March 12, 1957 R. A. HAIGH 2,785,258

TEST HANDLE

Filed Dec. 16, 1953 3 Sheets-Sheet 1

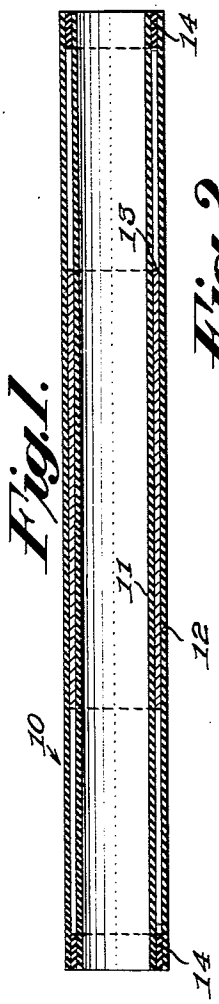


Fig. 1.

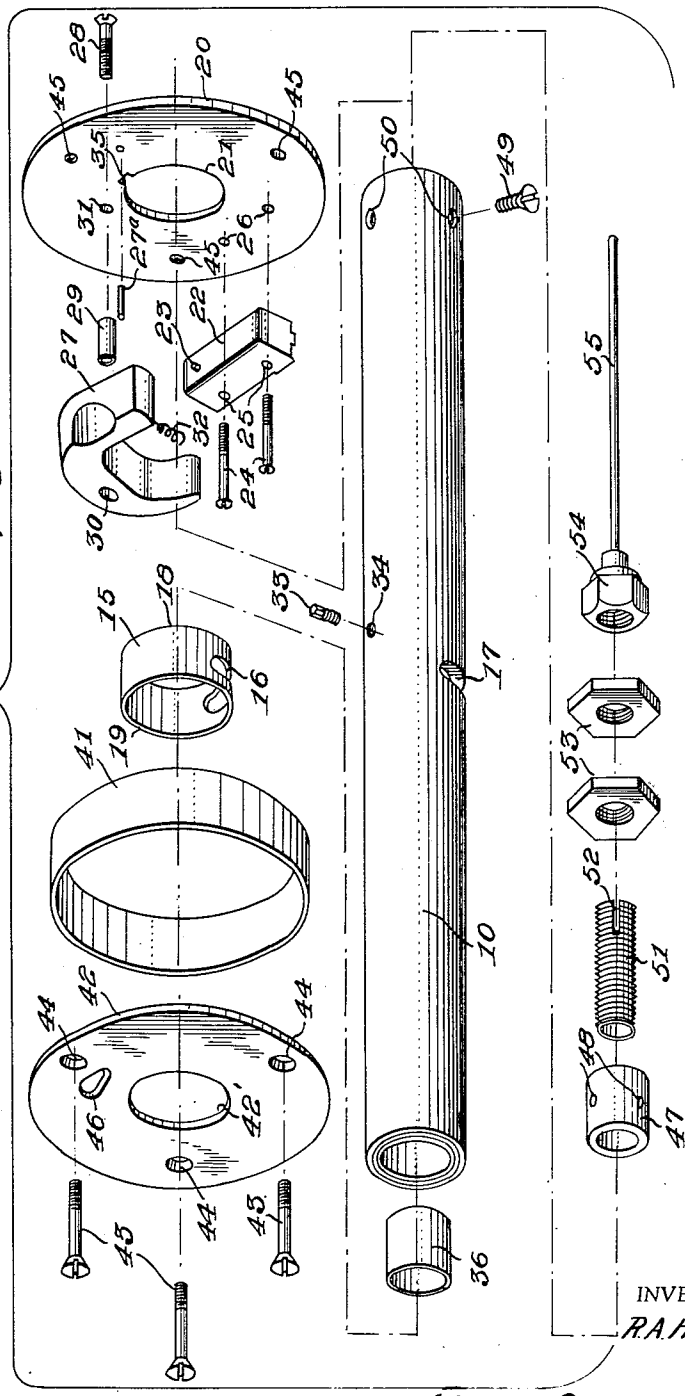


Fig. 2.

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Fig. 3.

