

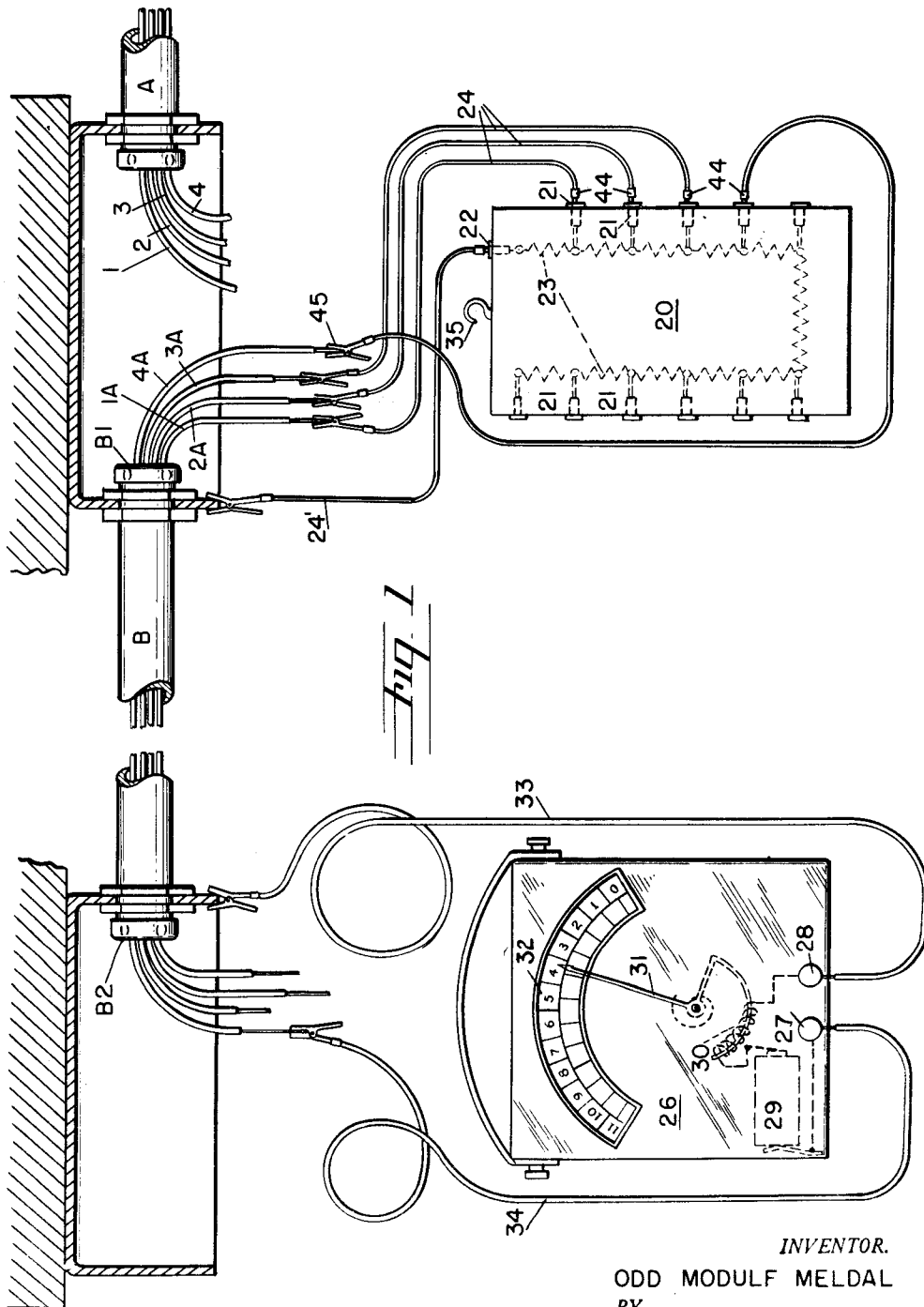
Jan. 19, 1954

O. M. MELDAL
METHOD AND MEANS FOR FACILITATING CONNECTING
ELECTRIC MULTICONDUCTORS

2,666,898

Filed July 3, 1951

2 Sheets-Sheet 1



