Nov. 24, 1970 R. E. DINCHER ET AL 3,543,003

ELECTRIC BASEBOARD HEATER UNITS

Filed Sept. 4, 1968

3 Sheets-Sheet 1

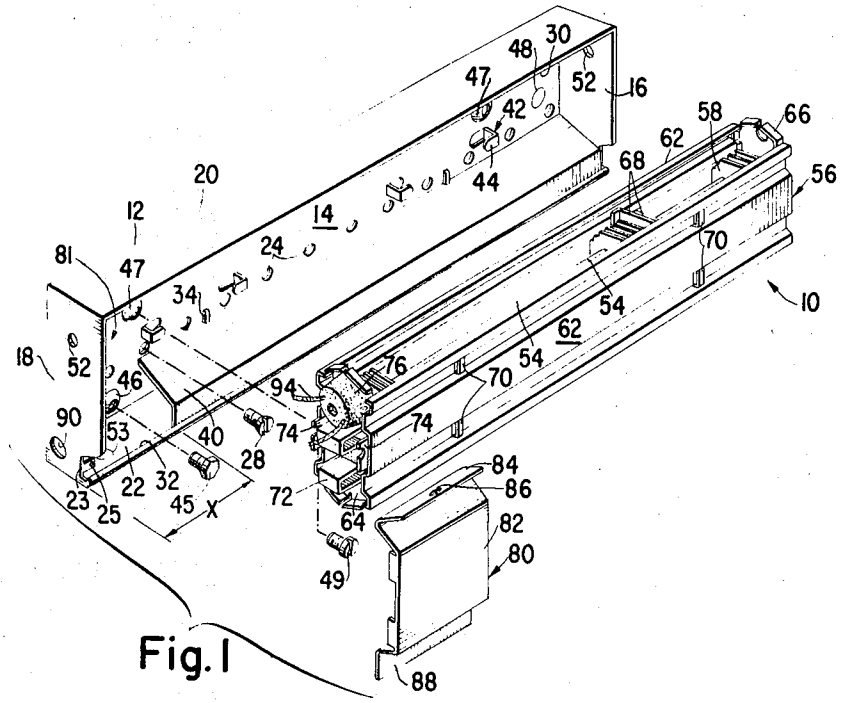


Fig. 1

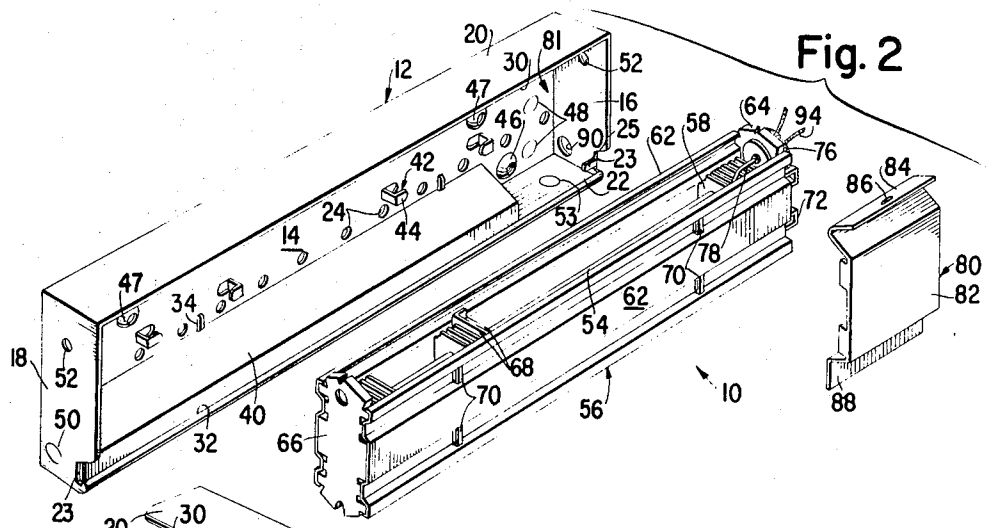


Fig. 2

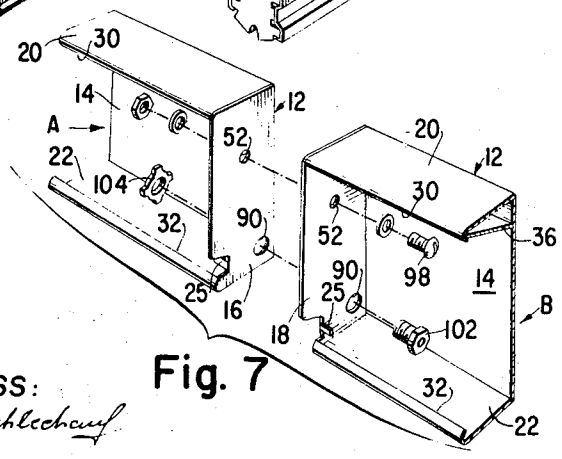


Fig. 7