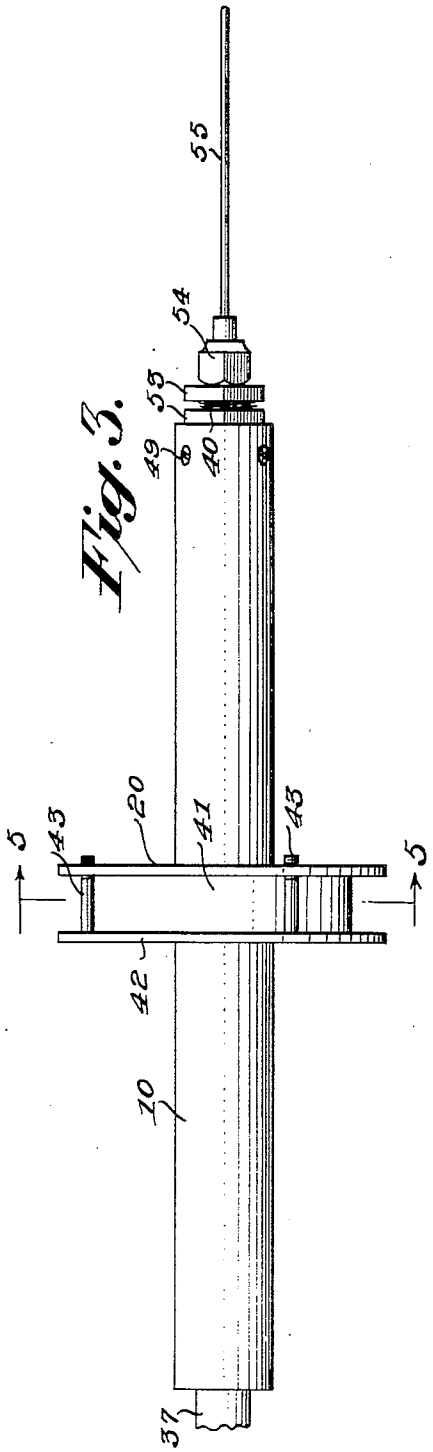


Fig. 4.

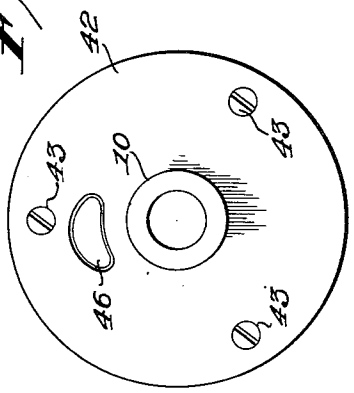
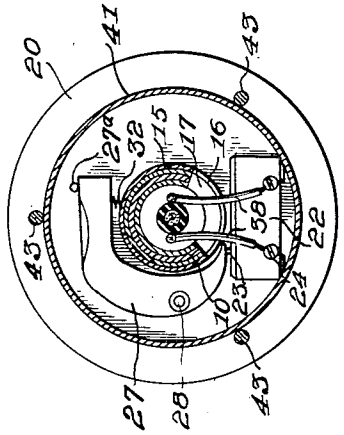


Fig. 5.



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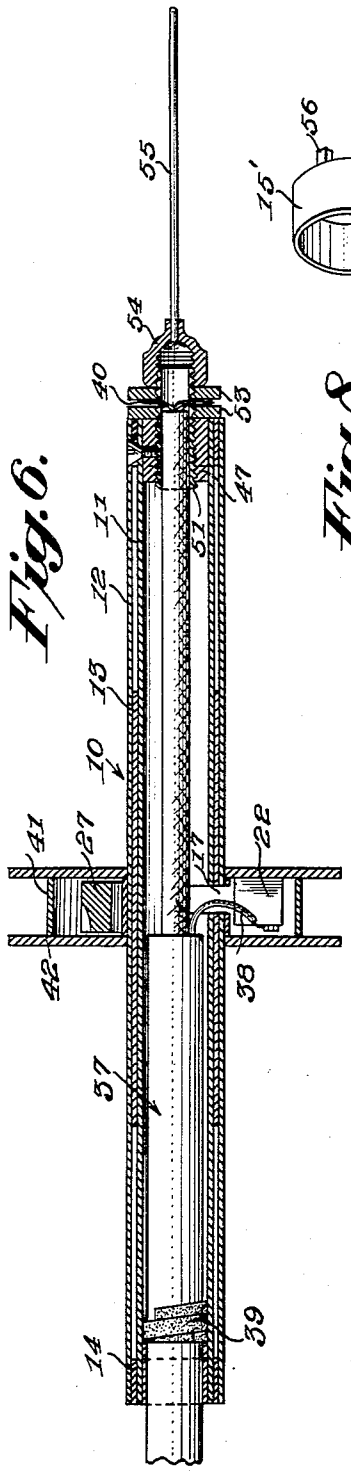


Fig. 6.

