Dec. 2, 1941. A. BARNSTEINER 2,264,271

GROUNDING CONNECTION

Filed Dec. 29, 1939 2 Sheets-Sheet 1

Fig. 1.

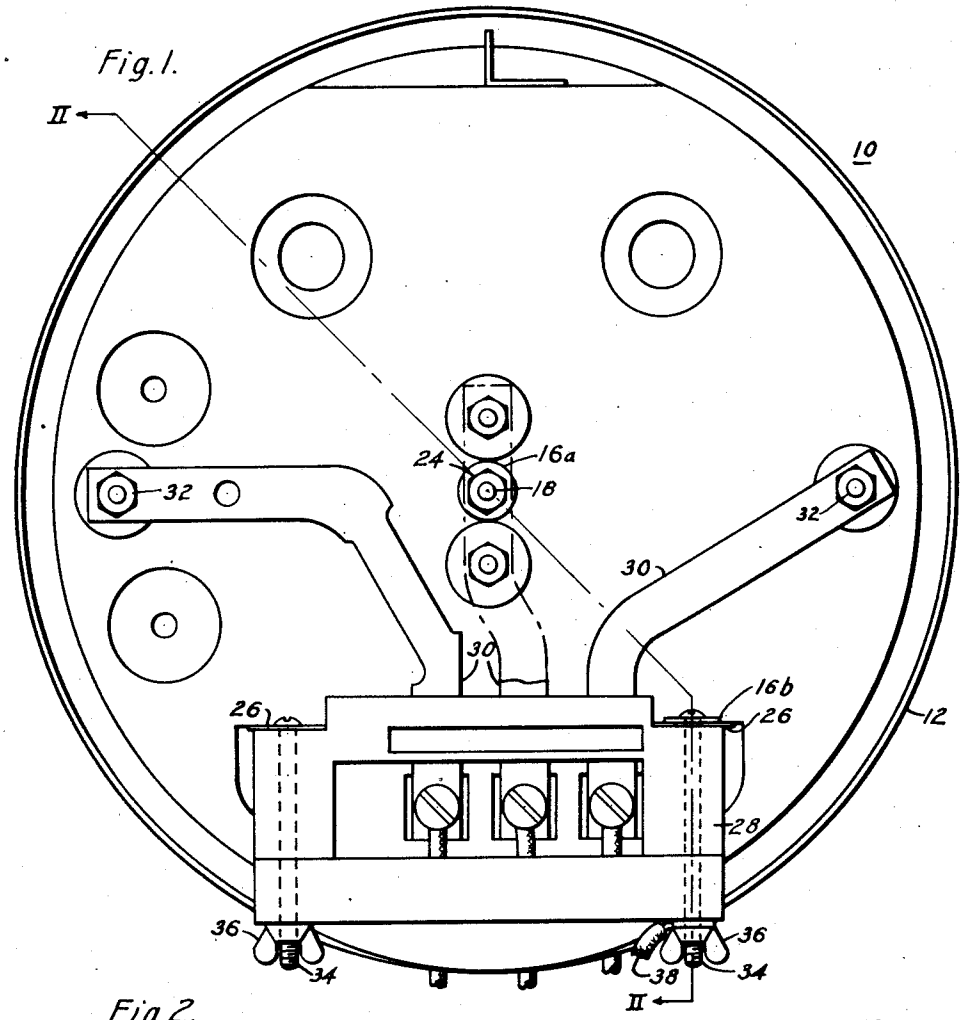


Fig. 2.

