

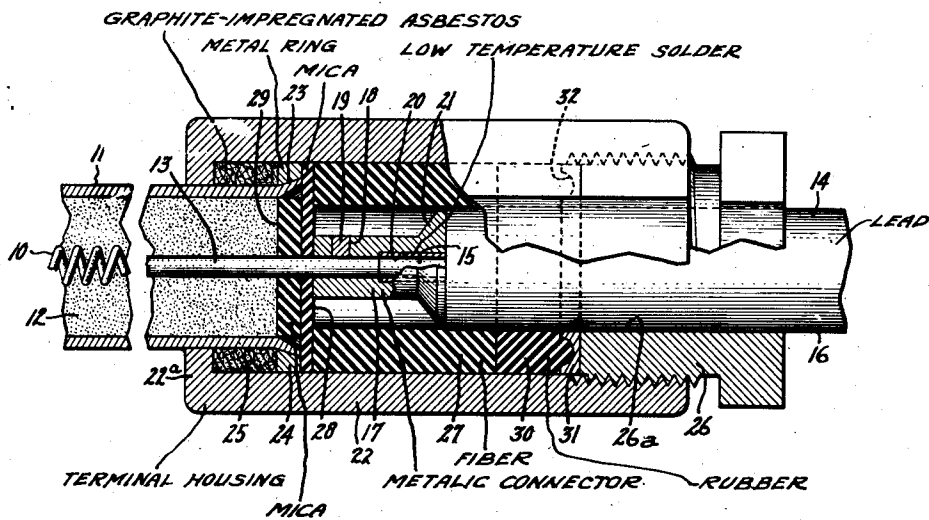
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ELECTRIC HEATER

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ELECTRIC HEATER

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This invention relates to electric heaters, more particularly to electric heaters of the sheath-wire type, and it has for its object the provision of improved means for sealing the terminals of heaters of this type.

Although not limited thereto, this invention has particular application in the sheathed heater described in the United States Patent No. 1,367,341 to C. C. Abbott, dated February 1, 1921. As there described, this heater comprises a resistance conductor mounted in a metallic sheath, and supported in spaced relation with the sheath by a highly compacted mass of electrically insulating and heat conducting material, such as granular magnesium oxide. Terminals are secured to the ends of the resistance conductor. The inner ends of the terminals are embedded in the compacted mass, while their outer ends project from the sheath.

This invention contemplates the provision of improved means for sealing the ends of the sheath where the terminals emerge so as to render them impervious to fluids, such as moisture, oil, gas, and the like.

This invention further contemplates the provision of improved sealing means constructed and arranged so that the sealing means may be readily partially disassembled to provide for replacement of supply leads or to make any other needed repairs at the terminals.

In accordance with this invention, a suitable terminal housing is provided for each terminal. The housing has one end surrounding the terminal end of the sheath, and it is so proportioned that it has a wall spaced from the outer wall of the sheath. Within the space between the sheath and the housing is a compacted mass of packing, which preferably will be graphite-impregnated asbestos. In one form of this invention, the packing is pressed between an intumed flange or abutment on the housing that fits closely about the sheath and an out-turned flange or abutment at the end of the sheath and which fits closely the inner wall of the terminal housing; and in this form of the invention, the two abutments or flanges are drawn toward each other to highly compress the packing. Here also, the two abutments are drawn together by means of a loading plug which is fitted in the outer end of the terminal housing and is moved inwardly with reference to the terminal housing against a suitable loading member within the housing to draw the housing outwardly and thereby move the two abutments together to highly compress the packing. The asbestos packing provides a

fluid-impervious joint between the inner end of the terminal housing and the sheath. A suitable electrical supply lead enters the housing through the packing plug, and preferably interposed between the plug and the loading member is a resilient ring surrounding the lead. This yieldable ring when the plug is forced inwardly of the housing is tightly wedged between the walls of the housing and the lead so as to provide a fluid-impervious joint at this point. The conducting member of the lead is secured to the terminal by soft solder or some similar means which upon heating to a relatively low temperature will permit dis-engagement of these members. And preferably, the plug will have a screw-threaded connection with the housing so that it may be forced inwardly by turning. Also, the parts may be disassembled merely by turning the plug to move it outwardly.

For a more complete understanding of this invention, reference should be had to the accompanying drawing in which the single figure is an elevation mainly in section illustrating an electric sheathed heater provided with terminal sealing means arranged in accordance with this invention.

Referring to the drawing, this invention has been shown as applied to a sheathed electric heater such as described and claimed in the above-mentioned Abbott patent. This heater comprises a helical resistance conductor 10 mounted within a tubular metallic sheath 11 and supported in spaced relation with respect to the sheath by a highly compacted mass of electrically insulating and heat conducting material 12. The material 12 preferably will be granular magnesium oxide. Secured to the opposite ends of the resistance conductor 10 are terminals 13 (only one shown) which have their inner ends embedded in the mass 12 and their outer ends projecting from the sheath, as shown.

