

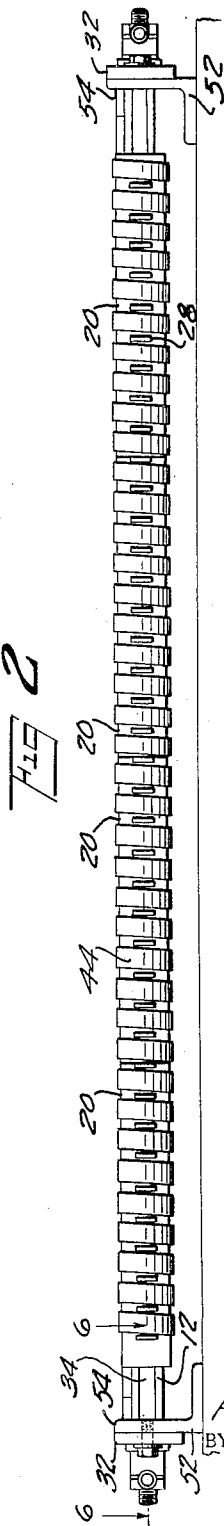
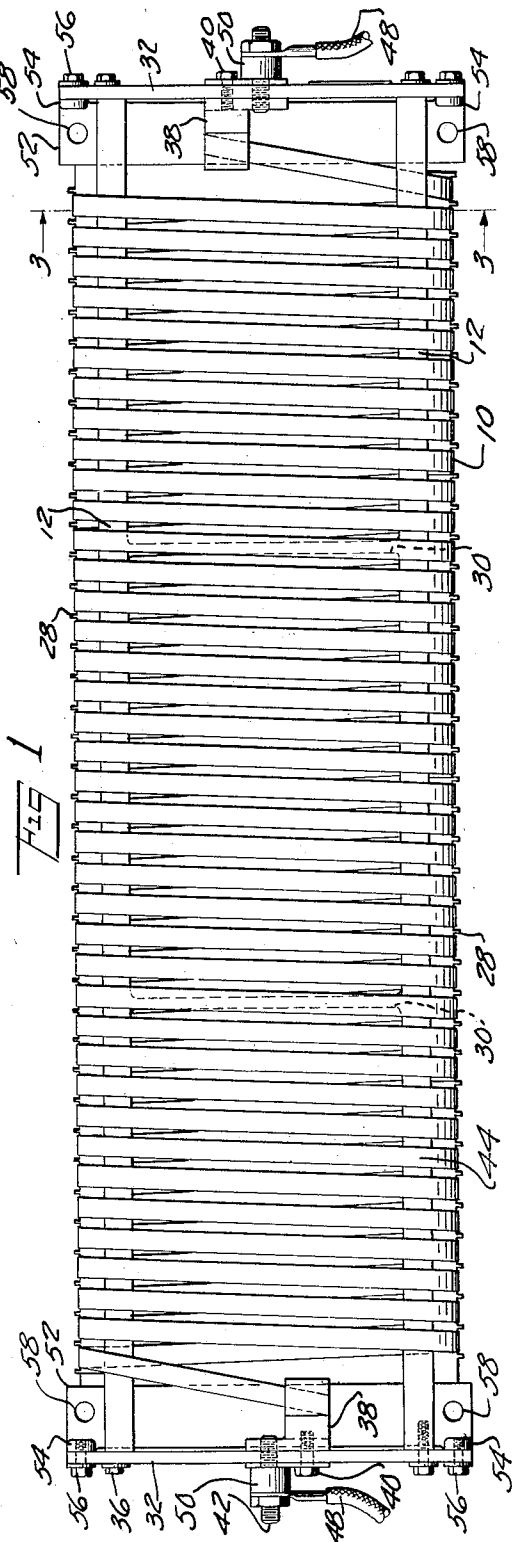
May 7, 1929.