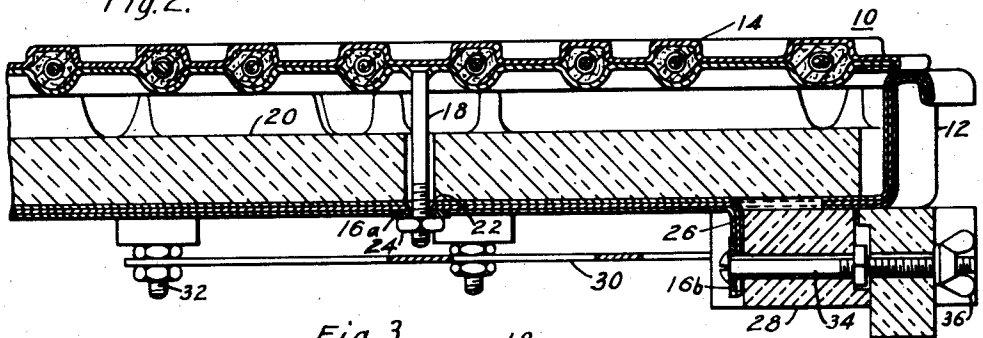
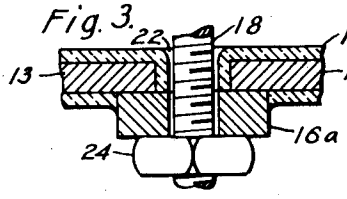


Fig. 3.



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Fig. 4.

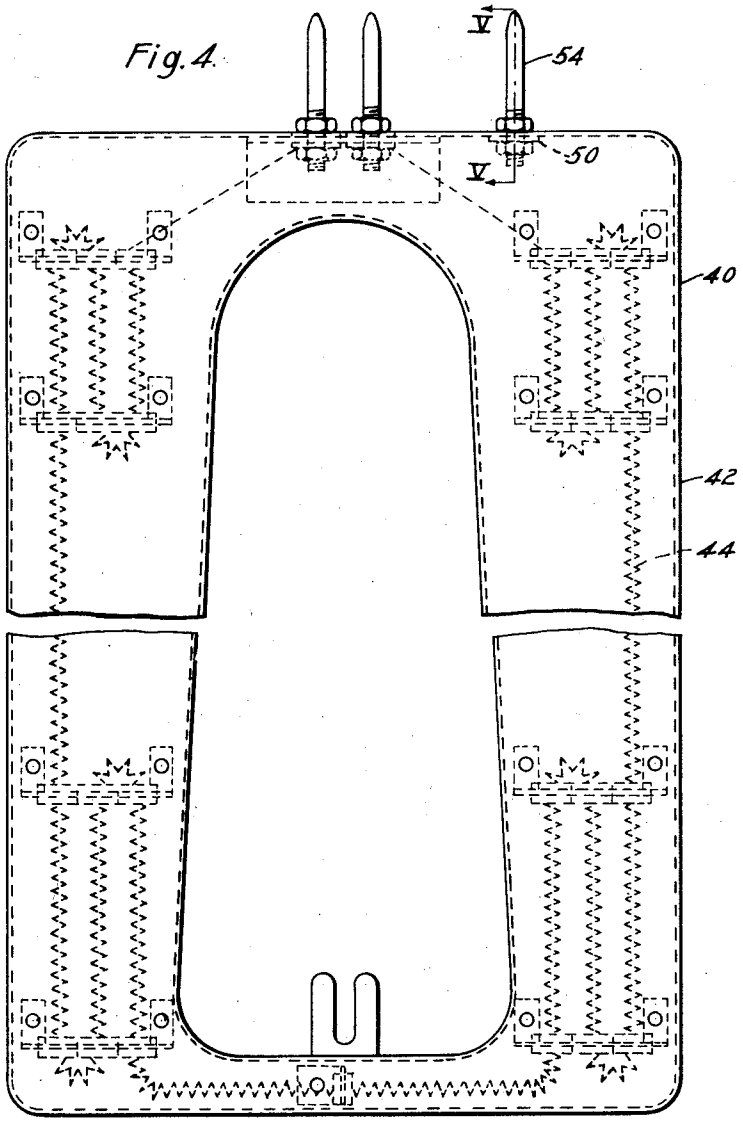
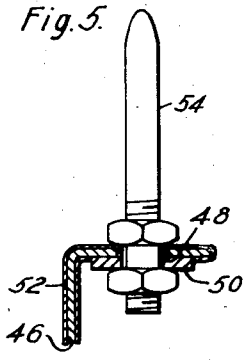


Fig. 5.



