

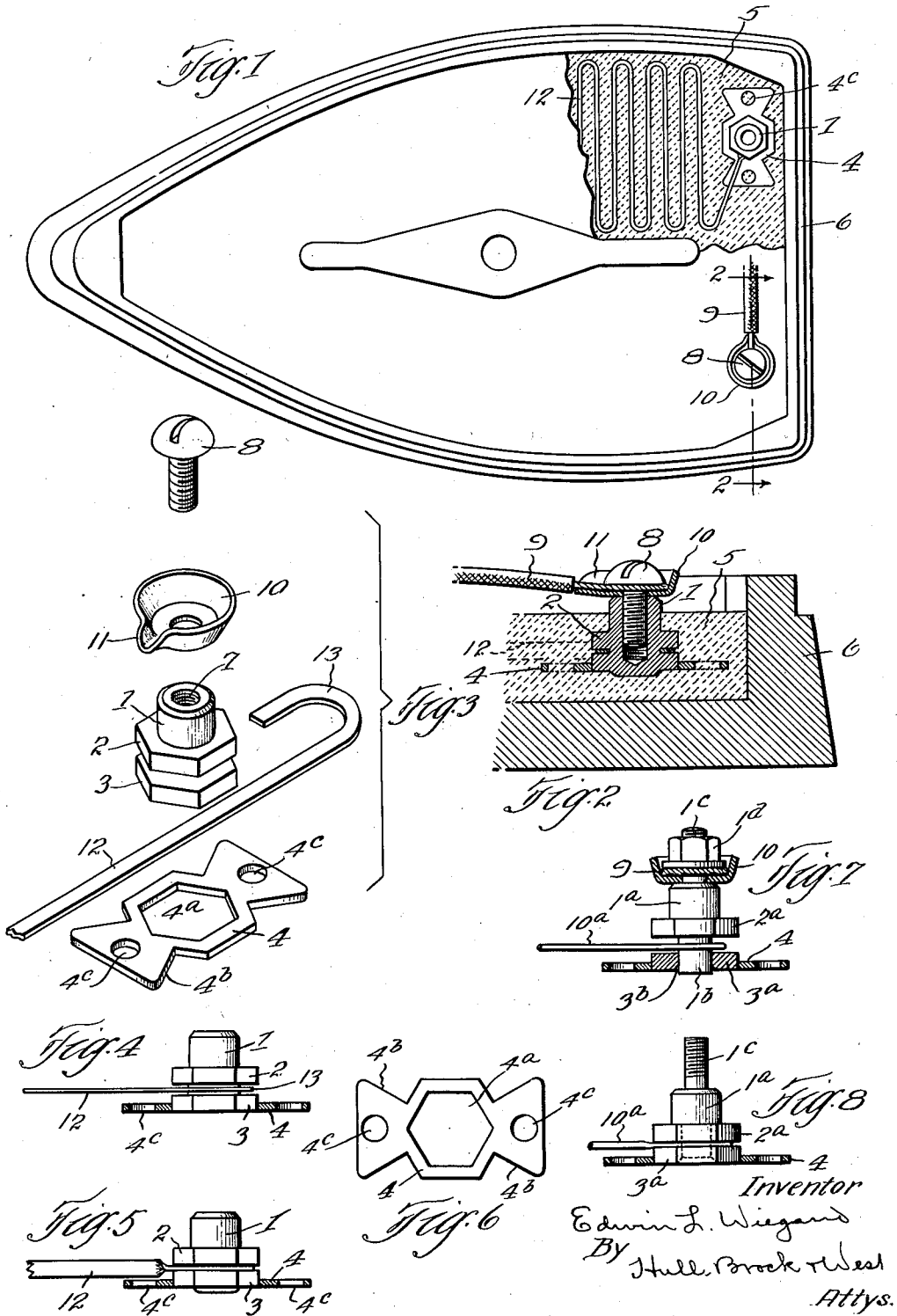
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TERMINAL FOR ELECTRICAL CONDUCTORS

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TERMINAL FOR ELECTRICAL CONDUCTORS

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This invention relates to a terminal connection for electrical conductors, and more especially to a device of this character that is peculiarly adapted for use with the resistor elements of electrically heated devices for making connection between said elements and the leading-in wires.