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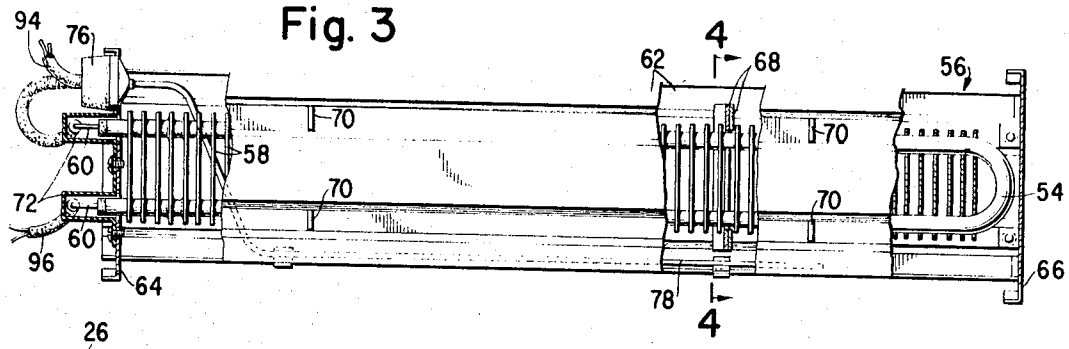
Nov. 24, 1970 R. E. DINCHER ET AL 3,543,003

ELECTRIC BASEBOARD HEATER UNITS

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Fig. 3



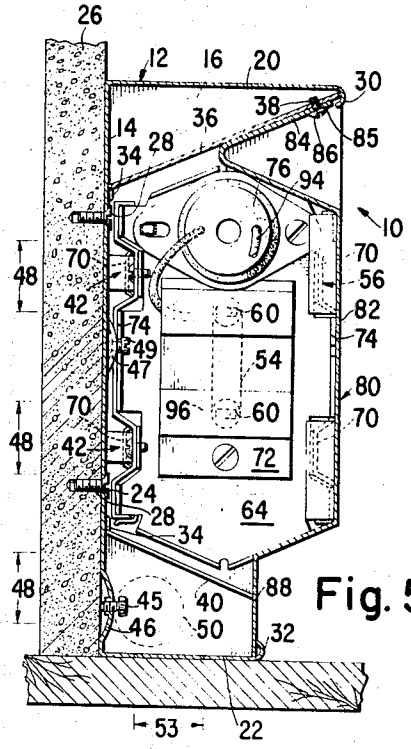
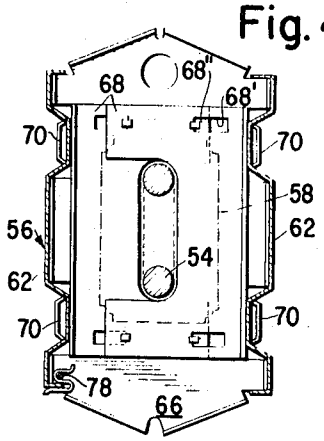