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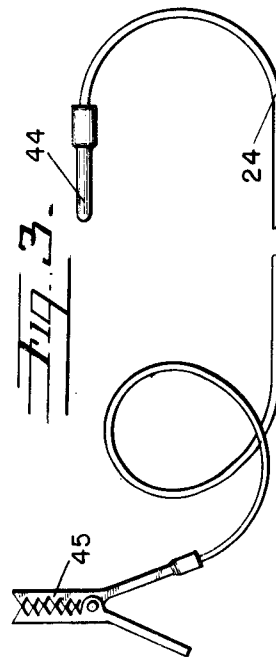
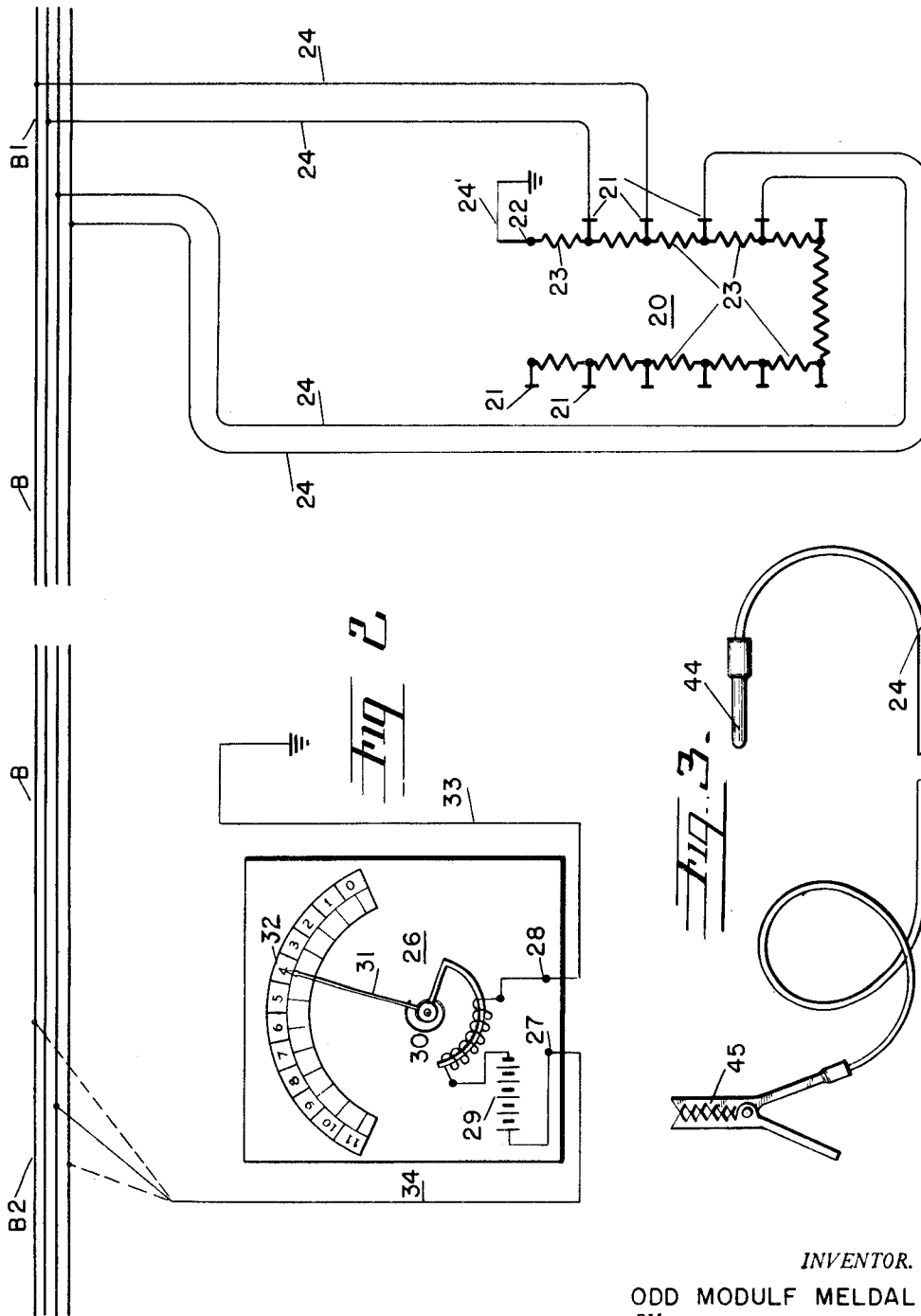
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METHOD AND MEANS FOR FACILITATING CONNECTING ELECTRIC MULTICONDUCTORS