H. E. SOMES

1,712,010

UNIT ELECTRICAL HEATER

Filed Oct. 29, 1923 2 Sheets-Sheet 1



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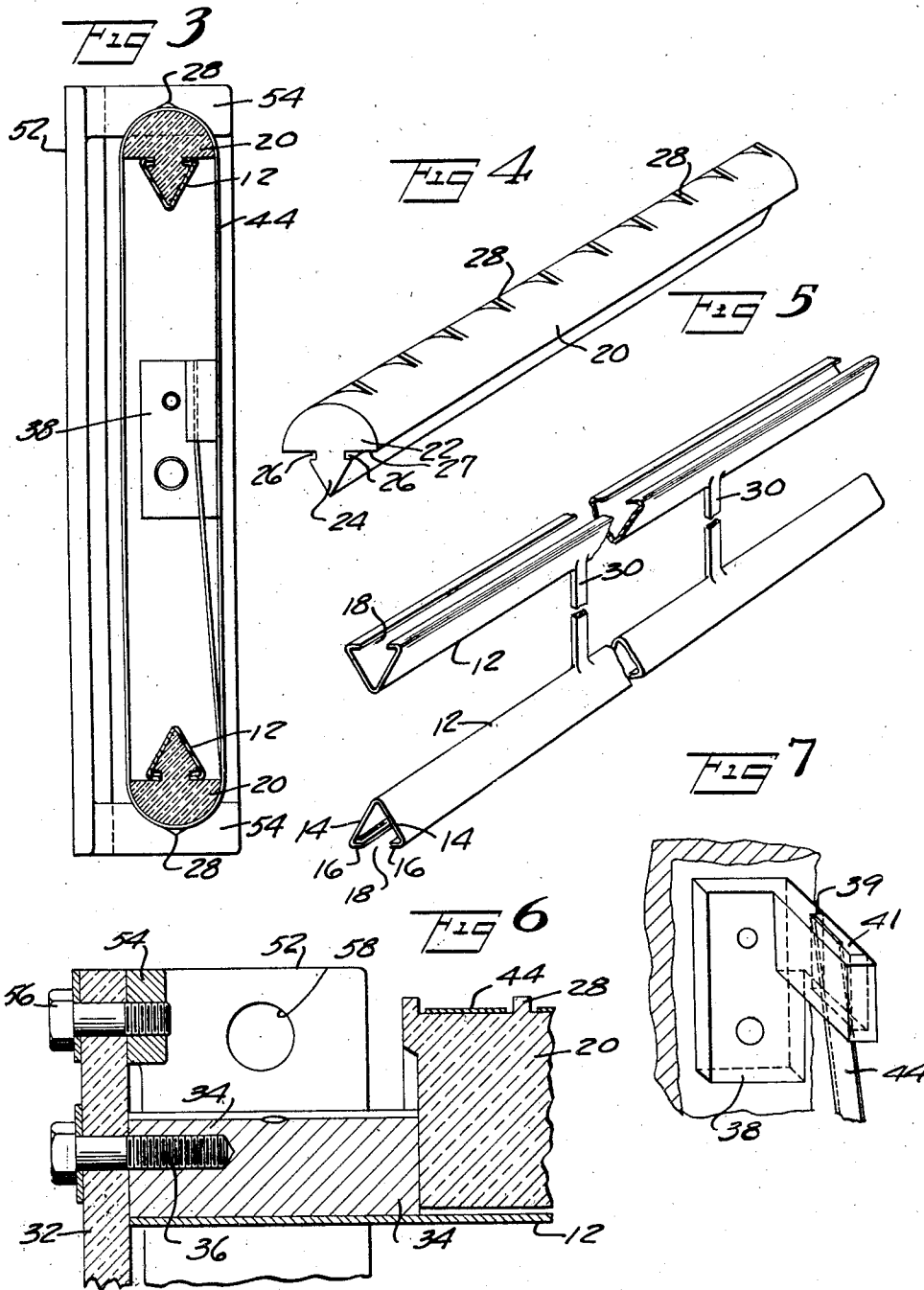
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UNITED STATES PATENT OFFICE.

HOWARD E. SOMES, OF PHILIPSE MANOR, NEW YORK.

UNIT ELECTRICAL HEATER.

Application filed October 29, 1923. Serial No. 671,301.

My invention relates to an electrical heater of unit type construction.

One use for which unit heaters in accordance with my invention are well adapted is for air heating of ovens for baking enamel on automobile parts, but such use is referred to for illustration only, apparatus embodying the invention being of general utility in connection with electrical heating.

One object of the invention is the provision of a unit heater, which is not readily short circuited, the device being so constructed that the electrical heating element is doubly insulated, and that it is necessary for the insulation to be bridged or the circuit otherwise shorted in at least two widely separated places before a short circuit can be produced. The importance of this feature is particularly noteworthy in connection with use of electrical heating units in ovens, such as referred to above, and in which the enamel is inflammable and may be ignited and destructive fires caused as the result of a short circuit.

Another object of the invention is the provision of improved insulating means and the use of a channel bar for supporting same, permitting the use of internal braces without in any way interfering with the insulating members for insulating and supporting the heating elements.

The invention provides a simple structure of great lightness, strength and ruggedness which can be readily produced in quantities and will stand up without breakage over long periods of use. The metallic parts of the device are preferably of sheet metal and of light section, thereby securing important economies in operation as compared with devices making use of metallic parts of heavy or solid section.

In the accompanying drawings I have illustrated a preferred embodiment of the invention, but it is to be understood that same is only for illustration and for affording an understanding of the invention, and not for limitation thereof to the precise construction shown.