Fig. 5

Fig. 4



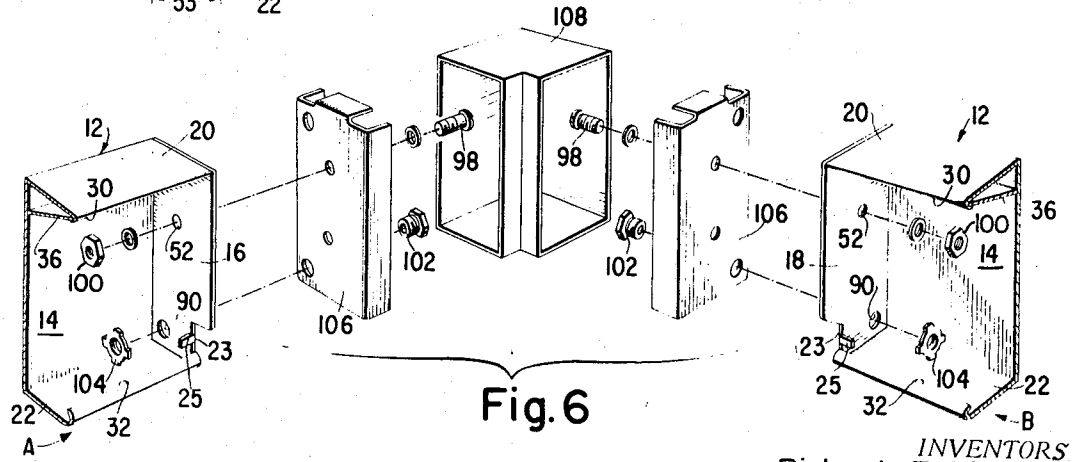


Fig. 6

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ELECTRIC BASEBOARD HEATER UNITS

