductor 41 of pliable or flexible character which is fitted within a diagonal passage 42 in the solid portion or thickened wall of the inner barrel 22 between the chamber 24 and the reduced portion 25 forming a tubular shank. In other words, this passage 42 converges toward the axis of the barrel and the tester instrument so that the outer end is closely adjacent the periphery of the barrel. The flexible insulated cable 41 is comparatively long and as shown, extends longitudinally along the space and reduced portion or shank 25 and then is bent as shown at 43 around the stationary rigid terminal or pointed end of the pin 38, after which it is extended in the opposite direction at the diametrically opposite side thereof to a point adjacent the inner barrel proper 22 where the reduced portion 25 is formed but slightly spaced therefrom to accommodate an insulated sleeve or fingerpiece 44 in which it is frictionally held, clamped or soldered. This insulated sleeve prevents transference of current to the fingers and body of the user and avoids injury or shock. The cable 41 connects to a pointed or tapered terminal or pin 45 preferably within the sleeve 44 and extends through a reduced bore portion 46 at the free end thereof forming an internal oppositely facing shoulder 47 in the bore of the sleeve or fingerpiece 44 and the pin or terminal has an enlarged portion 48 at its inner end detachably or otherwise connected to the conductor or cable 41 in one of the manners heretofore described in connection with the bulb, protective resistance or the pointed terminal 38. This enlarged portion 48 forms a shoulder 49 on the pointed terminal 45 which seats against the shoulder 46 and prevents displacement of the terminal but the important feature is to have the latter held within the fingerpiece so as to resist pressure in forcing the pointed end of the terminal into an insulated cable such as C in Fig. 3 of the drawing so that the terminals 38 and 45 will pierce or engage the conductors C' thereof or in making any other suitable electrical connection with a part to be tested. For this pur-

pose, the terminal 45 may have a shoulder corresponding to the shoulder or stop 39 of the terminal 38 or may be otherwise suitably anchored, frictionally held, clamped or soldered in position. When the device is not in use, the terminal 45 may be accommodated within a longitudinal socket 50 exposed outside of the reduced extension or shank 25 and offset radially in parallel relation to the bore 26 so as to open endwise toward the terminal 38 and through a shoulder 51 between the inner barrel 22 and the reduced portion or shank 25 by which it is formed. A cap 52 may be provided to fit over the exposed parts of the testing device or over the pencil or other marking or writing instrument 11 and for this purpose, has a closed end and an open end as shown. The open end is preferably provided with a tapered threaded bore portion 53 to engage the corresponding threads 21 externally on the outer barrel 10 at the end thereof adjacent the shoulder 51 but merely to frictionally engage over the cylindrical portion of the writing instrument 11 which is left unthreaded as shown although this securely holds the cap in place over the pencil when the tester is in use. When the device is not in use, it may be held in a pocket of a garment as by means of a spring clip 54 of the usual or any preferred type.