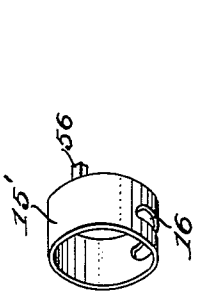


Fig. 8.

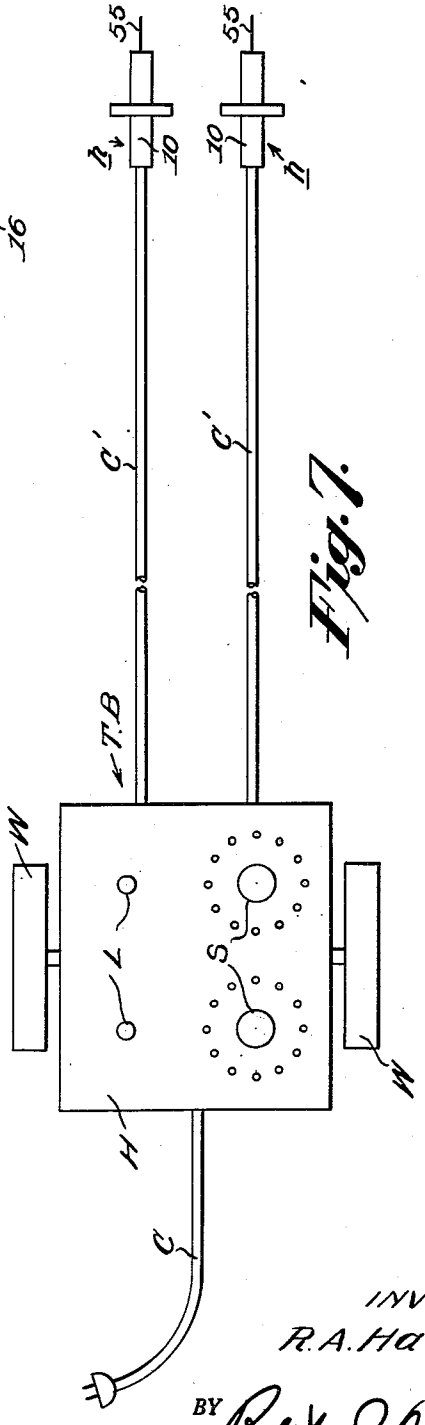


Fig. 7.

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TEST HANDLE

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Application December 16, 1953, Serial No. 398,492

9 Claims. (Cl. 200—157)

This invention relates to a test handle structure for ground test boxes.

Ground test boxes now in conventional use embody a wheel supported housing within which are various electric devices including a transformer and selector.

The housing is provided with an electric plug-in cable and a pair of outlet cables, each of which is provided with a terminal handle by which contact is made with the particular device to be tested.

The outlet cables are of substantial length and the handles are permanently united with the cables.

The handles necessarily embody major portions which are of insulating material and accordingly do not have the capacity to withstand substantial impact without breakage thereof.

The referred to ground test boxes are used in many places where the handles are subject to substantial impact even under the usual care by an operator. On the other hand, such handles are carelessly dropped or otherwise roughly handled with the result that some are broken.

Since such handles are permanently connected with the cables, breakage of a handle requires not only a new handle but a complete relatively long cable with a handle attached.

Thus, with the conventional test box construction, breakage of a handle entails considerable financial loss as well as a loss of time required for the replacement of a unitary cable and handle.

It is accordingly a primary object of this invention to provide a handle for an output cable of a ground test box which is detachably connectable with the cable whereby upon breakage of the handle, a new handle may readily be substituted therefor with a retention of the cable.