Filed Sept. 4, 1968 3 Sheets-Sheet 3

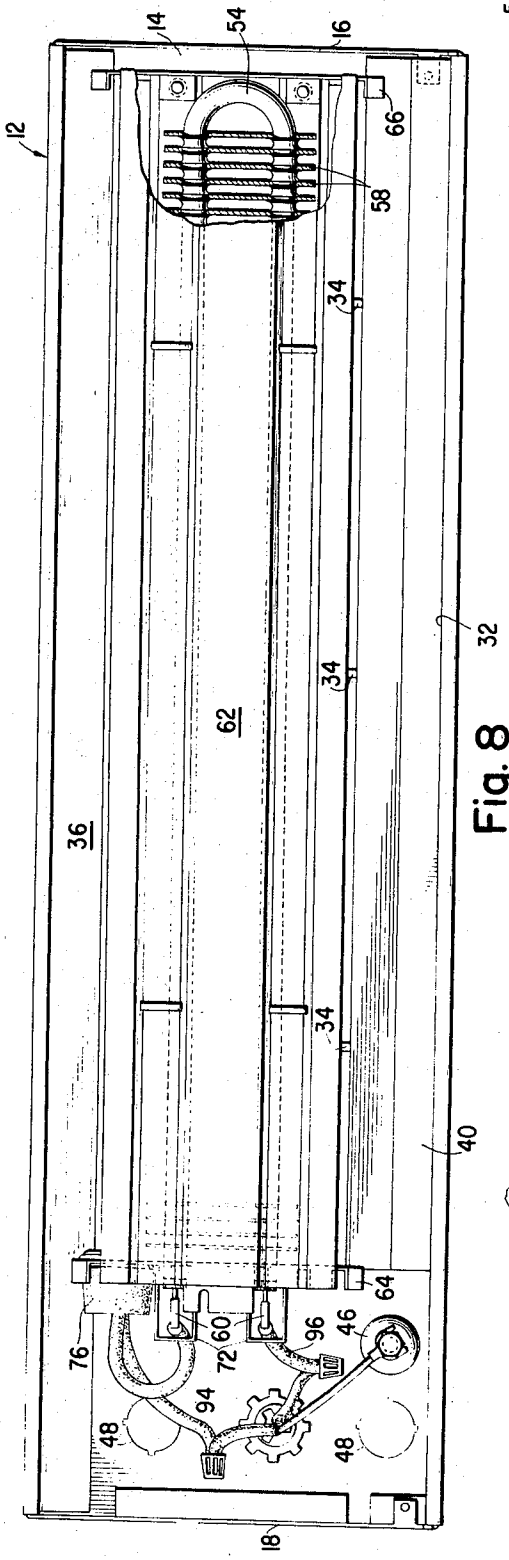


Fig. 8

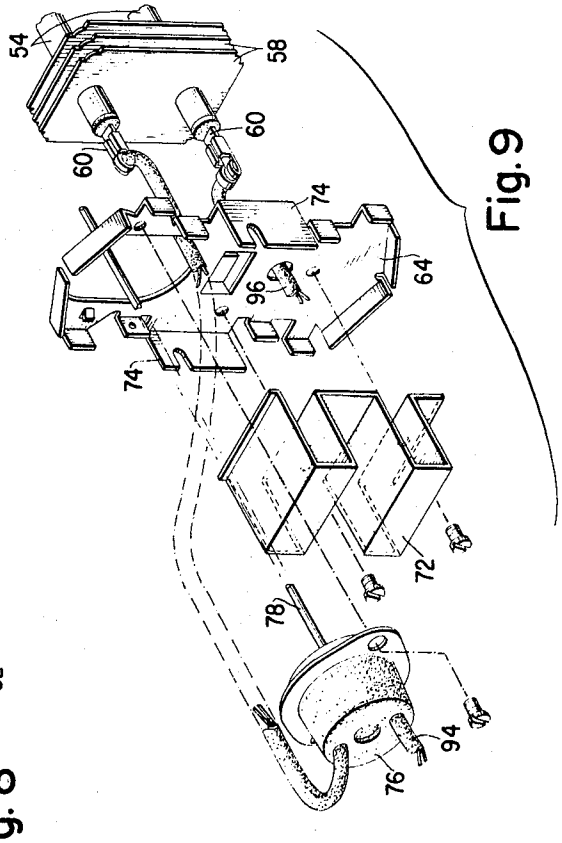


Fig. 9

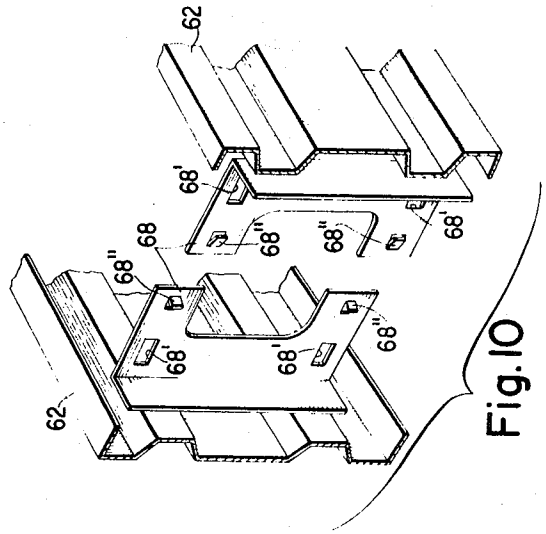


Fig. 10

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3,543,003

ELECTRIC BASEBOARD HEATER UNITS

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Int. Cl. H05b 3/50
U.S. Cl. 219—366 4 Claims

ABSTRACT OF THE DISCLOSURE

An electrically energized elongated baseboard heater including an elongated housing and provisions for mounting the housing on a wall. The baseboard heater includes an elongated unit or core that carries heating element apparatus for connection to a source of electrical energy. The core unit further includes provisions for removably mounting it on the housing so that it may be reversed end for end on the housing.