In the use of the tester, the cap is removed from the barrel 10 after the clip 54 is disengaged from the pocket of a garment from which the same is removed, the same as a writing instrument which it resembles in appearance. The cap is then applied over the writing instrument or pencil 11 as shown in Figs. 2 and 3 of the drawing from the normal position shown in Fig. 1. This exposes the cable or conductor 41 and after removing the pointed terminal or needle 45 from the socket 50, the rigid pointed terminal 38 is arranged to pierce a cable or connect with some other part to be tested in good electrical connection therewith. The pointed terminal or needle 45 is similarly positioned and this without likelihood of shock or injury from current to the user by reason of the insulated sleeve or finger piece 44. Also, by having the flexible cable 41, the instrument may be turned in any desired position to insure proper visibility of the lighted tube, this being permited because the flexible cable 41 of the terminal 45 may be arranged in any desired position. The units are combined in one instrument and serves universally as a writing or marking implement in the form of a pen or pencil or well as a convenient pocket neon tester for determining the condition of various wires or electrical parts and operating on very low amperage. It may be used to test A. C. current from 65 to 125 volts or more as desired and D. C. current from 90 to 125 volts or more depending upon its construction and capacity, to test live lines or wires, grounded lines, open circuits, shorts, polarity and whether A. C., D. C. or R. F. (radio frequency) locate blown fuses, defective spark plugs, cables or distributor caps and is the only device to my knowledge produced to conveniently test distributor caps or similar ignition parts with facility. The device is a handy tester and is always at hand and may be carried in one's pocket without danger of injury from dangling wires or pointed terminals in addition to being more effective and including a writing or marking instrument for convenient use, preferably a unit in the form of a conventional retracting or magazine feed lead type pencil complete with an eraser. Merely by removing the cap 52, the testing device of the tester unit will be exposed and while the terminals are shown pointed or in the form of a tapered pin, stem or needle, they may be in the form of prongs or other suitable formation. By having one terminal solid or rigid, the device is readily grasped and is rendered easy to grip firmly and to make good contact as well as to face the instrument in a position for best visibility of the neon light. In addition, by having only one small window in the barrel for observation of the neon tubes and testing, a better light density and clearer observation or visibility is possible. When the flexible pointed cable is not in use, it is anchored so that no pointed parts are exposed inasmuch as the curved end 43 of the cable 41 also extends around or adjacent the pointed end of the terminal 38 while the terminal 45 is held in the socket 50, being merely plugged in the side hole forming the same and permitting the cap to be screwed on or off without any difficulty. In other words, the cap encloses the complete tester unit and in this way, no wire is left dangling or exposed, thus not only giving full protection against damaging the tester unit but producing an appearance like an ordinary pen or pencil. By providing a connection from either terminal point to the sensitive neon tube through a protective resistance, the tube is protested against injury or electrical surges especially by reason of being highly insulated and avoiding all danger of shock. There is no danger from swinging wires or terminals too close to the connected parts or parts to be tested and better contact is insured on spark plugs, distributor caps, outlet boxes, fuses and the like. As will be noted, there are two of the gas electrodes and when illuminated, shows a live wire. The neon tube will operate on a very weak circuit, preferably one-tenth milliampere, both electrodes lighting up on A. C., one on D. C., and also showing the polarity of the current by lighting one or the other. For relatively strong current, the gas will light substantially red, crimson or carmine or it may be orange in color for A. C. and D. C. and pink for radio frequency. Thus, the device is also safe for children and a protection against piercing the body or clothes as well as awkwardness of use compared to old devices employing prongs and exposed parts. The device is also especially adapted for use in connection with the spark plugs since no swinging wires are left exposed to blow out the bulbs by touching a motor casting or contacting with a ground.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of constructions set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A pocket current tester including an outer barrel, a plug closing one end of the barrel, a cap adapted to be held on either end of the outer barrel, an inner barrel fitted within the outer barrel, one barrel having a reduced portion, a chamber in the inner barrel, a plural gas electrode bulb in the chamber and exposed through a window therein, a conductor rigid in the reduced portion and having a terminal point elec-

trically connected therethrough to an electrode of the bulb with an interposed protective resistance confined in a barrel, a flexible conductor also connected to an electrode through the inner barrel and having a terminal conductor point, said barrel having a socket in which the last named pointed terminal is adapted to be mounted when not in use, said flexible conductor adapted to be bent on itself adjacent the pointed end of the other terminal to be covered by the cap.

2. A current tester including an open ended outer barrel, a closure at one end of the barrel, an inner barrel in the outer barrel, said barrels being of insulation, a chamber in one end of the inner barrel, a closure for the open end of said chamber and limiting the displacement of the inner barrel in the outer barrel, a gas filled bulb in the chamber and exposed through a sight window in the barrels, said inner barrel having a reduced end, a pointed conductor terminal at one end of the reduced portion and electrically connected to a bulb through a resistance, an elongated flexible conductor also connected to a bulb, a pointed conductor terminal at the free end of the last named conductor, means in the barrel alongside of the reduced portion to receive and anchor the last named terminal, and a cap mounted on the barrel for disposition at either end.