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Patented Dec. 2, 1941 2,264,271

UNITED STATES PATENT OFFICE

2,264,271

GROUNDING CONNECTION

Alfons Barnsteiner, Mansfield, Ohio, assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application December 29, 1939, Serial No. 311,631

4 Claims. (Cl. 219—37)

My invention relates to range heaters and more particularly to a method of grounding such heaters.

Enameled supporting structures have been and are being used to a great extent for various types of heating units, such as range surface units and oven heaters, or the like. Safety requirements demand that such structures be grounded. A satisfactory grounding of such enameled structures requires that the grounding connection be firmly connected to the metallic base or understructure which, by necessity, due to the enamel protective coating thereon is formed of a corrosive metal.

Such connection has heretofore been made directly with the corrosive metallic structure, and although various methods have been employed to make the necessary grounding connection, in all cases a portion of the enamel protective coating was required to be removed from the corrosive understructure. Quite frequently, the enamel has not been properly removed, thus leaving a portion of the base about the grounding connection without a covering of protective enamel. The corrosive metal is thus free to deteriorate, resulting in the possibility of the grounding connection becoming disengaged or electrically disconnected from the supporting structure. Such ungrounded structure is then a very dangerous hazard capable, under some conditions, of serious injury to an operator contacting it.

To overcome this serious hazard which has retarded the use of enameled heating unit supporting structures, I propose to utilize a non-corrosive electrically conducting grounding or contact member which may be rigidly attached to the corrosive supporting structure without the need of removing the protective coating from that structure.

It is, therefore, an object of my invention to provide a grounding device for enameled structures which may be rigidly attached to such structures before applying the enameling coating thereto.

A further object of my invention is to provide a corrosive metallic enamel-adhering heating-unit-supporting structure with a metallic, non-corrosive, non-oxidizing, electrically conducting grounding or connecting device to which an enamel coating will not adhere, as a grounding device therefor.

Another object of my invention is to provide a method of grounding an enameled structure by attaching a non-corrosive metallic member to such structure, applying a coating of enamel to such structure exclusive of such member and then connecting the desired grounding device to such member.

Still a further object of my invention is to provide a grounding member for an enameling structure which may be subjected to the usual enameling spray or dipping process but which will not retain the enamel coating during the baking operation whereby such coating will automatically be removed from the grounding member during such baking operation.

Other objects of my invention will either be pointed out specifically in the course of the following description of a device embodying my invention, or will be apparent from such description.

In the accompanying drawings:

Figure 1 is a bottom plan view of a heating unit embodying my invention;

Fig. 2 is a sectional view taken along the line II—II of Fig. 1;

Fig. 3 is a fragmentary, enlarged sectional view similar to Fig. 2;

Fig. 4 is a top plan view of an oven heating structure embodying my invention; and

Fig. 5 is an enlarged sectional view taken along the line V—V of Fig. 4.

Referring to Figs. 1, 2 and 3 of the accompanying drawings, in which like reference characters indicate like parts in the several figures, I show a range surface unit heating structure 10 comprising an enameled supporting structure 12 and a heating element 14 rigidly attached to the structure 12, the enameled supporting structure 12 having non-corrosive metallic members 16a and 16b attached thereto for permitting the structure 10 to be adequately grounded.

The heating unit 10 is, in this instance, of a well-known structure in which the heating element 14 is formed of a plurality of complementary plates with electric resistors insulatedly positioned therebetween and is rigidly attached to a supporting pan-like structure 12 by means of a suitable bolt-like member 18. It is to be understood that any desired heating element may be used in lieu of element 14. The bolt-like member 18 is rigidly attached to or integral with the heating element 14 and depends therefrom, at substantially the mid-point thereof. The bolt 18 is adapted to pass downwardly through a suitable insulating member 20 positioned within the pan 12 and through a centrally located aperture 22 in such pan structure 12. A suitable nut 24 is then positioned upon the lower end of bolt 18 drawing the heating element 14 down against the insulating member and

pan structure 12 to form a functionally integral heating unit 10.