BACKGROUND OF THE INVENTION

The prior art discloses various types of electrically energized baseboard heaters that are adapted to be mounted on the interior walls of buildings near the bottom of the wall close to the floor to provide better distribution of the radiated heat. Some of the prior art baseboard heaters are provided with electrical terminals for the electrically energized heating elements at one end only of the heaters. However, since it has been found desirable to be able to connect the source of electrical energy to either end of the heater manufacturers construct their units either (a) with a set of electrical terminals at both ends of the heater units or (b) with the terminals positioned on the right side only of some of their units and on the left side only of other of their units. One of the drawbacks of the (a) units is that the cost of providing two sets of terminals is too high to be competitive and another is that it adds to the non-heat radiating segment of the unit. One of the drawbacks of the (b) units is the added expense of keeping in stock twice as many units because it is necessary to use both left and righthand units. A third solution to the problem is disclosed in the U..S. Pat. 2,861,167, Nov. 18, 1958, issued to A. P. Wick who utilizes a terminal at one end only but makes his heater symmetrical so that a user may reverse the whole unit end for end. However, the Wick baseboard heater discloses a non-radiating space at both end sections of the heater. Furthermore, to meet the Underwriters' Laboratories, Inc. specifications for baseboard heaters of the size and wattage contemplated by the present heater a thermal cut-off device is required. Such a thermal cut-off device is designed to detect overheated segments of the heater and thereupon actuate a swtich that disconnects the heating element from the source of electrical energy. Such heat detection devices are positioned along the length of either the top or the bottom of each unit, but due to the different heating characteristics at the bottom and top of each unit, a heat detection device designed for the top of the unit will not function properly at the bottom of the unit and vice versa. Thus, the Wick baseboard heater unit cannot utilize such a heat detection device.

SUMMARY OF THE INVENTION

The present invention comprises an electrically energized baseboard heater having an elongated housing assembly adapted for mounting on the inner wall of a building. The heater core assembly includes an elongated heating element unit that carries an electrically energizable heating element equipped with electrical terminals for

connection to a source of electrical energy. The invention further includes apparatus that removably mounts the core assembly on the housing assembly and allows such core assembly to be selectively reversed end for end on the housing assembly.

The baseboard heater of the present invention avoids or overcomes the drawbacks of the prior art as described above because it may utilize only one set of terminals at one end of the unit, and includes a heating element core assembly that is reversible end for end on the baseboard housing in such a manner that a heat detection device mounted on the core assembly in its most effective position and, in the present heater assembly is always positioned between the bottom of the housing and the heating element of the core assembly.

The heater of the present invention has the advantage that for a given length of housing assembly the novel construction of the heater allows for the maximum length of heating element and at the same time allows for assembly of the housing and core in a manner to provide a junction box means at a selected end of the heater.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view, in perspective, of the baseboard heater of the present invention;

FIG. 2 shows the same baseboard heater unit as in FIG. 1 but with the core assembly reversed end for end;

FIG. 3 is a front elevational view, partially broken away, of the core assembly shown in FIGS. 1 and 2;

FIG. 4 is an enlarged sectional view taken substantially along line 4—4 of FIG. 3;

FIG. 5 is an enlarged end elevational view, in section, of the baseboard heater showing it attached to the wall of a building;

FIG. 6 is an exploded view, in perspective, of corner connecting elements for the baseboard heater of the present invention;

FIG. 7 is a perspective view of end portions of two adjacent housing assemblies, illustrating the manner of connecting them together;

FIG. 8 is an enlarged front elevational view; partly in section, of the heater with the junction box cover plate removed to illustrate the wiring connections;

FIG. 9 is an enlarged disassembled perspective view illustrating the way in which the thermal cut-off switch and the heater element terminals are electrically connected;

FIG. 10 is an enlarged perspective view of the two-piece heating element supporting bracket.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the drawings, the numeral **10** indicates the baseboard heater generally and, as illustrated, is elongated and substantially rectangular as viewed from the front (FIG. 3) and also as viewed in cross section (FIG. 5). The heater **10** includes a rectangular open faced housing **12** that supports the other elements of the heater unit. The housing **12** includes a rectangular rear or back wall **14** and identical oppositely disposed side walls **16** and **18** extending outwardly away from the rear wall and joined by a top wall **20** and an oppositely disposed bottom wall **22** also extending outwardly away from the back wall **14**. The depth of the bottom wall **22** is less than that of the top wall **20** and the side walls correspond in depth to the top wall **20** to a point near the lower end of the side walls where a segment thereof is cut out to reduce the depth to that of the bottom wall **22**. Each of the lower sections of the side walls **16** and **18** present an edge **23** from which extends an integrally formed stop tab **25** that extends a short distance inwardly parallel to the rear wall **14**. A plurality of holes **24** in the rear wall **14** allow

the housing to be secured to a house wall **26** by the screws **28**.