3. A tester for electric current including a barrel having a chamber therein at one end, a gas bulb in the chamber, said barrel having a reduced bore portion communicating with the chamber at one end and extending through the other end of the barrel, a conductor in the reduced bore portion having a rigid terminal abutting the latter end, a flexible conductor having a terminal at its free end and of a length approximately twice the length of the first conductor and bent on itself over the first terminal and means for anchoring the terminal of the flexible conductor longitudinally in the barrel outwardly of the first conductor and between the same and the periphery of the barrel, said conductors being connected to the bulb.

4. A tester for electric current, including a barrel having a chamber therein at one end and a reduced portion at the other end, a gas bulb in the chamber and having a plurality of electrodes exposed through a window in the barrel, a conductor in the reduced portion connected to one of the electrodes at one end and having a terminal at the other end rigid with the barrel and a flexible conductor having a terminal at its free end and connected to the other electrode at its other end, said flexible conductor being offset inwardly from the periphery of the barrel to extend through the latter for connection with said electrode and being of a length to be bent over the first terminal and along the reduced portion in offset relation to the periphery of the barrel and the barrel having means to receive and anchor the terminal thereof at the opposite side of the barrel with relation to the point of entry of said conductor through the barrel for connection with an electrode.

5. A pocket fluorescent or illuminable gas tester for electric currents comprising a barrel having a bulb chamber at one end and a reduced tubular portion at the other end, a bulb in the chamber having a pair of electrodes exposed through a window in the barrel, a rigid pointed terminal snugly fitting in and projecting from the bore of the reduced portion at its free end and connected to one of the electrodes through the bore and a flexible conductor much longer than the reduced portion and rigid terminal connected to the other electrode through the barrel at one side of the bore and having a pointed terminal at its free end, said reduced portion forming a shoulder having a socket to receive and anchor the last terminal.

6. A pocket tester for electric current including a barrel having a bulb chamber at one end and having a reduced tubular portion at the other end forming an external shoulder facing the free end of the reduced portion, a bulb in the chamber having a pair of light filaments exposed through a window in the barrel, a rigid conductor terminal held in the outer end of the bore and connected to one light filament through the bore with an interposed protective resistance fitting the inner end of the bore and a flexible conductor extending through the barrel at the shoulder and connected to the other light filament at one end and extending outwardly along the reduced portion at one side, bent back over the rigid terminal and along the reduced portion at the other side thereof and having a terminal at its free end, there being a socket in the barrel at the shoulder to removably receive the last named terminal when not in use.

7. A current tester including a barrel having a plug at one end and a chamber in the barrel at said end closed by the plug and provided with a sight opening, fluorescent bulb in the chamber having two illuminable gas electrodes exposed at the opening and a pair of conductor terminals connected at the electrodes, one terminal being rigid at one end of the barrel and projecting therefrom and the other having an elongated flexible conductor bent back on itself over the first terminal and means for removably anchoring the second terminal in the barrel radially between the first conductor and the outer surface of the barrel.

8. A tester for electrical current including a barrel having a lamp chamber open at one end and a reduced tubular portion at the other end forming an internal annular shoulder at said end, the inner portion of the bore of the reduced portion extending into the barrel and communicating with the chamber, the barrel forming an external shoulder around the reduced portion and having a socket extending into the barrel at the shoulder; a protective resistance in the inner end of the bore, a gas lamp in the chamber and having two electrodes, one of which is connected to the resistance, a conductor cable extending through the bore and connected to the other end of the resistance, a pointed metallic terminal at the outer end of the cable and rigidly mounted in and projecting from the free end of the bore, a flexible conductor cable extending longitudinally through the barrel from the external shoulder to the interior of the chamber and connected to the other electrode, said latter conductor cable having a pointed metallic terminal at its free end and extending outwardly along the reduced portion, and bent back over the terminal therein along the reduced portion to removably fit into the socket and a cap removably mounted on the barrel over the reduced portion, cable and terminals.

JOHN WICH.