In said drawings, Fig. 1 is a side view. Fig. 2 is a top view. Fig. 3 is a section on line 3—3, Fig. 1. Fig. 4 is an isometrical view of an insulator section. Fig. 5 is an isometrical view of the channel bar supporting frame prior to insertion of insulators. Fig. 6 is a section on line 6—6, Fig. 2,

and Fig. 7 is an isometrical view of the electrical connection member.

The heating unit designated generally by reference character 10 may be of various forms, but is preferably made relatively high and narrow and of any suitable length to suit the location where it is to be installed. When the heating units are used end to end in enamel baking ovens, for example, each unit may conveniently be in the neighborhood of four or five feet in length, but a wide variation in dimensions is permissible.

Unit 10 comprises a pair of channel bars 12, 12, preferably of pressed sheet steel, and preferably of generally V-shape section, having web portions 14, 14, and inwardly extending flange portions 16, 16. Channel bars 12, 12 are spaced apart at any suitable distance, and arranged with the openings 18, 18 between flange portions 16, 16 facing outwardly in opposite directions.

The insulator sections 20, 20 are inserted endwise in the channel bars 12, 12, and are so constructed as to be held firmly therein and to project from the open sides thereof, and to extend laterally beyond the channel bars, thereby spacing the ribbon or other heating element well away from the metallic channel bars. In the form shown, the insulators 20 comprise the relatively wide, preferably rounded or semicircular portions 22 adapted to extend laterally beyond the channel bars 12 on each side, and a generally V-shaped rib portion 24 adapted to fit in the channel bar with lateral grooves 26, 26 formed at the base of the shouldered juncture 27 to coact with the flanges 16, 16, which are received therein when the insulator sections are introduced endwise into the channel bars. Spacing lugs 28, 28 are preferably provided on the outer rounded portions 22 of the insulators to insure correct spacing of the heating elements. While the insulating members 20, 20 may be in one piece, if desired, they are preferably formed, as by molding, in sections, and, in the form shown, four or more sections 20 may be used to advantage in each of the channel bars 12.

While any suitable insulating material may be used for the insulators 20, 20, I preferably make use of the material known as electrobestos molded insulation, which gives good results and is not readily broken when molded into insulators of the construction described.

It will be seen that the insulators are metal bound for a considerable portion of their girth, thus assuring great strength together with lightness.

5 It will also be seen that, due to the metal of channel bars 12, 12 being exposed on the inner sides thereof, it is readily possible to provide braces therebetween, so as to secure great strength and lightness of structure.
10 In the form shown, two braces 30, 30 are shown connecting the pair of channel bars 12, 12 and same may be secured in place in any desired way, preferably by being welded to the channel bars.

15 The end pieces 32, 32 are of insulating material of high strength, and may advantageously be made of the material known as transite asbestos wood. Means are provided for securing bars 12, 12 thereto in such
20 manner as to provide a strong, rigid structure. This is preferably accomplished by the provision of metal plugs 34, 34, which are inserted in the ends of channel bars 12, 12, preferably those at one end being secured in place prior to insertion of the insulators in the channel bar and those at the
25 other end after the insulating members are in place. Plugs 34 are preferably welded to channel bars 12 so as to form in effect an integral part thereof and in order to secure same to end pieces 32, they may be provided with tapped holes 34 and bolted to end pieces 32 by bolts 36.

30 The binding posts for making the electrical connections are preferably carried by the insulator end pieces 32 and preferably midway between the channel bars 12, 12, thereby securing a maximum insulated gap between the channel bars 12 and such binding posts.
40

In order to insure that the connection of bus bars or like current carrying members shall not turn or otherwise disturb the connections to the heating elements, I preferably provide a relatively short metallic conducting member 38 bolted by two bolts 40, 42 to the end piece 32. The bolt 42 extending through end bar 32 and conductor plate 38, and preferably through the opposite end of plate 38 from the bolt 40, serves for making the connection with the bus bar 48, a spacing sleeve 50 being preferably provided under the bus bar to give free access to bolt 40. The bolts or screws 40, 42
55 being separated by practically the entire length of the member 38 serve to prevent any give or movement of this terminal member under the strain of installing connections to the heater. The arrangement of
60 bus bars or other connections will, of course, vary from the simple form shown for illustration where there is corresponding variation in the nature of current supply.

In order to insure that a perfect electrical
65 connection shall be obtained between con-

ducting member 38 and ribbon 44, the conducting member 38 is provided with a slot 39 and keeper plate 41 and ribbon 44 is secured by being welded with plate 41 and conducting member 38, thus providing an
70 electrical connection which is both mechanically and electrically secure.

