

Dec. 10, 1935.

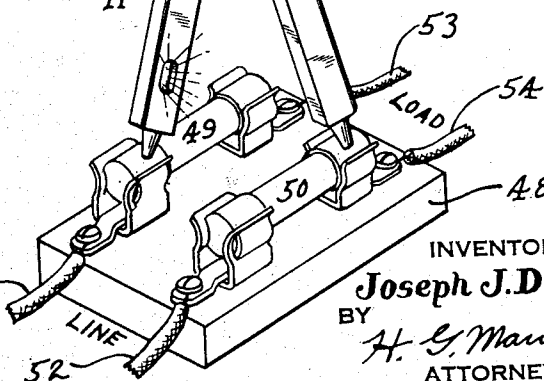
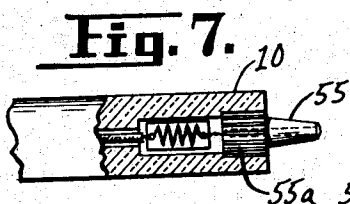
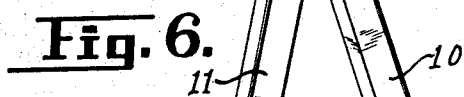
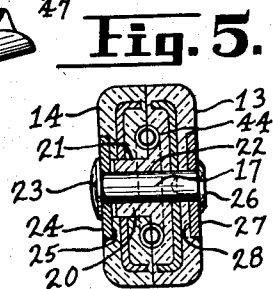
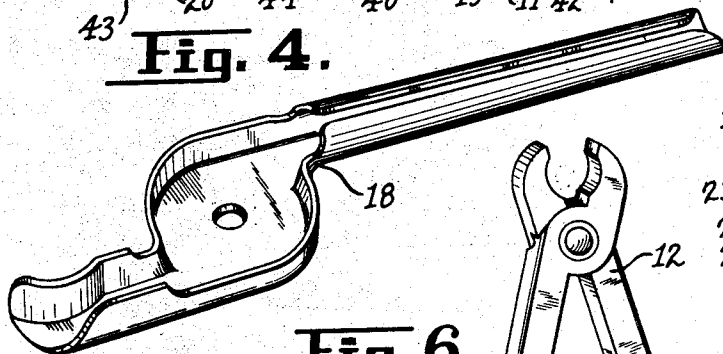
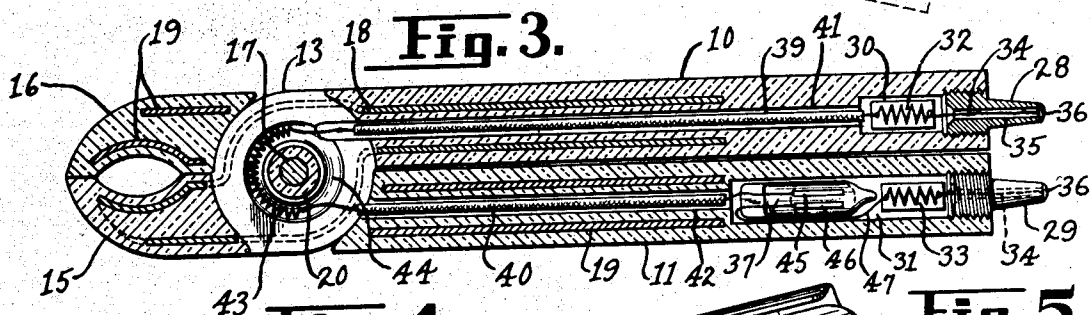
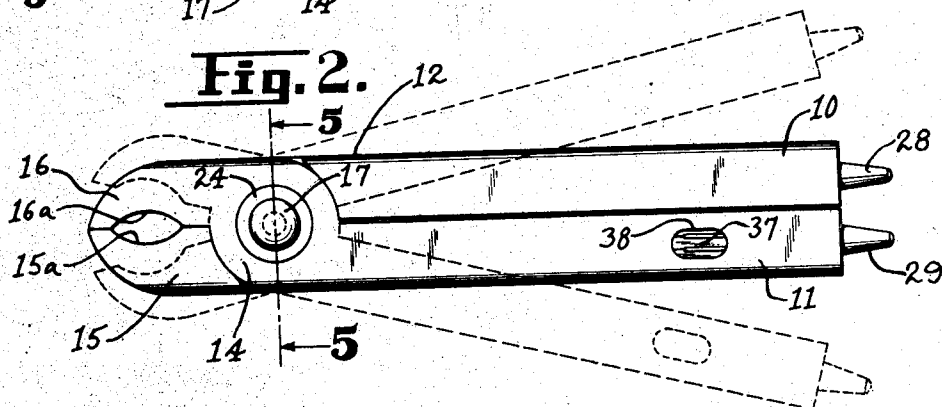
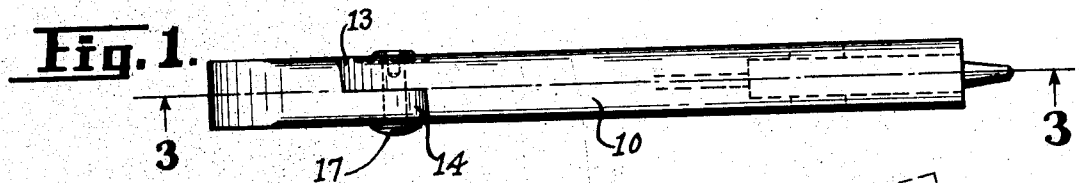
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2,023,916