The enameled supporting structure 12 is formed of an oxidizing or corrosive enamel-adhering metallic sheet 13 in a well-known manner. Such metal is preferably a commercial vitreous enamel iron of rather high purity. By having the pan structure 12 formed of an enamel-adhering metal, such structure may be readily enameled in any well known manner. However, if the pan structure 12 be wholly enameled, it follows that the heating element 14 will be electrically insulated therefrom. Accordingly, to adequately ground the element and pan structure, it is necessary to provide electrically connecting means therebetween, as herein described. Suitable depending ears 26 are formed within the lower surface of pan structure 12 to permit a terminal block 28 to be rigidly attached thereto in a well-known manner. The terminal block 28 retains three ends of suitable terminal straps 30 which are connected to terminals 32 of the heating element 14. The depending ears 26 are integral with the pan structure 12 and are enameled therewith in the usual manner. These ears 26 retain the insulating block 28 by means of suitable through bolts 34 which pass therethrough.

Suitable non-corrosive, non-oxidizing, enamel-non-adhering, electrically conducting, washer-like members 16a and 16b are rigidly attached to the corrosive metallic sheet 13 used in forming the pan structure 12. These non-oxidizing washers are preferably of a high temperature copper nickel alloy which are low in iron content such as is sold under the trade name Monel. The washers 16a and 16b are rigidly attached to the pan structure 12 in any desired manner. However, it is preferred that they be spot welded thereto. One washer 16a is positioned about the aperture 22 coaxial therewith. A second washer 16b is positioned on one of the depending ears 26 of the pan structure 12 to provide means for connecting, say, grounding means to such structure.

After rigidly attaching the non-oxidizing enamel-non-adhering washers to the corrosive metallic base metal 13 of the supporting structure 12, such structure is enameled, usually by the spraying method, so as to provide a suitable enameled coating therefor. The enamel is then baked on in a well-known manner to provide a suitable non-corrosive, electrically non-conductive coating for the supporting structure 12. Some of the enamel coating will be deposited upon the washers during the spraying operation. However, inasmuch as the washers 16a and 16b are non-oxidizing and enamel-non-adhering, the enamel coating unintentionally sprayed upon the washers will not adhere thereto. Such enamel is drawn off the washers during the baking or firing operation because of the non-oxidizing and enamel-non-adhering characteristic of the washers by the surface tension of such enamel coating prior to solidification thereof. Accordingly, there will be no corrosive coating positioned upon the washers after the baking operation.

It therefore follows that there will be an electrical connection between the uncoated, non-corrosive washers 16a and 16b and the coated pan structure 12 due to the rigid intimate connection between such washers and structure before the enamel coating is placed thereon.

Inasmuch as the heating element 14 is rigidly attached to the supporting structure 12 by means of the electrically conducting bolt 18, it follows that such element 14 is electrically associated with the metallic supporting structure 12, due to the bolt 18 being intimately associated with such element 14 at one end thereof and operatively associated with the metallic washer 16 through nut 24 at the other end thereof. The heating element 14 is thus grounded to or electrically associated with the enamel coated structure 12.

The pan structure 12 is grounded by means of one of the elongated bolts 34 which rigidly attach the terminal block 28 to the supporting structure. The elongated bolt 34 passing through the washer 16b and terminal block 28 is rigidly attached thereto by means of a suitable wing-nut 36. A suitable grounding wire 38 may thus be positioned between the terminal block 28 and wing-nut 36, so as to make electrical contact therewith. The enamel supporting structure 12 is thus grounded by means of wing-nut 36, elongated bolt 34 and non-corrosive washer 16b, which is rigidly attached thereto.

The heating element 14 is thus electrically associated with or grounded to the enamel coated supporting structure 12 by means of non-corrosive washer 16a. The combination structure of the supporting member 12 and heating element 14 is then grounded by means of the second washer 16b and wing-nut connection 36 to the grounding wire 38.