The free end segment of the top wall **20** is turned downwardly and inwardly to form a lip **30** while the free end segment of the bottom wall **22** is turned upwardly and inwardly to form a lip **32**. On the rear wall **14** there are formed two parallel rows of spaced stop nubs **34** (FIG. 5) that extend along the length of the rear wall, one row of nubs being spaced a short distance downwardly from the top wall **20** and the other row being spaced a short distance upwardly from the bottom wall **22**. Positioned between the top row of nubs and the underside of the lip **30** is a heat deflecting plate **36** (FIG. 5) that extends lengthwise of the housing **12**. The plate **36** extends at an acute angle from the vertical rear wall **14** to the top wall **20** and is captured between the lip **30** and the nubs **34** thereby to hold the plate securely in place. The plate **36** includes two screw holes **38** one near either end of the plate. Captured between the bottom row of stop nubs **34** and the lip **32** is an endwise slidable wire raceway cover **40** that is a length *x* shorter than the length of the housing **12**. Punched out of the rectangular rear wall **14** are a plurality of mounting tabs or hooks **42**. Each mounting tab includes a tongue **44** that is spaced from but parallel with the back wall **14**, each tongue being spaced an equal distance from the back wall. The mounting tabs **42** consist of two sets of four each, each set of four being spaced inwardly from its respective housing side wall approximately one-third the length of the housing **12**. Each set of four mounting tabs is divided into two pairs and in each pair the free end of one tab tongue faces the free end of the other tab tongue across a short predetermined distance. Formed in the back wall **14** close to the bottom wall **22** are two apertured ground bosses **46**, that receive screws **45**, each boss **46** being spaced an equally short distance from its respective side wall. Also formed in the back wall **14** are two apertured locking bosses **47** positioned closer, vertically, to the upper line of mounting tabs (FIG. 5) than the bottom line and outwardly of the line of tabs. The bosses **47** receive screws **49**. The back wall **14** further includes in each end section a plurality of knockout discs **48**. The discs **48** have been partially cut out and require only a slight tap with a hammer to remove the discs to provide openings for electrical conduits, as described below. Knockout discs **50** are also provided in the lower segment of each of the side walls **16** and **18**, while in the upper segment of each side wall there is provided a screw hole **52**, the function thereof to be described below. Further knockouts **53** are provided in the bottom wall **22**.

A tubular U-shaped electric heating element **54** constructed of conventional designs is supported in a core assembly **56** which in turn is removably mounted in the housing assembly **12**. The U-shaped electric heating element **54** extends substantially the length of the housing **12** and has mounted thereon, at regularly spaced intervals, a plurality of identical parallel heat conducting fins **58** which extend transversely of the heating element **54** and at right angles to the back wall **14** and parallel with the side walls **16** and **18**. To each of the two ends of the heating element **54** there is connected a terminal **60**. The heating element **54** is positioned between two identical face plates **62** which are closed by apertured end plates **64** and **66**. Intermediate the length of the heating element **54** a two-section bracket **68**, secured to the face plates **62**, receives the heating element **54**. The bracket **68** and the end plate **64** combine to support the element **54** between the face plates **62**. Each face plate **62** has formed thereon two pairs of tab loops or eyes **70** each pair on each face plate spaced equidistant from the ends of the face plate. To the end plate **64** there is attached a protective band **72** constructed of electrically nonconductive material to cover each of the terminals **60**. Extending outwardly from the end plate **64** and parallel to the back wall **14** are a pair of slotted lock tabs **74**.