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2 Claims. (Cl. 324—66)

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This invention relates in general to the problem of electrically connecting up a cable, or similar multiconductor, comprising a plurality of individual insulated electric wires, so that the same individual wire may be connected at each end of the multiconductor to the proper respective current carrier and contact element.

As is well known, when a conduit or cable having a number of separate individual wires, such for example as control circuit wires, is required to be connected in one part of a building to corresponding incoming wires and at another part of the building to the corresponding control circuits, the problem of selecting the right wire for each connection at the corresponding ends of the cable or multiconductor is a laborious task, and the amount of time consumed in ascertaining the corresponding ends of the individual wires in order to make such connections is increased very considerably with an increase in the number of separate or individual wires in the multiconductor. Heretofore the procedure customarily followed has consisted of the method of trial and error for each wire separately, and obviously this has been a long procedure when the two ends of the multiconductor are considerably remote from each other.

The primary object of the present invention is to provide a convenient, simple and practical method and means whereby the ascertaining of the corresponding ends of each individual wire and the connecting up of such a multiconductor can be accomplished with a minimum expenditure of time and labor.

A related object of the invention is to provide a practical means by which the corresponding ends of individual wires can be checked and identified in quick succession when taken in a group at a time.

A further object of the invention is to provide a convenient and simple means by which the checking of the ends of the wires in a multiconductor can be accomplished efficiently by a single operator even though the ends of the multiconductor are located in different parts of the building or otherwise widely separated.

These objects I have been able to achieve by the use of means consisting of a pair of simple devices employed in combination in the manner hereinafter briefly explained, one member of the combination apparatus comprising a special resistor block, and the other being in effect a simple ohmmeter as will be readily understood from the following description with reference to the accompanying drawings.

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In the drawings:

Fig. 1 is an elevation showing, more or less diagrammatically, the means employed in carrying out my invention and the manner of operation of the same;

Fig. 2 is a corresponding wiring diagram; and

Fig. 3 is a foreshortened elevation of one of the individual plug-in cords used in part of my apparatus.

Referring first to Fig. 1, let it be assumed that a multiconductor A, having a plurality of individual conductor wires 1, 2, 3, 4, for example, has its terminus at some point in a building, and that a second multiconductor B, leading from the terminus of A to some other distant point in the building, has at least an equal number of separate conductor wires which are to be joined at the adjacent end B' of the multiconductor B to the incoming wires from the multiconductor A, and are to be joined at the other end B2 of the multiconductor B to separate control circuits, telephone connections, or to circuits for some other separately operating installations.

The individual incoming wires 1, 2, 3, 4 of the multiconductor A will be individually marked or tagged for identification as is customary. However, before the adjacent ends of the wires at the end B' of the multiconductor B are connected with these incoming marked wires of multiconductor A it is necessary to determine which are the corresponding ends of these wires at the other and remote terminus B2 of the multiconductor B.

A resistor assembly or block, indicated as a whole by the reference character 20, is provided with a number of plug-in sockets 21 which are electrically connected in series with a similar plug-in socket 22, the serial connections being through the medium of the successive resistor elements 23. Thus the resistance to the passage of an electric current from any one of the plug-in sockets 21 to the socket 22 would be different for each of the sockets 21 and would depend upon the cumulative resistance of the various resistor elements 23 in the line between that particular socket 21 and the socket 22.

A plurality of plug-in cords 24 (see Fig. 3) are provided, each cord having a plug-in contact element 44 at one end, for plugging in to one of the sockets 21 or into the socket 22, and a contact clamp 45 at the other end for making a clamping contact with the end of a wire or with any other conducting element.

