Nov. 22, 1927. 1,649,925

A. RUCKSTAHL

ELECTRIC HEATING DEVICE

Filed May 18, 1925 2 Sheets-Sheet 1

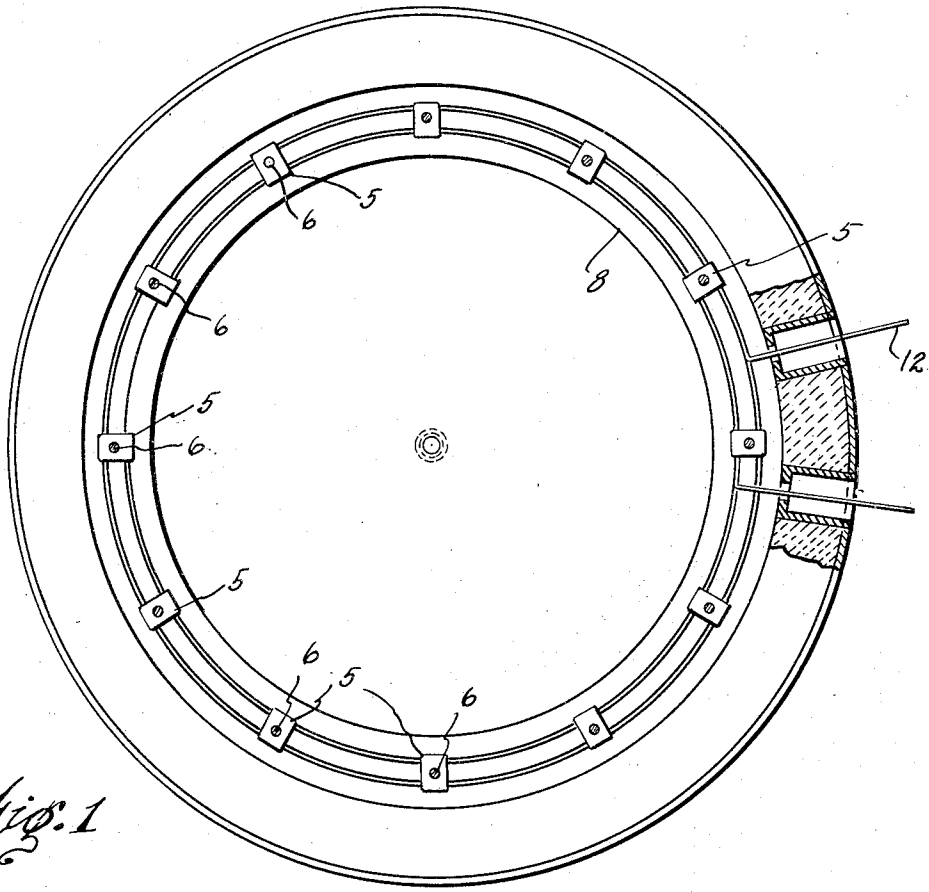


Fig. 1

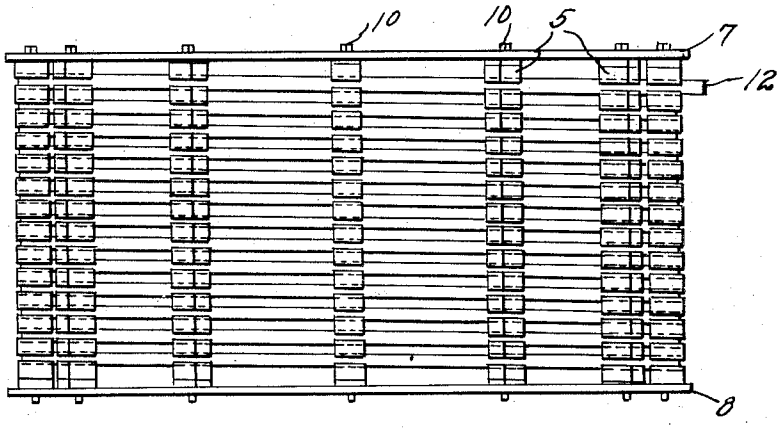


Fig. 2

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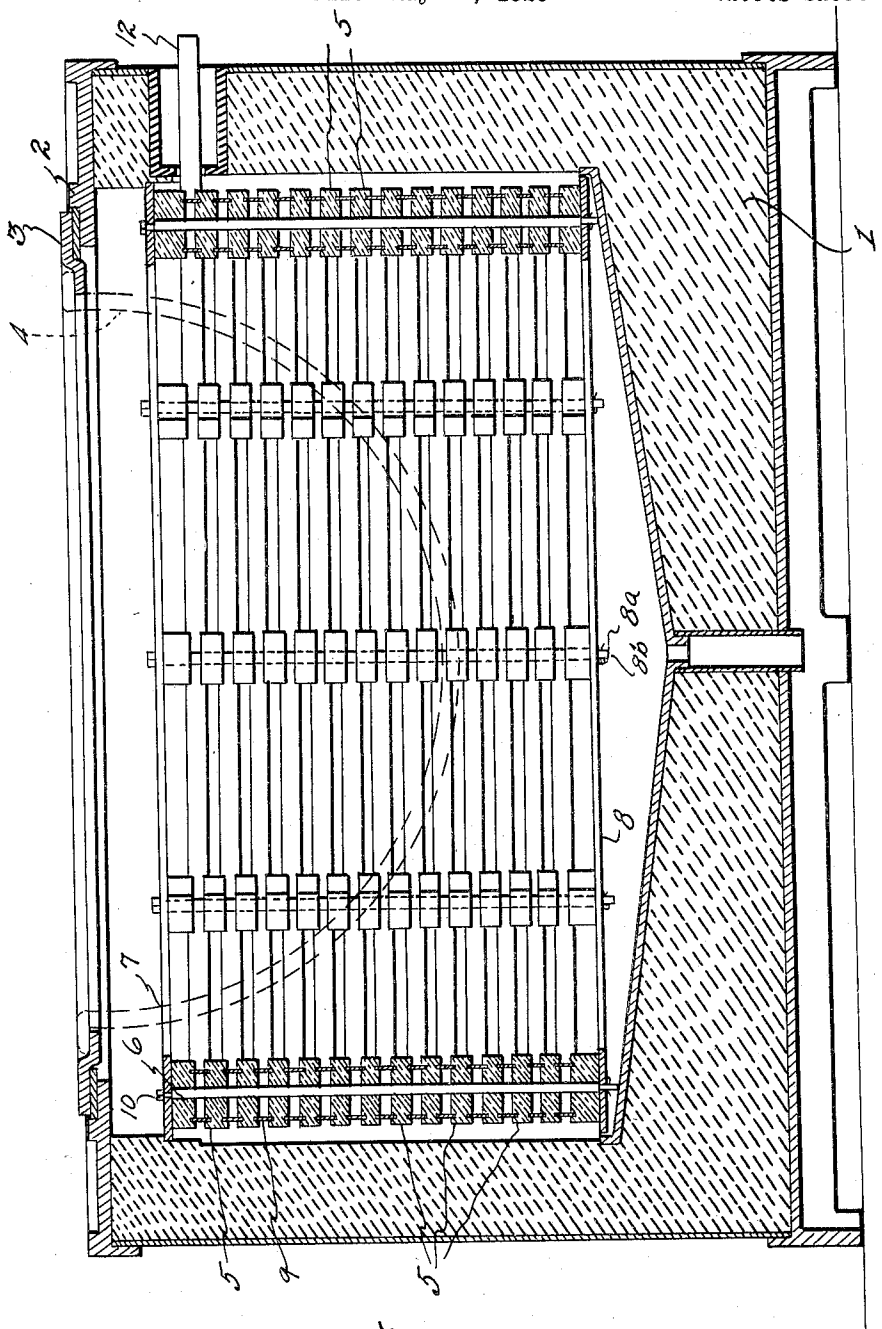


Fig. 5

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UNITED STATES PATENT OFFICE.

ALFRED RUCKSTAHL, OF DETROIT, MICHIGAN, ASSIGNOR TO HOLCROFT & COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

ELECTRIC HEATING DEVICE.