COMBINATION FUSE PULLING PLIERS AND TEST LIGHT

Filed June 1, 1933

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 12.

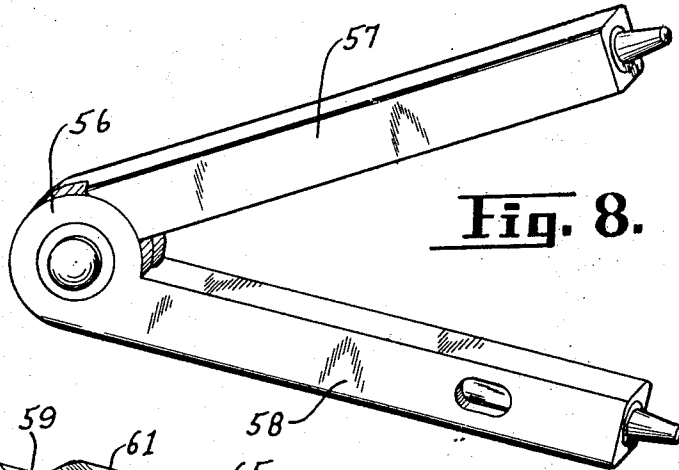
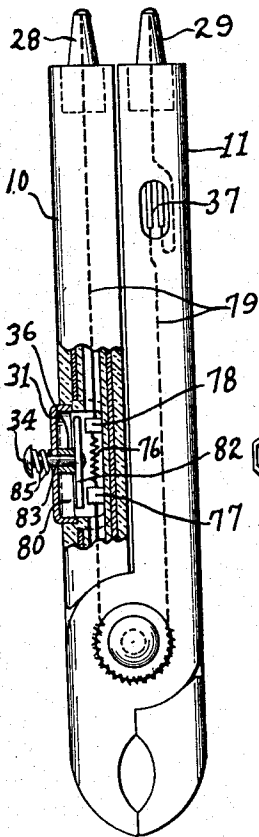


Fig. 8.