It is therefore obvious that I have provided an article of manufacture comprising an oxidizing, corrosive, enamel-adhering, metallic structure with a non-oxidizing, non-corrosive, electrical conducting, enamel-non-adhering member rigidly attached to said structure, and in electrical contact therewith, for providing means for grounding the corrosive metallic structure or for attaching an electrical connection thereto, such structure but not said member being covered with a non-corrosive, electrically non-conducting, protecting coating.

Referring to Figs. 4 and 5, I show a second form of a protectively coated heating unit. Such heating unit 40 comprises a main structure 42 and a suitable heating element 44 insulatedly attached thereto. The heating unit 40 herein described and illustrated is more fully described and claimed in a copending application Serial No. 311,617, filed December 29, 1939, of E. H. Lockwood, assigned to the assignee of this application. The structure 42 is likewise formed of a corrosive enamel-adhering metallic sheet 46, which is likewise preferably a commercial vitreous enamel iron of rather high purity, with an aperture 48 located therein to provide means of grounding such structure. A metallic non-corrosive electrically conducting enamel-non-adhering metallic washer 50 (preferably of same material as washers 16a and 16b) is rigidly attached to the corrosive sheet 46 about the aperture 48 in electrical communication therewith.

The corrosive enamel-adhering sheet 46, with the metallic washer 50 attached thereto, is then enameled in any desired manner, such as by spraying. However, due to the washer 50 being enamel-non-adhering, the enamel coating 52 will not remain upon such washer, as hereinabove described. Such enamel coating will, however, extend down within the aperture 48 adjacent the washer 50.

It, therefore, follows that any desirable and suitable grounding member 54 may be rigidly attached to the washer 50 so as to be in electrical

communication with or ground the enameled supporting structure **42** of the heating unit **40**.

It is, therefore, obvious that I have provided a method of grounding an enameled or protectively coated corrosive metallic structure which permits such structures to be grounded without the need of wiping or removing the protective coating therefrom at any stage of the process of coating such structures. Further, that such grounding member will permit any desired or necessary grounding structure to be rigidly attached to the corrosive metallic structure without harming the protective coating thereon.

It is to be understood that the electrical connection with the enameled structures, through the medium of the enamel-non-adhering members attached thereto, need not be for grounding purposes alone but may be used for making any desired electrical connection with an enameled structure.

Various further modifications may be made in devices embodying my invention without departing from the spirit and scope thereof, and I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art and the appended claims.

I claim as my invention:

1. An article of manufacture comprising a corrosive metallic structure, a non-corrosive member rigidly attached to such structure and in electrical contact therewith, said structure alone being covered with a non-corrosive protecting coating, and contact means attached to said member for making electrical contact with the structure.

2. An article of manufacture comprising a grounding member, a corrosive metallic structure, having an aperture therethrough for permitting the grounding member to pass therethrough, a non-corrosive electrical conducting member attached to said structure adjacent the aperture and in electrical contact therewith, said structure alone being covered with a non-corrosive electrically non-conducting protecting coating, and said grounding member passing through the aperture and engaging the non-corrosive member rigidly attached to the structure for grounding such non-corrosively coated structure.

3. A heating unit comprising, in combination, a heating element, a corrosive metallic supporting pan structure, a plurality of non-corrosive metallic members rigidly attached to the pan structure in electrical contact therewith, a non-corrosive electrically non-conducting enamel coating covering such pan structure alone, means for attaching the heating element to such pan structure, said means engaging one of the non-corrosive members for grounding such element to the pan, and means comprising a second non-corrosive member for grounding the pan structure and heating element.

4. A heating unit comprising, in combination, a heating element, a corrosive metallic heat shield adapted to support such element, a non-corrosive metallic washer rigidly attached to the shield coaxially with an aperture therethrough, a non-corrosive electrically non-conducting enamel coating covering the shield alone, a grounding bolt passing through the washer and aperture, and nuts threaded upon such bolt for rigidly attaching it to the shield and washer for providing electrical connection from such bolt to the washer and shield.

ALFONS BARNSTEINER.