The class of electrically heated devices in connection with which the improved terminal is particularly designed for use is the class wherein the resistor element and the terminal connection are embedded within a hardened mass of refractory insulating material.

This application is made to cover, in addition to certain more recent improvements therein, the terminal connection disclosed and claimed in an application filed by me on April 21, 1922, said application bearing Serial No. 555,870, and insofar as the subject matter of the two cases is the same, this application is a continuation of the earlier application.

Much difficulty has arisen from the character of connections heretofore employed between the leading-in wires and the resistor elements of electrically heated devices, especially of the class described above where the element and terminal are enveloped within a hardened concrete mass of refractory insulating material and consequently inaccessible without breaking the body of insulating material. The seriousness of a loosened connection in such a construction is self-evident.

It is the primary object of my invention to eliminate this difficulty by providing a simple and inexpensive terminal connection to which the resistor element may be securely and intimately joined by engaging a portion of the element between opposed abutment portions of the terminal connection and then pressing said portions together into firm holding engagement with the element, the material whereof the terminal connection is made being sufficiently malleable to permit of this treatment without injury to itself, and sufficiently soft to avoid any injury to the electrical conductor or resistor element.

Another object of the invention is to provide a more secure and a more mechanical

connection between the resistor elements of electrically heated devices and the lead-in wires than has heretofore been used to the end that the production of devices of this character may be improved and may be reduced to a more standardized and commercial basis. This obviously expedites and cheapens manufacture.

Another object of the invention is to provide a terminal connection for the resistor elements of electrically heated devices of the aforesaid class which is so designed and constructed as to effectively resist turning or loosening within the body of refractory insulating material and which is so connected to the resistor element as to insure a permanent and positive connection therewith, notwithstanding any turning or lateral strains which may be imposed upon the portion of the terminal connection protruding from the body of insulating material in the customary use or within a reasonable range of abuse of the electrically heated device.

A further object of the invention is the provision of an inexpensive attachment, preferably in the shape of a dished washer, which may be applied to the terminal for properly confining, protecting and supporting the portion of the leading-in wire that is connected thereto.

Still further and more general objects are to provide a terminal connection for electrical conductors which is strong; which is convenient of attachment; which lends itself readily to manufacturing facilities; which meets the exact requirements of a terminal connection for use with the class of electrically heated devices hereinbefore referred to; which is small and compact and is thus especially suitable for use in devices of the class mentioned; which, so far as its connection with the resistor element or equivalent conductor is concerned, is free from rotatable parts that are liable to loosen under frequent alternate heating and cooling of the parts; which provides permanent electric continuity between the resistor element or equivalent electrical conductor and the terminal connection, and which affords substan-

tial and convenient external connecting facilities for leading-in wires and the like.

The objects above enumerated with others hereinafter appearing are attained in the forms of the invention illustrated in the accompanying drawings wherein Fig. 1 is a plan view of an electrically heated device—incidentally, the base of a sadiron—equipped with terminal connections of my invention; Fig. 2 is a sectional detail on the line 2—2 of Fig. 1, the present view being on a somewhat larger scale than the former one; Fig. 3 shows, in perspective and in separated condition, the various elements of the terminal connection and an end of an electrical conductor or resistor element formed for attachment to the terminal; Fig. 4 is a side elevation of the terminal connection with the hooked end of the conductor engaging between spaced abutment portions thereof; Fig. 5 shows the parts of Fig. 4 after the terminal connection has been formed to bring the abutment portions into clamping engagement with the conductor, and the conductor, where it leaves the connection, twisted at right angles for installation in the device illustrated in Figs. 1 and 2; Fig. 6 is a plan view of the anchorage element; and Figs. 7 and 8 are views, similar to Figs. 4 and 5, of a modification of the invention, and showing it as attached to a conductor of circular cross section in contra-distinction to the flat type of conductor illustrated in the preceding views.