A suitable electrical supply lead 14 is provided for each terminal having a conductor core 15 and an insulating covering 16 for the core. A connector 17 functions to connect the terminal 13 with the conductor core 15. This member, as shown, is of sleeve-like form, and has a centrally-arranged aperture receiving the projecting end of the terminal. Preferably, the sleeve 17 is brazed to the terminal, an opening 18 being provided in the sleeve through which the brazing material 19 is inserted. The core 15 also is inserted in the centrally-arranged bore provided in the connector 17. The core is mechanically connected with the connector by a soft or low

temperature solder indicated by the numeral 20. Preferably, the connector at the lead end will be provided with an outwardly extending flange 21 which functions as an abutment for the adjacent edge of the insulating covering 16.

A suitable terminal housing 22 is provided to house the projecting terminal, the inner end of the lead and the connection means between the terminal and lead. This housing, as shown, is of tubular form, and has an internal diameter somewhat larger than the external diameter of the sheath. The inner end of this housing surrounds the terminal end of the sheath, and it is provided with an intumed flange or abutment 22a which fits the outer walls of the sheath relatively closely. The sheath has its terminal end provided with a spunout part 23 against which a suitable metal ring 24 bears. The metal ring 24 constitutes a second abutment or flange which extends outwardly and closely fits the inner wall of the terminal housing. Interposed between the abutments or flanges 22a and 24 is a highly compacted mass of packing 25. Preferably, asbestos-impregnated with graphite will be used for the packing 25.

The asbestos mass 25 is highly compacted by causing the abutments 22a and 24 to be drawn together, and this is accomplished by means of a loading plug 26 threaded in the outer end of the terminal housing 22, as shown. This plug is provided with a centrally arranged aperture 26a through which the lead is inserted. The plug works against a loading sleeve 27 formed of any suitable electrically insulating material, such as a suitable fiber having considerable mechanical strength. The fiber sleeve at its inner end abuts against an electrically insulating plate 28 which preferably will be formed of mica; as shown, the plate 28 covers the end of the sheath, its spun-out end 23 and also the metallic ring 24. If desired and it is preferable to do so, a second plate 29 of mica will be inserted in the sheath in the spun-out end section 23 immediately behind the plate 28 so as to cover the exposed insulating mass 12. Interposed between the inner end of the plug 26 and the outer end of the loading sleeve 27 is a yieldable ring 30 formed of any suitable yieldable material, such as rubber, and also a metallic loading plate 31 bearing on this ring and which is adapted to be engaged directly by the inner end of the plug 26, as shown. It will be observed that when the plug 26 is turned to move it inwardly of the housing 22 it will draw the two flanges 22a and 24 together to highly compact the packing 25. At the same time, it will highly compress the yielding ring 30 to force it inwardly and outwardly against the lead and inner wall of the housing 22. The packing 25 and the ring 30 effect fluid impervious joint between the terminal housing and the sheath and between the terminal housing and the lead 14. Preferably, the ring or washer 31 will have a concave surface 32 which centers the yielding ring 30 and prevents the flow of the rubber upwardly between the inner and outer edges of the ring and the lead 14 and housing 22 respectively.

In assembling the sealing means, it will be understood that before the spun-out end 23 is formed on the sheath, the housing 22, the packing 25 and the metallic ring 24 all will be assembled with the sheath. Then the spun-out section 23 may be formed and the plates 28 and 29 assembled with the terminal 13. Thereafter, the lead 14 will be connected with the terminal 13

in the manner previously described, and after this, the loading sleeve 27 will be placed within the housing, and over this will be placed the yielding ring 30 and the metallic washer 31. Then the plug 26 may be screwed inwardly to compress the packing 25 and 30. If it is desired to gain access to the terminal or the connection means between the terminal and lead it is merely necessary to unscrew the plug 26 and slide the housing 22 inwardly of the sheath. If it be desired to replace the lead it is merely necessary to heat the low temperature solder 20 to its melting point whereupon the lead may be withdrawn.

The graphite in the packing 25 functions as a filler to prevent the asbestos from absorbing fluids. Also it provides for easy sliding movement of the housing 22 on the sheath 11.

It will be observed that the sealing means of this invention is of simple and inexpensive construction, and is very easy to assemble and disassemble.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An electric heater comprising a conductor, a sheath housing said conductor, a terminal for said conductor projecting from said sheath, a lead for said terminal, means connecting said lead with said terminal, a housing for said terminal and connecting means, said housing having a section surrounding the end portion of said sheath that is larger than said end portion so as to leave a space between them, said sheath having an outwardly extending abutment at its end and said housing having an inwardly extending abutment on its inner end that has a sliding fit with said sheath, and a yieldable mass of packing in said space tightly compressed between said abutments so as to effect a fluid-tight joint between said sheath and said housing.