Application filed May 18, 1925. Serial No. 31,032.

This invention relates to electric heating devices such for instance as is used in electric furnaces, heat treating furnaces etc., and the object is to provide a new and unique means of mounting and carrying the resistance element.

A feature of the invention is in the arrangement of the insulators carrying the resistance element whereby more than the usual length of a continuous ribbon or wire may be utilized in a small space.

The heating element may be arranged in any desired form complemental to that of the furnace with which it is to be used, and I have shown the invention as used with an ordinary circular type of heating furnace.

A feature of the invention, irrespective of the actual shape of the furnace chamber, is in the arrangement of the various parts including the insulators and electrical resistance element so that the element is not rigidly held at any point permitting it to expand and contract and sufficient insulators are utilized whereby the successive turns of the element in the preferred arrangement are held out of contact between the successive turns of a coil or adjacent turns of parallel coils.

A feature of the invention is involved in the means for holding the coils to prevent warping or short-circuiting and in the means provided to enable the entire heating device to be readily introduced into or withdrawn from the furnace. These various objects and novel features of construction are hereinafter more fully described and claimed, and the preferred embodiment of my invention is shown in the accompanying drawings in which—

Fig. 1 is a plan view of the heating element in position in a furnace.

Fig. 2 is a side elevation of the heating element.

Fig. 3 is a cross section of a furnace and my improved heating element therewithin.

In the drawings I have shown the ordinary stereotype melting furnace, the heat insulating walls being indicated at 1 provided with a cap member 2, an adaptor 3 supporting the pot indicated by the dotted lines 4. Within this furnace wall, which is approximately circular in form, is provided my improved electrical heating device. This device consists of a series of insulating blocks 5, 5, 5 etc., centrally apertured and mounted on rods 6, 6, 6 etc. As shown in plan view there are a number of these rods arranged parallel with the furnace wall 1 and the top and bottom of the group is provided with a metal ring 7 and 8 respectively in which the rod ends are mounted and the whole forms a unit as indicated more clearly in Fig. 2.

These rods 6 have a shoulder and a threaded extension at the upper end to which the nut 10 is applied in holding the ring 7 and the rods are also shouldered at the bottom and have an extension of less diameter extending through apertures in the ring 8. Preferably a cotter pin 8^a is introduced through an eye provided in the lower extension 8^b of each rod holding the ring 8 in position. The insulating blocks 5 are formed on adjacent faces with a groove to engage opposite faces of the resistance element 9. The resistance element is here shown as being of ribbon form but it is to be understood that the element may be of any approved form in cross section and that the grooves of the insulating blocks will be altered to correspond to the shape of the resistance element. In any of the forms the upper and lower face of each turn of the element lie in the grooves of the respective adjacent blocks as will be readily understood and the rods provide a means whereby the blocks may be readily assembled. A sufficient number of rods are used so that the spaces between the rods are not sufficiently great to permit the unsupported resistance element therebetween to warp or bend to a degree to short circuit the adjacent turns of the two coils.

A feature of this invention is in the arrangement of the resistance element in parallel spiral coils having a common center and the term "coil" is used herein to refer to the arrangement of the element in spiral form irrespective of whether the form is truly circular, hexagonal, octagonal or other form as the case may be, the arrangement as to form being dependent entirely upon the form of the chamber of the furnace in which the heating device is to be utilized. It will be noted from the drawing that these coils are arranged in successive turns of a spiral form and the resistance element is assembled with the insulators by introducing the two opposite ends thereof in the two opposed

grooves of the two lowermost blocks on a rod and thence to grooves of the next pair of insulators on the succeeding rod. These insulators are placed in position as the two ends of the resistance element are moved in position as the two ends of the resistance element are moved forward from rod to rod of the group. This is continued until parallel coils of the desired length of axis are formed whereupon the two end portions are bent outwardly at different places to form terminals 11 and 12 extending through apertures provided in the furnace wall at the upper end of the coils. By the arrangement just described a resistance element of continuous length is formed in parallel coils having a common center and is supported and maintained in the assembled relation through use of the rings and the rods as heretofore described enabling the heating device to be handled as a unit but it is to be understood that these insulators are loose on the rods to enable the insulators to move more or less vertically and permit expansion of the heating element when current is applied thereto without breakage.