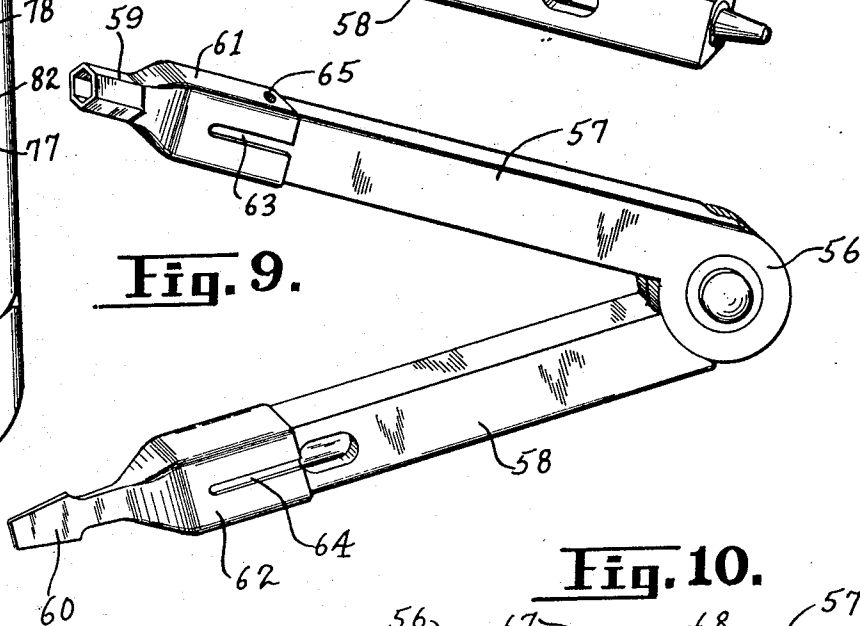


Fig. 9.

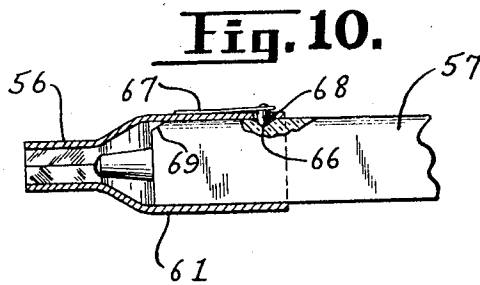


Fig. 10.

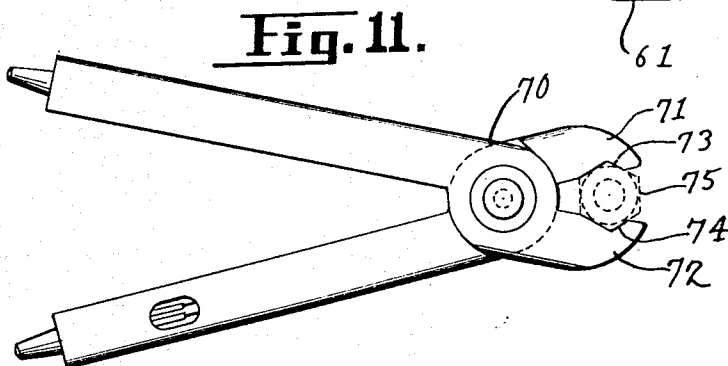


Fig. 11.

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2,023,916

COMBINATION FUSE PULLING PLIERS AND
TEST LIGHT

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Application June 1, 1933, Serial No. 673,802

6 Claims. (Cl. 175—183)

This invention relates to electrical tools, and more particularly to a combination tool for testing electrical cut-outs of all types and extracting fuses of the cartridge type.

One object of this invention is to provide a device of the above nature which will be in the form of a pair of pliers constructed of insulating material to prevent danger of shocks when handling live electrical parts.

A further object is to provide a pair of test pliers of the above nature in which the insulating material will be strongly reinforced with metal concealed therewithin.

A further object is to provide a combination fuse tester and puller of the above nature having a signal lamp in one of the handles in circuit with a pair of conductor test pins projecting from the ends of both handles, and in which said lamp is caused to be lighted by a current passing through a live fuse or other conductor to be tested, but will remain unlighted in case the fuse is "blown" or the conductor is dead.

A further object is to provide a device of the above nature having several tool attachments which may be interchangeably and detachably secured to the ends of the handles for use in installing or repairing electrical fixtures.

A further object is to provide a pair of test pliers of the above nature which will be simple in construction, inexpensive to manufacture, easy to manipulate, compact, ornamental in appearance, and very efficient and durable in use.

With these and other objects in view there have been illustrated on the accompanying drawings several forms in which the invention may be conveniently embodied in practice.

In the drawings:

Fig. 1 represents a top plan view of the invention.

Fig. 2 is a side elevation view of the same.

Fig. 3 is an enlarged vertical sectional view of the same, taken along the line 3—3 of Fig. 1.

Fig. 4 is a perspective view of one of the reinforcing metal insert members incased within the insulating handles.