A specially constructed ohmmeter, indicated in general by the reference character 25 has a pair of terminals 27 and 28 connected to opposite

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sides of a suitable battery 29, and is provided with an indicator finger or pointer 31 movable over a scale 32 to indicate the resistance in a closed circuit connecting the terminals 27 and 28. The indicator scale 32 is marked off to correspond to the successive plug-in sockets 21 of the resistor block 20 and the movement of the pointer 31 on the ohmmeter will register in accordance with the cumulative resistance provided in the resistor block 20 from the socket 22 to any one of the successive sockets 21.

One of the terminals 28 of the ohmmeter 26 is connected to a conductor cord 33. The other terminal 27 is connected to a similar conductor cord 34. The free ends of these conductor cords 33 and 34 carry contact clamps similar to the contact clamp 45 (Fig. 3).

The manner in which my apparatus is employed will now be explained with reference to Figs. 1 and 2. The ends of the wires in multiconductor B which are to be connected to the incoming wires from multiconductor A are tagged or marked for separate identification, preferably with numbers corresponding to numbers of the various plug-in sockets 21 in the resistor block 20.

Let it be assumed first that the number of wires in multiconductor B does not exceed the number of plug-in sockets 21 in the resistor block 20. The operator places the resistor block 20 close to the end B' of the multiconductor B. The resistor block 20 preferably is provided with a hook such as shown at 35 in Fig. 1, or other suitable means, whereby the plug can be suspended or supported close to the end of the multiconductor B. One plug-in cord marked 24' is plugged into the socket 22, which socket is designated as the grounding socket, and the other end of this same cord 24' is connected to any common grounded contact for the multiconductor B, such as a ground wire, or, in the event the multiconductor B has a metal tubular casing, to the casing or metal support for the end of the multiconductor B, as shown in Fig. 1. The adjacent ends of the wires of multiconductor B are then separately connected to the resistor block 20 by the plug-in cords 24 which are plugged into the corresponding sockets 21 in the block 20.

The operator then proceeds to the other end of the multiconductor B, which, as previously mentioned, may be located in a distant part of the building, taking with him the special ohmmeter 26, constituting the other portion of my testing apparatus.

At the other or remote end of the multiconductor B the operator then first grounds the ohmmeter 26 by attaching the clamp of the cord 33 to the common grounding connection, for example to the metal support for the tubular metal casing of the multiconductor B as illustrated. Then the operator clamps the end of the other cord 34 to each of the wires in turn of the multiconductor B, noting the position of the pointer 31 on the scale 32 for each wire and marking each wire accordingly.

Since the special ohmmeter 26 is arranged to operate within the total amount of cumulative resistance provided by the various resistor elements in series in the resistor block 20 and since the scale 32 is marked off in sections to correspond to the respective plug-in sockets 21 of the resistor block 20, with the resistance in each case indicated by the ohmmeter pointer 31 when at the center in each corresponding section on the scale 32, thus indicating the resistance encoun-

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tered by the particular plug-in sockets and grounded socket 22, the pointer 31 will immediately indicate which wire is momentarily connected with the cord 34. By marking the wire ends accordingly at the terminus B2 of the multiconductor B, to correspond to the ends at the terminus B', the operator then establishes the identity of each wire at both ends of the multiconductor B. As will be apparent, the entire operation is done very easily and within a comparatively short time.

Should the number of wires in the multiconductors A and B exceed the number of plug-in sockets 21 provided in the resistor block 20, thus if there are more than eleven wires (assuming that there are eleven plug-in sockets 21 in the resistor block 20 as illustrated), the operator connects any 11 wires of the multiconductor B, at the terminus B' to the resistor block 20 and then tests the other wire ends at the terminus B2 in the same way as mentioned. Obviously when a wire which is not connected up to the resistor block 20 is contacted by the end of the cord 34 of the ohmmeter 26 there will be no movement of the pointer 31, and the operator then knows that the other end of this wire has not yet been marked and for the time being disregards that particular wire. He proceeds with his testing through the special ohmmeter 26 until he had contacted and marked all of the plugged-in wires. Then he returns to the resistor block 20 and connects eleven other wires to the block in place of those previously connected. Thus the testing in such case is repeated for each group of wires. However, since the testing of each group can still be accomplished in a considerably shorter time than would be possible in the old customary method, the total saving of time becomes greater the larger number of wires of the multiconductor. Furthermore it is possible, feasible and practical for the testing and marking of all the wires regardless of the number, and thus regardless of the size of the multiconductor, to be done entirely by a single operator.