Mounted on the upper section of the end plate **64** is a conventional thermal cut-off switch **76** to which is connected a capillary tube **78** that extends down and along substantially the length of the bottom of one of the face plates **62**. The switch **76** is connected in series between one of the terminals **72** and the positive side of the electrical power supply. The capillary tube **78** contains a fluid that expands as the heat to which the tube is exposed increases. The tube and its fluid and the cut-off switch are designed to actuate the switch when the tube or a section of it is exposed to a predetermined high temperature.

To mount the heating element core assembly **56** on the housing **12** it is merely necessary to place the unit **56** within the confines of the housing **12** with the thermal cut-off switch **76** in the upper part of the housing and in the end of the housing desired. The core assembly **56** may then be slid endwise so that the hooks **70** on the face plate **62** facing the back wall **14** engage those mounting tabs or hooks **42** having the free end of their tongues **44** extending in the direction opposite to the direction that the unit **56** is being slid. When the core assembly **56** is mated with the tabs **42** the appropriate apertured locking boss **47** is aligned with its corresponding slotted lock tab so that the slot in the tab is aligned with the aperture in the boss to allow the installer to insert the screw **49** and thereby lock the core assembly **56** against endwise movement and also against movement away from the back wall **14**. With the core assembly **56** locked in place the wire raceway cover **40** can also be slid as far as it will go in the same direction that the unit **56** was moved. The distance, designated as *x*, FIG. 1, between the exposed end of the raceway cover **40** and the housing side wall opposite is equal to the distance between the end plate **64** and that same side wall, and the space defined thereby, along with the defining walls and a junction box cover **80**, is designated in the art as the junction box, here indicated generally by the numeral **81**. The cover **80** is formed with a flat face **82** and a V-shaped end segment having a flange **84** formed with an aperture **86**, while the opposite end segment includes a flange **88**. The cover **80** is mounted by slipping the flange **84** under the lip **30** of the housing **12** and then sliding the flange **88** under the lip **32** of the housing with the flange **88** resting on the stop tab **25** to keep the cover properly spaced from the back wall **14**. The cover is secured in place by a screw **85** received by the aperture **86** in the flange **84** and the corresponding aperture **38** in the heat deflecting plate **36**. The electrical conduit **94** connected to the switch **76** may be conveniently led through the aperture remaining after one of the knockouts **48** at that end segment of the back wall **14** is removed, and thence to the positive side of an electric power source through suitable terminals and wiring in the house wall **26**. The negative or return side of the electric supply is connected to an electrical conduit **96** which is also led through the aperture remaining after the knockout **48** is removed, and finally, when necessary, an electrical grounding wire (not shown) may be led through the opening to the ground boss **46** to which it is secured, thereby grounding the housing **12**. The metallic structure forming the support unit **56** and the raceway cover **40** and the heat deflecting plate **36** are in turn grounded by suitable grounding connections to the housing.

The junction box **81** may be formed at the opposite end of the heater **10** simply by removing the cover **80**, disconnecting the electrical conduits and the screw **47**, securing the lock tab **74** to the boss **47** on the back wall **14**, sliding the support unit **56** off the tabs, turning the unit **56** end for end without reversing its vertical position and thereafter sliding the raceway cover **40** toward the opposite side wall of the housing and remounting the unit **56** toward the opposite end of the housing. Thereafter the connections may be completed as was done in the initial mounting. Thus, the electrical connections for the electric input conduits can be made readily available at a selected end of the housing **12**.

As can be understood by reference to FIG. 7 the present invention contemplates securing a plurality of heating units end to end. In FIG. 7 the identical housings are labeled as A and B. The securing is accomplished simply by passing a bolt **98** through apertures **52** in side walls **16** and **18**. At the bottom of the side walls **16** and **18** the holes **90** remaining after the knockout discs **50** have been removed receive a hollow connector **102** that mates with a nut **104** to lock the lower ends of the housing. The hollow connector **102** is utilized to pass the electrical conduits from the housing A to the housing B. The electrical conduits that connect the heater element for the B housing are first led into the junction box (not shown in FIG. 7) end of the housing and then through the wire raceway and finally into the housing B.