Fig. 5 is a transverse sectional view taken along the line 5—5 of Fig. 2, looking in the direction of the arrows.

Fig. 6 is a perspective view of a fuse base showing how the improved pliers may be used for testing fuses of the cartridge type.

Fig. 7 is a fragmentary sectional view through the end of a handle having a modified form of conductor test pin assembled therein.

Fig. 8 shows a perspective view of a modified

form of the invention in which the jaws of the pliers have been omitted.

Fig. 9 is a similar view of the same showing two forms of accessory tools detachably locked to the handle ends thereof.

Fig. 10 is a longitudinal sectional view through one of the accessory tools showing a modified form of locking means.

Fig. 11 is a side elevation view of a further modified form of fuse testing pliers in which the jaws are shaped to grip a hexagonal nut or other articles of various shapes.

Fig. 12 is a modified form of pliers showing a means for bridging the conductor wire around a resistance unit.

It has been customary in the past to locate defective fuses by the use of complicated sets of test lamps, etc., and to remove such fuses either by hand or with strings, screw drivers, and other unsatisfactory devices when the defective fuse was located. By means of the present invention a defective fuse may be instantly located and quickly removed and replaced without danger of shocks to the operator's hands by contact with the live electrical connections or conductors.

Referring now to the drawings in which like reference numerals denote corresponding parts throughout the several views, the numerals 10 and 11 indicate the handle members of a pair of pliers 12. The handles 10 and 11 are preferably made integral with a pair of interfitting reduced barrel sections 13 and 14 and a pair of forward jaw members 15 and 16. The barrel sections 13 and 14 are adapted to hinge about a pivot pin 17 transversely located therein. The jaws 15 and 16 are provided with opposed arcuate grooves 15a and 16a on their inner faces, the slots being adapted to grip the various sizes of cartridge fuses now in commercial use. The handles 10 and 11 and the jaws 15 and 16 of the pliers 12 are made from an insulating material such as fiber, rubber, or similar material, but preferably from "Bakelite".

In order to reinforce the handle members 10 and 11 and the integral jaws 15 and 16, provision is made of a pair of metal inserts 18 and 19 preferably made from flat metal stampings as shown in Fig. 4, conforming to the general shape of the handle members.

It is to be noted in Fig. 3 that the metal inserts 18 and 19 are entirely imbedded within the molded "Bakelite" of the respective handle members 10 and 11, and tend to relieve the stresses at the fulcrum point of said members.

The construction of the pivotal connection is 55

best shown in Fig. 5 wherein the barrel section 13 of the handle member 10 is shown as provided with a concentric integral boss 20, which is adapted to have a rotating fit in an aperture 21 concentrically formed in the barrel section 14. The boss 20 and barrel 13 are provided with a central boss 22 for receiving the pivot pin 17 having an enlarged head 23 adapted to rest against a washer 24 seated in a circular recess 25 formed in the outside surface of the barrel 14. The opposite end of the pivot pin 17 is made tubular for permitting a flange 26 to be formed outwardly upon another washer 27 similarly seated in a recess 28 formed in the barrel 13. It is obvious from the above construction that the pivot pin 17 is supported by the washers 24 and 27 whereby the stress on the center boss 20 in the operation of the pliers is relieved.

Test Light

The test light feature of the pliers 12 is best illustrated in Fig. 3, wherein is shown a pair of conductor test pins 28 and 29 screwed in the free ends of the handle members 10 and 11, said pin being joined in the enlarged chambers 30 and 31 of said handles by a pair of resistance units 32 and 33. The resistance units 32 and 33 are electrically connected to their respective test pins 28 and 29 by means of a conductor strand 34 passing through a central hole 35 in said pins to the outer extremities thereof, to which said strands may be permanently secured in place, as by a drop of solder 36.

Located in the chamber 31 of the handle 11 is a small neon lamp 37 which will be visible from the outside of said handle 11 through an elongated slot 38 intersecting the chamber 31. The tube 37 is connected in circuit with the test pins 28 and 29 located in the handles 10 and 11, and through the resistance units 32 and 33, by means of a pair of insulated conductors 39 and 40 located in the handle members 10 and 11, and passing through bores 41 and 42 provided therein.