A further object of the invention is to provide a handle which not only has provision for detachable connection with an output cable of a ground test box but which of itself comprises readily separable parts, whereby upon breakage of one or more parts, same may readily be replaced without the necessity of providing an entire new handle.

Other objects and advantages of the invention will become apparent in the course of the following detailed description, taken in connection with the accompanying drawings, wherein:

Fig. 1 is an axial sectional view of the tubular handle body.

Bracketed Fig. 2 is an isometric exploded view wherein the cooperating handle elements are shown in a designated order of assembly within and upon the handle body.

Fig. 3 is a side elevational view of the complete handle structure in accordance with a preferred structural embodiment thereof.

Fig. 4 is an end elevational view as observed from the left of Fig. 3, with the cable being omitted.

Fig. 5 is a transverse sectional view as observed in the plane of line 5—5 on Fig. 3.

Fig. 6 is a longitudinal axial sectional view of the improved handle.

Fig. 7 is a broken diagrammatic top plan view of a conventional test box with which the improved handle in accordance with the present invention is used.

Fig. 8 is an isometric view disclosing a slight modification of the invention.

For a better understanding of the purpose of the present invention, reference will first be made to Fig. 7 wherein the diagrammatically disclosed test box T. B. includes a generally rectangular control enclosing and supporting housing H which is supported on wheels W for transportation thereof from one testing position to another.

The control means includes selectors S and pilot lamps L.

The housing is provided with an electric plug-in cable C and is also provided with a pair of outlet cables C′ and which are provided with terminal handles *h*.

The purpose of a test box which is generally understood by those skilled in the art is to ground test structures, such as generators, electric fans and the like and in the testing operations, the handles provide the test leads which embody picks whose free ends are engaged with the structures being ground tested.

The cables C′ indicated as broken in Fig. 7 are in practice of substantial length for unobstructed movement of the handles *h* to desired testing positions.

While the handles, with which test boxes have heretofore been provided, satisfactorily fulfilled their functions so far as ground testing was concerned, it has been observed that such handles often receive rough usage and are often dropped resulting in same being broken and rendered unserviceable.

In the test box structures now in use, the long cables C′ are provided with handles which are in effect unitary therewith whereby upon breakage of a handle, same together with the entire cable C′ must be replaced.

The improved handle in accordance with the present invention and which wholly overcomes the above noted objections to existing handles, comprises a tubular handle body 10 which as indicated in Figs. 1 and 6, includes inner and outer tubes 11 and 12 respectively which are of electrical insulating material and which are of equal length but of different diameters leaving a space therebetween, and a shorter metal tube 13 is disposed within the space between the tubes 11 and 12.

The purpose of the metal tube 13 is to reinforce the tubular handle body and render same immune to breaking upon impact with another body. Suitable insulating collars 14 may be disposed between the inner and outer insulating tubes 11 and 12 at the opposite ends thereof and all described parts of the tubular handle body are suitably adhered into a unitary structure. The various elements entering into the handle structure and which are operatively associated with the handle body will be described substantially in the order in which they would be assembled with the handle body and in which description reference will be particularly directed to Fig. 2.

Externally of the handle body 10 a tubular sleeve 15 of insulating material is introduced over one end of the tubular body and positioned substantially centrally thereof and adhesively secured to the tubular body.

The sleeve 15 is provided with an arcuate notch 16 which in assembled position with the handle body aligns with a corresponding notch 17 in the tubular handle body. The opposite ends of the sleeve 15 provide positioning shoulders 18 and 19 for a purpose to be referred to.

A disk 20 is provided with a central aperture 21 for

receiving the tubular handle body **10** and prior to the assembly of the disk same is provided with a micro-switch **22** having a depressible switch button **23** and which is secured to the disk **20** by means of a pair of screws **24** which extend through apertures **25** in the micro-switch and whose free ends are engaged in tapped apertures **26** in the disk.

A finger engageable switch operating member **27** is pivotally secured to the disk by means of a screw **28** extendable through a sleeve **29** disposed within an aperture **30** in the member **27** and through an aperture **31** in the disk.

A retracting spring **32** has one end thereof secured to the switch operating member **27** and the opposite end of the spring bears on sleeve **15** in the assembled position of the disk. A stop pin **27a** projects from the disk and limits retraction of member **27**.