According to the present preferred embodiment of the invention, the body portion 1 of the terminal connection is formed from an integral piece of malleable material into a substantially cylindrical shape and has, adjacent one end, longitudinally spaced abutment portions 2 and 3. These abutment portions are shown as hexagonal in outline, although they may be of any desired shape, preferably other than circular, however, so that when used in electrically heated devices of the embedded type hereinbefore referred to, the connection will resist turning within the body or mass of refractory insulating material. To improve the holding tendency of the terminal connection within the body or mass of material, and to more effectively resist turning or tilting due to lateral strains imposed upon the protruding end of the connection, I apply an anchorage member 4 to the body portion of the connection, preferably to the abutment 3 thereof, the member 4 having an opening 4^a of a size and shape to snugly receive said abutment. In some instances a pressed fit of the abutment within the opening 4^a is sufficient to hold the body portion 1 and member 4 together with the proper degree of security to answer all practical requirements, but in the use of the terminal connection in electrically heated devices where the terminals are more exposed than in the example shown herein and which

consists of a sadiron base, (such devices, for instance, as those disclosed in my co-pending application Serial No. 660,294 filed August 31, 1923) greater security of attachment of the anchorage member to the body portion of the terminal connection is desirable, in which cases the anchorage member, after being fitted to the abutment portion 3, may be brazed. The anchorage member 4 is preferably designed to include surfaces 4^b which are approximately radial or, in other words, at right angles to the direction of turning, thereby to more effectively lock the anchorage member, and consequently the terminal connection, against turning within the body or mass of insulating material. To effect a further interlocking of the anchorage member with the body of insulating material, the former is shown as provided with holes 4^c which fill with the insulating material during the embedding process, the effect being clearly shown in Fig. 2. In Figs. 1 and 2, where the terminal connection is shown as incorporated in the electrically heated device, the mass of refractory insulating material is indicated at 5 and the cavity of the base which is occupied by said mass is designated 6.

The body portion 1 of the terminal connection is provided with a threaded bore 7 that extends from the exposed end of said body portion to within a comparatively short distance of the inner or embedded end thereof, as will be clearly seen by reference to Fig. 2. A screw 8 operates within said bore, and between the head of the screw and the upper end of the body portion a leading-in wire 9 is adapted to be clamped. Preferably, in making the connection between the leading-in wire and the terminal, I employ a dished washer 10 which is applied to the screw 8 and is interposed between the upper end of the body portion and the looped end of said wire, the wire passing out through a spout-like extension 11 formed on one side of the washer. The inclined side walls of the washer tend to force and confine the looped end of the leading-in wire beneath the head of the screw 8 and, in fact, impose a proper shape thereto if in the original instance it lacked such shape. Furthermore, the washer protects the leading-in wire and prevents any frayed strands thereof in case it is of the kind made up of strands from coming in contact with adjacent metal parts of the device and which condition might cause a short circuit.

A flat or ribbon type electrical conductor or resistor element 12 is shown associated with the terminal connection in Figs. 1 to 5 and its end is formed with a hook 13 that is engaged about the body portion 1 between the abutments 2 and 3 (see Figs. 3 and 4). With the parts so assembled, the abutment 3, as by means of a suitable press, is advanced toward the abutment 2 so as to firmly clamp the conductor or element between the abutments (see

Figs. 2 and 5). This effects a very intimate electrical and a secure and permanent mechanical connection between the parts.

In Figs. 7 and 8 I have shown a modification of the invention wherein the body portion 1^a is extended beyond the abutment 2^a in the form of a shank 1^b, and a washer 3^a is placed over the shank in opposed relation to the abutment 2^a, and between the abutment and washer the hooked end of the electrical conductor 10^a, indicated as circular in cross section, is adapted to be engaged about the shank 1^b. Then, by suitable means, the shank 1^b is deformed, as shown in Fig. 8, to bind the washer in clamping relation to the abutment 2^a with the conductor 10^a securely imprisoned between them. The rear face of the washer 3^a may be countersunk, as shown at 3^b, to receive the mushroomed end of the shank 1^b. The anchorage element 4 may be secured to the washer 3^a in the same manner as, in the former instance it is secured to the abutment portion 3. The body portion 1^a, instead of being bored and tapped as in the former case, may be provided with a binding post or stud 1^c which is threaded for the application of a nut 1^d; and in connecting the leading-in wire 9 to the stud or binding post, the dished washer 10 may be employed with the same advantages as in the former case.