When the multiconductor is in the form of a wire cable composed of the separate insulated wires it is often customary for one of the wires of the cable to be specially marked throughout its extent, for example by insulation of a different color, in order that the ends of the wire at both ends of the multiconductor can be immediately identified. In such case this wire can initially be used as the common ground wire for resistor block and ohmmeter in carrying out my invention. Also any wire of the multiconductor, the opposite ends of which have been ascertained, can of course be used as the common ground connection.

Various modifications in the form of construction of the resistor block, or the special ohmmeter, or of the associated elements which I employ in the apparatus for carrying out my invention would be possible within the scope of my invention and without departing from the principle of the same. The number of plug-in sockets 21 and connecting resistor elements on the resistor block 20 could of course be increased, the plug-in sockets always being connected in series. For example, by having 20 such plug-in sockets on the resistor block, having the scale 32 on the ohmmeter read up to 10, and providing a switch and suitable means on the ohmmeter for switching the ohmmeter to high resistance, the wires connected to the first ten plug-in sockets of the resistor block 20 could be marked with the ohm-

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meter in low resistance and then the wires connected to the remaining 10 plug-in sockets marked by turning the ohmmeter to high resistance and numbering the corresponding wire ends 11, 12, etc. instead of 1, 2, etc.

It is not my intention to limit my invention otherwise than as set forth in the claims.

I claim:

1. A device of the character described for ascertaining the ends of each individual wire of an electric multiconductor at the opposite ends of the multiconductor, said device including the combination of a resistor assembly adapted to be set up at one end of said multiconductor, a cooperating resistance indicator adapted to be set up at the other end of said multiconductor to establish a circuit with said resistor assembly through the intermediary of said multiconductor, and electric current producing means for the established circuit, said resistor assembly and said resistance indicator each having one terminal adapted to be connected to a common ground connection, means for temporarily connecting said resistor assembly terminal and means for temporarily connecting said resistance indicator terminal to said common ground connection, a plurality of contact terminals in said resistor assembly connected with said first mentioned terminal in said resistor assembly through resistance elements providing respectively different amounts of resistance to the passage of current between said first mentioned terminal and said contact terminals, means for temporarily connecting said contact terminals with the adjacent ends of the wires in said multiconductor respectively, means for connecting the other terminal of said resistance indicator successively to the ends of the wires of said multiconductor adjacent said resistance indicator, and an indicator scale on said resistance indicator marked to correspond to the relative amounts of resistance provided in said resistor assembly between said first mentioned resistor terminal and said other contact terminals respectively.

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2. A device for ascertaining the ends of each individual wire of an electric multiconductor at the opposite ends of the multiconductor, said device comprising the combination of a resistor block adapted to be set up at one end of said multiconductor and a cooperating ohmmeter assembly adapted to be set up at the other end of said multiconductor to establish a circuit with said resistor block through the intermediary of said multiconductor, electric current producing means in said ohmmeter assembly, said resistor block and said ohmmeter each having one terminal adapted to be connected to a common ground connection, means for temporarily connecting said resistor block terminal and means for temporarily connecting said ohmmeter terminal to said common ground connection, a plurality of plug-in sockets in said resistor block connected in series by resistance elements with said first mentioned terminal in said resistor block through resistance elements, plug-in cords for temporarily connecting said plug-in sockets with the adjacent ends of the wires in said multiconductor respectively, a conductor cord for connecting the other terminal of said ohmmeter assembly successively to the ends of the wires of said multiconductor adjacent said ohmmeter assembly, and an indicator scale on said ohmmeter assembly marked to correspond to the relative amounts of resistance provided in said resistor block between said first mentioned resistor terminal and said plug-in sockets respectively.

ODD MODULF MELDAL.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,366,789	Horham	Jan. 9, 1945

FOREIGN PATENTS

Number	Country	Date
119,561	Sweden	Sept. 2, 1947