In order to permit the opening and closing of the pliers, the inner wires of the conductors 39 and 40 are electrically connected to a flexible conductor member 43 herein shown as a coiled spring, located in a pair of annular grooves 44 cut in the adjacent surfaces of the barrel sections 13 and 14. The grooves 44, as best shown in Figs. 3 and 5, are semi-circular in cross-section, and when registered with each other in assembled position, form a circular annular groove concentric with the pivot pin 17. The grooves 44 are adapted to intersect the bores 41 and 42 in the respective handle members to provide an unrestricted passage through said handle members.

As most clearly shown in Fig. 3, a pair of spaced electrodes 45 and 46 are located within the neon tube 37, the electrode 45 being connected with the test pin 28 through the insulated conductors 39 and 40, while the electrode 46 is connected to the test pin 29 through the resistance unit 33, by means of a short conductor wire 47.

Operation

The manner in which the pliers 12 are used for testing fuses is clearly shown in Fig. 6, where an ordinary type of fuse base 48 is illustrated having a pair of cartridge type fuses 49 and 50 clipped thereto. A pair of insulated supply conductors 51 and 52 are shown attached in the usual manner to one side of the fuse base 48, while another pair of conductors 53 and 54 lead off from the opposite side of said base 48

to any power consuming device, not shown. The particular position in which the pliers 12 are shown in Fig. 6 will indicate whether or not the fuse 50 is "live" or "blown"; that is, if the fuse 50 is good the neon tube 37 will light, and if said fuse 50 is "blown" the neon tube 37 will not light.

In order to test the fuse 49, it is only necessary to reverse the pliers to the diametrically opposite position, as shown in Fig. 6. In case any fuse is "blown" it may be readily removed by gripping the same by the jaws 15 and 16 of the pliers 12 and pull the fuse out from its clips. A new fuse may then be replaced by the pliers without danger of shock to the operator.

It is also to be understood that the pliers 12 may be used in testing the plug type of fuses by contacting the test pins 28 and 29 with the diametrically opposite terminals of the plug cut-out base.

In Fig. 7 a modified form of test pin 55 is shown in which the holding end of the pin 55 is formed with a knurled enlarged section 55a which is adapted to be driven into the end of the handle 10 for permanently attaching it thereto.

A modified form of tester indicated by the numeral 56 is shown in Fig. 8. This construction is the same in all respects with the test light pliers 12 illustrated in Figs. 1 to 6 inclusive, with the exception that the jaw members 15 and 16 are omitted. This type of tester 56 is manipulated as before in the manner of a draftsman's compass in order to span the terminal points of any fuse base for testing the fuses.

In Fig. 9 the fuse tester 56 is shown as having detachably secured to the ends of its handles 57 and 58 various tools. Thus, the handle 57 carries a detachable socket wrench attachment 59, while the handle 58 carries a screw driver attachment 60. The tools 59 and 60 are provided with enlarged squared handle embracing sockets 61 and 62 which are detachably slipped over the ends of the handles 57 and 58. Two of the diametric walls of the sockets 61 and 62 are provided with elongated slots 63 and 64 for the purpose of causing an indented nib 65 to engage in a detent recess 66 in the broken away section of the handle 57, as shown in Fig. 10.

In Fig. 10 is shown a modified construction of detachable locking means. In this form a socket wrench attachment 59 is constructed without the slots 63 and is attached to one of the side walls of the handle engaging socket 61 by a leaf spring 67. Riveted to the free end of the spring 67 is a locking nib 68 which is adapted to protrude through a suitable aperture in the socket 61 and engage in the detent recess 66 in the handle 57. The handle 57 may be beveled at 69 to cause the locking nib to spring outwardly in order to facilitate the assembly of the socket wrench 59 upon the handle 57.

While the accessory tools have been herein shown attached to the modified form of tester of Fig. 9, it is to be understood that they may be used in connection with the pliers 12 of the first form of the invention, and also that other tools less than those illustrated in the drawings may be applied thereto.

In the modified form of pliers shown in Fig. 11, and indicated by the numeral 70, the jaws 71 and 72 are provided with angular grooved faces 73 and 74 to accommodate a standard size hexagonal nut 75 shown in dotted outline.