With the micro-switch **22** and operating member secured to the disk **20** as above described, the disk is entered over the right hand end of the handle body **10** until the face of the disk surrounding the central aperture **21** therein engages the shoulder **18** on sleeve **15**.

In the positioning of the switch equipped disk as above, a key **33** which is threaded into a tapped opening **34** in the handle body **10** is received within a keyway **35** opening through the periphery of the aperture **21** in the disk for restraining rotation of the latter.

A sleeve **36** of insulating material is secured within the left hand end of the tubular handle body **10** and adhesively secured thereto.

An electric cable **37** is then introduced into and through the handle body **10** and such cable is so prepared in advance of its assembly that the outer cover thereof is removed for a substantial distance from the pick end of the handle for exposure of leads **38**. With the cable then prepared, it is drawn through the handle body **10** from left to right with respect to Fig. 6 and is provided with a winding of tape **39** which upon subsequent drawing of the cable from right to left engages the inner end of sleeve **36** which, together with the tape winding, precludes the handle from being withdrawn from the adjacent end of the cable C'. With the cable in proper position, the exposed end wires **40** will project slightly in advance of the right hand end of the handle body **10**.

After the cable is thus positioned, the leads **38** are drawn through the aligned notches **16** and **17** and secured to the screws **24**.

After the cable has thus been connected to the micro-switch **22**, a collar **41** is moved over the left hand end of the body **10** until the advance edge thereof engages the disk **20**, the collar being of a circumference to circumscribe the micro-switch **22** and the switch operating member **27** as is indicated in Fig. 5.

A second disk, **42**, having a central aperture **42'** is next moved over the left hand end of body **10** until it contacts the adjacent edge of collar **41** and shoulder **19** and thereafter a plurality of screws **43** are extended through countersunk openings **44** in the disk **42**, and which screws have their threaded ends engaged within tapped openings **45** in the disk **20**.

It will be observed from Fig. 5, that the three screws **43** are disposed externally of the collar **41** and since the collar and the disks are of insulating material, the screws are effectively insulated from the switch and the wiring, whereby the usual practice of directly insulating the screws is wholly overcome. Furthermore, the collar and the disks provide a housing for the switch which is prevented from axial movement by the sleeve **15** and from rotative movement by the key **33** and the cooperating keyway **35**.

The disk **42** is provided with a finger receiving opening **46** opposed to the switch operating member **27**. The body **10** is provided with a unit consisting of several readily removable parts and which comprise a sleeve **47** of insulating material receivable within the right hand end of the body **10**.

The sleeve **47** is provided with tapped openings **48** in which are receivable the inner ends of a plurality of screws **49** which are extendable through countersunk openings **50** in the right hand end of the tubular body **10**.

An externally threaded tubular member **51** has one end portion thereof threadedly engaged with the inner wall of sleeve **47** and the other protruding end portion is provided with diametrically opposed slots **52** through which the wire ends **40** are extended as indicated in Fig. 6.

A pair of nuts **53** are threaded onto the slotted end of member **51** with the wire ends **40** clamped between the same.

A pick member is threaded onto the member **51** externally of the outermost nut **53** and the same comprises a nut member **54** to the outer end of which is rigidly secured a pick **55**.

In the modified construction shown in Fig. 8 the sleeve **15'** is provided with an integral lug **56** which provides a key receivable within the keyway **35** in the disk **20**, which does away with the tapped opening **34** and the threaded key **33**.

While as indicated in Fig. 7, two handles *h* are provided and which are replaced by the handle of the present invention, only one of such handles is provided with a switch, and the two handles being otherwise of like construction.

It should be appreciated from the foregoing disclosure, that by the present invention, a handle for ground test boxes is provided which provides for ready replacement of an entire handle or one or more of the several removable elements entering into the handle construction.

While I have disclosed my invention in accordance with a single specific structural embodiment thereof, such is to be considered as illustrative only, and not restrictive, the scope of the invention being defined in the sub-joined claims.