2. An electric heater comprising a conductor, a sheath housing said conductor, a terminal for said conductor projecting from said sheath, a lead for said terminal, means connecting said lead with said terminal, a housing for said terminal and connecting means, said housing having a section surrounding the end portion of said sheath that is larger than said end portion so as to leave a space between them, the sheath having an outwardly extending abutment at its end and said housing having an inwardly extending abutment on its inner end, a yieldable mass of packing in said space, a plug threaded in said housing around said lead and turned inwardly to draw the two abutments together to highly compress said packing, and a loading sleeve member within said housing constructed and arranged to take the load of said plug as it is turned in to draw the two abutments together.

3. An electric heater comprising a conductor, a sheath housing said conductor, a terminal for said conductor projecting from said sheath, a lead for said terminal, means connecting said lead with said terminal, a housing for said terminal and connecting means, said housing having a section surrounding the end portion of said sheath that is larger than said end portion so as to leave an annular space between the housing

and sheath, the sheath having an outwardly extending abutment at its outer end and said housing having an inwardly extending abutment at its inner edge, a yieldable mass of packing in said annular space, a loading sleeve in said housing around said terminal and connecting means, a yieldable packing ring around said lead bearing on said loading sleeve, and a plug around said lead threaded in said housing against said ring to draw said abutments together to highly compact said yieldable packing between said abutments and also to force said packing ring against said loading sleeve to highly compress it against said lead, said loading sleeve functioning to take the load of said plug as it is turned in.

4. An electric heater comprising a conductor, a sheath housing said conductor, a terminal for said conductor projecting from said sheath, a lead for said terminal, means connecting said lead with said terminal, a housing for said terminal and connecting means, said housing having a section surrounding the end portion of said sheath that is larger than said portion so as to leave a space between them, the sheath having an outwardly extending abutment at its end and said housing having an inwardly extending abutment at its inner end engaging said sheath with a sliding fit, and a mass of graphite-impregnated asbestos in said space highly compressed between said abutments and the walls of said sheath and housing.

5. An electric heater comprising a conductor, a sheath housing said conductor, a terminal for said conductor projecting from said sheath, a lead for said terminal, means connecting said lead with said terminal, a housing for said terminal and connecting means, said housing having a section surrounding the end portion of said sheath that is larger than said end portion so as to leave a space between them, the housing having at its inner end an inwardly extending abutment and the sheath having a flanged-out part at its end, a metallic ring against said part, and a yieldable mass of packing in said space tightly compressed between said abutment and said ring.

6. An electric heater comprising a sheath and a conductor in said sheath, a terminal for said conductor projecting from said sheath, a terminal housing for said terminal, a lead entering said housing and connected with said terminal, the housing having an inturned inner end that has a sliding fit with said sheath, and the sheath

having an outwardly extending abutment at its outer end, yieldable packing between said abutment and said inturned inner end, an electrically insulating member threaded on said terminal so as to cover said sheath and said abutment, a loading sleeve within said housing around said terminal abutting said insulating member, a yieldable ring in said sleeve around said lead abutting said loading sleeve, and a loading plug around said lead forced in the outer end of said housing to draw said inturned end toward said abutment and thereby highly compress said yieldable packing between them, and also to force said packing ring against said loading sleeve and thereby tightly compress it between said lead and terminal housing.

7. An electric heater comprising a conductor, a sheath housing said conductor, a terminal for said conductor projecting from said sheath, a housing for said terminal, said housing having a section surrounding the end portion of said sheath that is larger than said end portion so as to leave a space between them, the sheath having an outwardly extending abutment at its end and said housing having an inwardly extending abutment on its inner end, said latter abutment having a sliding fit with said sheath, a yieldable mass of packing in said space, a loading sleeve within said housing, a lead for said terminal entering said housing, a yieldable packing around said lead and bearing against said sleeve, a plug around said lead threaded in said housing against said packing around the lead to highly compress it against said loading sleeve and said lead and to draw said abutments together and thereby highly compress said yieldable mass of packing, a connector secured to said terminal, and a soft, low temperature solder connecting said connector with the conducting member of said lead.

8. An electric heater comprising a conductor, a metallic sheath housing said conductor, a terminal for said conductor projecting from one end of said sheath, a terminal housing for said terminal having one end surrounding said end of said sheath in spaced relation with it, and graphite-impregnated asbestos packing interposed within the space between said end of said sheath and said housing to provide a fluid-imperious joint between them, and also, to provide for relatively easy sliding movement between them.

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