In order to make the test pliers adaptable for testing fuses in low voltage (below 110 volts) as well as in high voltage circuits (above 110 volts), 75

a modified form of construction is shown in Fig. 12, in which a means is provided for bridging the circuit around the resistance unit. The pliers in this modified form are identical in all respects with the test pliers, as shown in Figs. 1 to 6 inclusive, except that the resistance units 32 and 33 are omitted, and replaced by a single resistance unit 76, having a pair of conductor caps or terminals 77 and 78 at its opposite ends, said unit 76 being located at an intermediate section of the handle member 10 (note broken away section of Fig. 12). The terminals 77 and 78 are in direct electrical connection with the test pins 28 and 29 through the neon bulb 37, as shown by the dotted line circuit wires 79. The resistance unit 76 is disposed in a suitable recess 80 cut in the handle member 10, and the open end of the said recess is adapted to be closed by a cap member 81 made of insulating material and having suitable anchorage within the insulating material of the handle member 10.

To bridge the circuit across the terminals 77 and 78, provision is made of a conductor bar 82 supported on the end of a transverse insulating shaft 83 slidable in the cap member 81 and carrying a push button 84 of insulating material on its outer end for manually pressing the bar 82 into contact with the terminals 77 and 78. The bar 76 is normally held out of contact with the terminals 77 and 78 by means of a helical spring 85 surrounding the shaft 83 and tensioned between the cap 81 and the button 84. The bar 82 is also limited in its outward movement by means of a collar or sleeve 86 surrounding said shaft 83 on the inside of the cap 81.

While there have been disclosed in this specification several forms in which the invention may be embodied, it is to be understood that these forms are shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosures but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new and for which it is desired to secure Letters Patent, is:

1. In a combination fuse puller and tester, a pair of inter-pivoted insulating handles, a pair of cooperating jaws connected to said handles on the opposite side of the pivot point, an electric signal lamp located in one of said handles, each handle having a pointed test pin extending from the end thereof, means located within said handles and passing around the pivot point for electrically connecting in series said test pins and said lamp, and means within said handles insu-

lated from said conducting means for reinforcing said handles.

2. In a combination fuse puller and tester, a pair of insulating handle members having inter-pivoted integral barrel sections and jaw members at their opposite ends, each handle having a reinforcing metal insert concealed therein, a neon tube located in one of said handle members, a pair of test pins attached to the ends of said handles, a pair of resistance units connected with said test pins, and means for connecting said tube and pins in circuit with said resistance units.

3. In a combination fuse puller and tester, a pair of inter-pivoted plier members of insulating material comprising integral handle members and jaw members, a pair of reinforcing metal inserts imbedded in said plier members, said handles having test pins, means in one of said handles for indicating the condition of an electrical circuit to which said test pins are applied, and means passing around the pivot point for electrically connecting said indicating means with said test pins.

4. In a combination fuse puller and tester, a pair of insulating handle members having inter-pivoted integral barrel sections and jaw members at their opposite ends, each handle having a reinforcing metal insert concealed therein, a neon tube located in one of said handle members, a pair of test pins attached to the ends of said handles, a pair of resistance units connected with said test pins, means for connecting said tube and pins in circuit with said resistance units, and means for providing a flexible continuous conductor circuit through the pivoted connection to electrically connect said conductor means.

5. In a combination fuse puller and tester, a pair of insulating handle members having inter-pivoted integral barrel sections and jaw members at their opposite ends, a neon tube located in one of said handle members, a pair of test pins attached to the ends of said handles, a resistance unit located on one of said handles in circuit with said pins and said neon tube, and means for manually short-circuiting said resistance unit.

6. In a combination fuse puller and tester, a pair of insulating handle members having inter-pivoted integral barrel sections and jaw members at their opposite ends, a neon tube located in one of said handle members, a pair of test pins attached to the ends of said handles, a resistance unit having a pair of terminal caps in circuit with said pins and said neon tube, a slidable conductor bar for bridging said caps, and means for manually forcing said bar into engagement with said caps for short-circuiting said resistance unit.

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