In order to reenforce the transite end bar 32 and to afford a convenient means for supporting the device in place in an oven or
75 the like, there is provided the supporting bar or plate 52 having angle lugs 54 thereon which are bolted to the end piece 32, as by bolts 56. It will be seen that member 52, which is usually grounded, is insulated from
80 the frame channel bars 12, 12, and also from the binding post member 38, by the insulating end bar 32, so that in order for the ribbon 44 to be grounded two gaps must be crossed, one from the ribbon 44 to the channel
85 bar 12, and a second gap from channel bar 12 to the supporting plate 52, a condition not readily arising in practice. The construction described supplies frame end
90 pieces of substantially angle section, making a very rigid construction of great strength.

The electrical heating units of my invention may be secured in place in an oven or other device in any suitable way. In the form shown supporting plate 52 is provided
95 with holes 58, 58 for bolting it in place. The electrical heating unit, preferably in the form of a ribbon 44, is wound on the frame constructed as described, the consecutive coils being spaced between the spacing lugs
100 28 of insulators 20. With the frame constructed as described, a ribbon of relatively great length may be wound on the frame and made use of in a constricted space, and very efficient electrical heating results secured.
105 It will be seen that the device is cheap to construct, simple, light and strong, that there is no disturbance of the heating element by screwing up bus bar connection, and that short circuits are effectively prevented by the provision of two distinct electrical gaps well separated from one another, which must both be crossed or bridged in order to produce a short circuit.

Changes and modifications may be resorted to within the scope of my claims without departing from my invention.
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I claim:

1. In an electrical heater, end pieces of insulating material, metallic supporting
120 pieces secured thereto, channel bars secured to the insulating end pieces at a distance from their points of attachment to the metallic supporting pieces, whereby an electrical gap is formed therebetween, insulators
125 having a part thereof within the channels of the channel bars and a part projecting laterally and outwardly therebeyond, and electrical heating material wound on said insulators and thereby spaced away from
130

the channel bars to provide an electrical gap therebetween.

2. An electrical heater comprising insulating end members, metallic means for securing the same to a support, metallic supporting members secured to said end members in spaced relation to the metallic securing means therefor to provide an electrical gap therewith, insulating members interlocking with said metallic supporting members and projecting laterally beyond the same, and an electrical heating element supported by said insulating members in spaced relation to said metallic supporting members to provide an electrical gap therebetween.

3. In an electric heater, end plates of insulating material, a pair of metallic tubular members having relatively constricted longitudinal slots at the outer sides thereof, and secured intermediate of and to said end plates, members of insulating material having inner portions fitting within said tubular members, reduced intermediate portions passing through said slots and enlarged outer portions overlying said tubular members and extending laterally beyond the same, and an electrical heating element disposed upon said insulating members in spaced relation to said tubular members.

4. In an electrical heater, end plates of insulating material, a pair of V-shaped tubular members having relatively constricted longitudinal slots at the outer sides thereof, and secured intermediate of and to said end plates, bracing members connecting the inner edges of said tubular members, members of insulating material having inner portions fitting within said tubular members, reduced intermediate portions passing through said slots and enlarged outer portions overlying said tubular members and extending laterally beyond the same, and an electrical heating element disposed upon said insulating members in spaced relation to said tubular members.

5. In an electric heater, end pieces, a pair of metallic tubular members open at the ends thereof having relatively constricted longitudinal slots at the outer sides thereof, members of insulating material having inner portions fitting within said tubular members, reduced intermediate portions passing through said slots and enlarged outer portions overlying said tubular members and extending laterally beyond the same,

members received within the open ends of said tubular members, means for securing the same to said end pieces, and an electrical heating element disposed upon said insulating members.

6. In an electrical heater, end pieces of insulating material, a pair of metallic tubular members open at the ends thereof having relatively constricted longitudinal slots at the outer sides thereof, members of insulating material having inner portions received within said tubular members, reduced intermediate portions passing through said slots and enlarged outer portions overlying said tubular members and extending laterally beyond the same, metallic blocks secured within the open ends of said tubular members and retaining said insulating members against longitudinal movement, means for securing said blocks to said end pieces, and an electrical heating element disposed upon said insulating members.

7. In an electrical heater, a pair of metallic tubular members open at the ends thereof, having longitudinal slots at the outer sides thereof, insulating members received within said tubular members in interlocking engagement therewith and having portions passing through said slots and extending laterally beyond said tubular members, metallic blocks secured within the open ends of said tubular members, end plates of insulating material, means for securing said end plates to said blocks, and an electrical heating element disposed about said insulating members.

8. In an electrical heater, end plates of insulating material, metallic members disposed intermediate of and secured to said end plates in spaced relation to each other, insulating members carried by said metallic members, an electrical heating element disposed about said insulating members, metallic plates at the inner sides of said end plates intermediate of said metallic members having projections for securing the ends of said electrical element thereto, and a plurality of means for securing each of said metallic plates to said end plates against movement; certain of the securing means serving for the connection of conductors at the outer sides of said end plates.

In testimony whereof, I have signed my name hereto.

HOWARD E. SOMES.