What I claim and desire to secure by U. S. Letters Patent is:

1. A handle for a ground test box having a relatively long outlet cable, comprising an elongated insulating tubular body for receiving one end of the cable, means at one end of the tubular body for restraining same against movement toward the end of the cable, a pick removably secured to the opposite end of the body, a switch supported externally of the body and intermediate the ends thereof, and said body being provided with a notch for passage of leads from said cable to said switch.

2. A handle for a ground test box having a relatively long outlet cable, comprising a tubular body for removably receiving one end of the cable, means removably secured to the tubular body for securing same to the cable, a switch supported by the tubular body externally thereof, said tubular body being provided with a notch receiving leads from the cable for connection to said switch, said switch being supported within a housing disposed externally of said tubular body, and a finger receiving opening in a wall of said housing for access to said switch.

3. A handle for a ground test box having a relatively long outlet cable, comprising an elongated tubular body for removably receiving one end of the cable, means removably secured to the tubular body for securing same to the cable, said tubular body comprising radially spaced inner and outer tubular members of insulating material, an intermediate reinforcing tubular member of metal whose opposite ends are disposed axially inwardly of the corresponding ends of the tubular members, and an insulating collar disposed between said tubular members at each end thereof.

4. A handle for a ground test box including a relatively long cable having the outer insulation layer thereof removed for a predetermined distance from the free end

thereof for exposing a pair of leads spaced from the free end and bare wires at the free end; comprising a relatively long tubular body throughout the length of which an end portion of said cable is extended, a micro-switch supported by the body intermediate its ends and externally thereof and to which said leads are removably connected, a unit removably secured to one end of said body to which said bare wires are secured, said tubular body comprising a pair of equal length insulating tubular members disposed in telescoping relation with a space therebetween, and a reenforcing metallic tubular member of less length than said insulating tubular members disposed within said space and having its ends equally spaced from the ends of said insulating tubular members.

5. A handle for a ground test box including a relatively long cable having the outer insulation layer thereof removed for a predetermined distance from the free end thereof for exposing a pair of leads spaced from the free end and bare wires at the free end; comprising a relatively long tubular body throughout the length of which an end portion of said cable is extended, a micro-switch supported by the body intermediate its ends and externally thereof and to which said leads are removably connected, a unit removably secured to one end of said body to which said bare wires are secured, a sleeve disposed within the other end of said tubular body, and a winding of tape on said cable engageable with the inner end of said sleeve for precluding removal of the handle from the cable.

6. A handle for a ground test box including a relatively long cable having the outer insulation layer thereof removed for a predetermined distance from the free end thereof for exposing a pair of leads spaced from the free end and bare wires at the free end; comprising a relatively long tubular body throughout the length of which an end portion of said cable is extended, a micro-switch supported by the body intermediate its ends and externally thereof and to which said leads are removably connected, a unit removably secured to one end of said body to which said bare wires are secured, a tubular sleeve surrounding said tubular body intermediate its ends, said sleeve and said tubular body being provided with aligned notches through which said leads are extended, a pair

of disks surrounding said tubular body, one engaged with each edge of said sleeve, said micro-switch being removably supported by one of said disks, a switch operating member pivoted to said last disk and the other disk being provided with an opening for receiving a finger for actuating said switch operating member.

7. The structure according to claim 6, together with a collar disposed between said disks adjacent their peripheries, and a plurality of circumferentially spaced screws extended through said disks in engagement with the outer periphery of said collar.

8. A handle for a ground test box including a relatively long cable having the outer insulation layer thereof removed for a predetermined distance from the free end thereof for exposing a pair of leads spaced from the free end and bare wires at the free end; comprising a relatively long tubular body throughout the length of which an end portion of said cable is extended a micro-switch supported by the body intermediate its ends and externally thereof and to which said leads are removably connected, a unit removably secured to one end of said body to which said bare wires are secured, said unit comprising an insulating sleeve removably supported within said one end of said body, an externally threaded metallic member having one end portion thereof threaded into said sleeve and the other end portion projecting from the sleeve and said one end of the body, said projecting end having diametrically opposed slots through which said bare wires are extended, a pair of nuts on said projecting end in clamping engagement with said wires, and a pick member removably secured to said metallic member outwardly of said nuts.

9. The structure according to claim 8, wherein said pick member includes a nut member threadedly engaged with said metallic member and a pick rigidly secured to said nut member.

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