While I have described the resistance element as being in a continuous length the feature of holding the parallel coils in the insulators and in a cage consisting of rods and the end retainers or rings is not confined to use with a continuous length of resistance element. Any arrangement of the resistance element as to continuity may be utilized and is to be understood as being within the spirit and scope of this invention as set forth in the appended claims.

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

1. In an electric heating device, the combination with a chambered casing, of a heating element positioned therewithin of continuous length and arranged in a spiral coil, a frame therefor comprising a metal ring member at each end of the coil, rods extending between the said rings spacing the same, and insulator blocks supported by the rods and maintaining the successive turns of the coil in the desired spaced and insulated relation, the end of each coil extending through the casing providing a terminal for connection with a source of current supply.

2. In an electric heating device, an electric resistance element formed in a spiral coil, a series of insulators arranged in vertical groups about the coil, each insulator being positioned to support and space the successive turns of the coil, and means for securing the insulators and coil in said relation.

3. In an electric heating device, a chambered casing, an electric heating element arranged in a spiral coil therewithin having terminals extending through the exterior of the casing, a series of grooved insulating blocks, rods for holding the blocks in position engaging the successive turns of the coil to maintain the same in spaced and insulated relation.

4. In an electric heating device, a heating element consisting of a continuous length of electrical resistance element formed in parallel spiral coils, a series of rods between the coils, insulating blocks on the rods formed on adjacent faces to engage over the edge of the successive turns of the element, and a retainer at each end of the rods.

5. An electric heating device for electric furnaces having a chamber and comprising a heating element adapted and arranged to be introduced into or withdrawn from the furnace chamber as a unit comprising a continuous length of electrical resistance element arranged in parallel spiral coils, a series of rods in spaced relation parallel with the coil, a series of insulator blocks on each rod, the adjacent faces of which are grooved and engaging opposite faces of each turn of the resistance element, a retainer at each end of the rods, blocks on each of the rods providing in conjunction with the rods means for supporting the successive turns of the coils and holding the resistance element from displacement or warping to an extent to permit contact between adjacent turns of the two coils, the end of each coil providing a terminal for connection with a source of current supply.

6. In an electric heating device, an electrical resistance element arranged to form a pair of parallel coils having a common center, insulator members between successive turns of each coil engaging and holding the same, rods arranged between the coils, said insulators being supported on the rods, and retainer members secured to each end of the rods for maintaining the coils of the resistance element rods, and insulators in assembled relation permitting the same to be handled as a unit.

7. In an electric heating device, an electric resistance element arranged in spiral coils with parallel turns, insulator blocks positioned between successive turns thereof, said blocks each being formed in opposite sides to receive and support the upper and lower parallel turns of the coils, and means for securing the blocks in position.

8. In an electric heating device, the combination with a chambered casing open at the top, of an electric heating element consisting of a continuous length of electric resistance element arranged in a spiral coil, a series of insulator blocks arranged in groups about the coil supporting and maintaining the successive turns thereof in spaced relation, fastening means for securing the blocks and coil in said relationship, and a metal member at the upper end of the coil with which the fastening means is connected adapting the

device to be introduced into or removed from the casing as a unit.

9. In an electric heating device, an electric resistance element of continuous length arranged in a spiral coil, a ring like member at one end thereof, a series of insulator members arranged in groups in spaced relation about the coil, each insulator member being arranged to maintain a turn of the coil in spaced relation with adjacent turns and holding the same from distortion, and means for securing each group to the ring member, the whole providing a structure adapted to be handled as a unit.

10. In an electric heating device, an electric resistance element of continuous length arranged in a spiral coil, a ring like member at one end thereof, a series of insulator blocks arranged in vertical groups in spaced relation about the coil, a fastening means consisting of a rod for each of the said groups attached at one end to the ring member and supporting the coil and blocks in a substantially fixed relationship permitting the handling of the device as a unit.

In testimony whereof, I sign this specification.

ALFRED RUCKSTAHL.