FIG. 6 illustrates an arrangement by which the present invention provides for mounting the baseboard heaters **10** so that they may be connected at a right angled corner. Thus, the knockout discs **50** are removed from the side walls **16** and **18** to provide the holes **90** that receive hollow connectors **102** which in turn pass through holes formed in the bottom of plates **106**. The plates **106** mount on the end faces of the legs of a hollow L-shaped corner box **108** that is equal in height to that of the housing **12**. The top section of the housings A and B and the corner box **108** are secured by the screws **98** and the nuts **100**. It is therefore possible to bring the electrical conduits from the raceway of housing A through the hollow connectors **102**, the corner box **108**, and finally to the housing B.

From the above description taken in connection with the drawings, it will be apparent that for a given overall length of the baseboard heater there is provided the maximum length of heater element, and at the same time assembly of the housing assembly and core assembly is such as to permit the junction box to be arranged at either end of the heater unit. The components of the core assembly are extremely simple in instruction. The front and rear face plates **62** are identical and each has secured to it one section of the heating element supporting bracket **68**. The two sections of the supporting bracket are also identical and are provided with apertures **68'** and hook tabs **68''**. The apertures and hook tabs are so located that when the final assembly of the front or rear face plate takes place the two sections of the heater element supporting bracket automatically interlock, as shown in FIG. 4, and thereby secure the heating element in its proper position. It is apparent that the core assembly is a complete unit and that it can readily be reversed end for end in the housing assembly to provide the junction box at either end of the heater.

What is claimed herein is:

1. An electric baseboard heater comprising:

(a) an elongated housing assembly having a rear wall, a top wall, a bottom wall, a right end wall and a left end wall,

(b) a core assembly, including a heating element having terminals at one end thereof, located within said housing assembly and having a length shorter than the length of said housing assembly,

(c) a junction box located within said housing assembly and having a size determined by the total difference in length between said core assembly and said housing assembly,

(d) electric conduit means connected to the terminals of said heating element and extending into said junction box means for ultimate connection to a source of electrical energy,

(e) two sets of mounting means formed in said housing assembly,

(f) the core assembly having symmetrical front and rear face plates,

(g) mounting means formed on the front and the rear face plates selectively to interconnect the core assembly and the housing assembly with the mounting means on one of the face plates co-operable with one of the sets of mounting means on the housing assembly to locate the junction box at one end of the housing assembly, and with the mounting means on the other of the face plates co-operable with the other set of mounting means to locate the junction box at the other end of the housing assembly, and

(h) the mounting means of the housing assembly and the core assembly, including a pair of spaced hooks slidably engageable within a pair of correspondingly loop-shaped members, with the hooks formed on one of the assemblies and the loop-shaped members formed on the other assembly.

2. The electric baseboard heater claimed in claim **1**, wherein the core assembly includes,

(a) end plates securing said face plates in substantially relative parallel relation,

(b) the heating element located between said front and rear face plates and having the terminals thereof projecting through one of said end plates and into said junction box,

(c) a heating element supporting bracket comprising two complemental members adapted to embrace the heating element at a point spaced from the junction box, and

(d) said two complemental members constructed to cooperate with one another when the two face plates of said core assembly are secured to said end plates.

3. An electric baseboard heater as claimed in claim **2** wherein the two complemental members comprising the heating element supporting bracket are symmetrical in shape and are respectively formed as to interlock during the positioning of the two face plates on the two end plates of said core assembly.

4. The combination claimed in claim **1** wherein:

(a) lock tabs formed on the core assembly, one on each of the front and rear face plates,

(b) the lock tab of the face plate which has the mounting means thereof engaged with the mounting means of the housing assembly disposed within the junction box, and

(c) locking means in the junction box connected to the lock tab to lock the position of the end of the core assembly adjacent the junction box while permitting free thermal expansion of the other end thereof.

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U.S. Cl. X.R.

165—55; 219—342, 365, 367, 375