In both forms of the invention the material whereof the terminal connection is made is preferably softer than the conductor so as not to injure the conductor when it is pinched between the opposed abutment portions.

It is apparent from the foregoing disclosure that the terminal connection, while not limited in any way to such use, is particularly effective when employed in heating devices of the so-called embedded type—the class hereinbefore referred to—where the conductor and the terminal are submerged and “molded” in the receiving matrix or mass of refractory insulating material under great pressure, this action obviously enhancing the permanency of the connection between the resistor element and the terminal.

While I have illustrated the terminal as having a complete circumferential groove for the reception of the resistor element, it will be obvious without specific illustration that the groove may extend only part way around the terminal. For example, the groove may be made in one side of the terminal, or it may be divided into parts occurring on opposite sides, or on three sides, of the terminal. Furthermore the terminal need not be of the shape illustrated, as it might be rectangular, triangular, or irregular in cross section. Clearly, these obvious alternatives come within the spirit of my invention.

Having thus described my invention, what I claim is:—

1. A terminal for the resistor elements of electrical heating devices, said terminal com-

prising a body portion incorporating means for attaching the resistor element to the part of the body portion that is to be embedded, an anchorage member applied to said part of the body portion and non-rotatable with respect thereto, and a screw connection for attaching an electrical conductor to a part of the body portion that is exposed when the terminal is embedded.

2. A terminal for the resistor elements of electrical heating devices, said terminal comprising a body portion incorporating means for attaching the resistor element to the body portion, the body portion having a part that is other than circular in cross section, and an anchorage member having an aperture within which said part is secured against rotation.

3. A terminal for the resistor elements of electrical heating devices, said terminal comprising a body portion incorporating means for attaching the resistor element to the body portion, and an anchorage member applied to the body portion and non-rotatable with respect thereto, said anchorage member having surfaces which are substantially radial with respect to the axis of the body portion.

4. A terminal for the resistor elements of electrical heating devices, said terminal comprising a body portion having integral opposed peripheral abutments spaced apart longitudinally of the body portion and between which a part of the resistor element is adapted to be engaged and clamped when the abutments are pressed toward each other into holding engagement with the conductor, one of said abutments being other than circular in outline, and an anchorage member having an aperture similar in outline to said abutment and which member is adapted to be applied to the abutment.

5. A terminal for the resistor elements of electrical heating devices, said terminal comprising a body portion incorporating means for attaching the resistor element to the body portion, a part of said body portion that is adapted to be embedded being other than circular in cross section, and an anchorage member having an aperture within which said part is adapted to be engaged for securing the anchorage member against rotation with respect to the body portion, said anchorage member having substantially diametrically opposed wings, the lateral edges of which wings are substantially radial with respect to the axis of the body portion.

6. A terminal and resistor assembly for use in electrical heating devices comprising an elongated body portion having peripheral enlargements adjacent one end, and a resistor element having a part permanently clamped by and between said enlargements so as to effect intimate electrical contact and inseparable physical connection between the body portion and element.

7. A terminal and resistor assembly for use
in electrical heating devices comprising an
elongated body portion having peripheral en-
largements adjacent one end, a resistor ele-
ment having a part permanently clamped by
and between said enlargements so as to ef-
fect intimate electrical contact and insepa-
rable physical connection between the body
portion and element, said enlargements being
other than circular in cross section so as to
resist turning when confined within the em-
bedding material, and screw means for con-
necting an electrical conductor to the end of
the body portion remote from the enlarge-
ments.

In testimony whereof, I hereunto affix my
signature.

EDWIN L. WIEGAND.