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ELECTRIC RESISTANCE FURNACE

2,561,640

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2 Sheets-Sheet 1

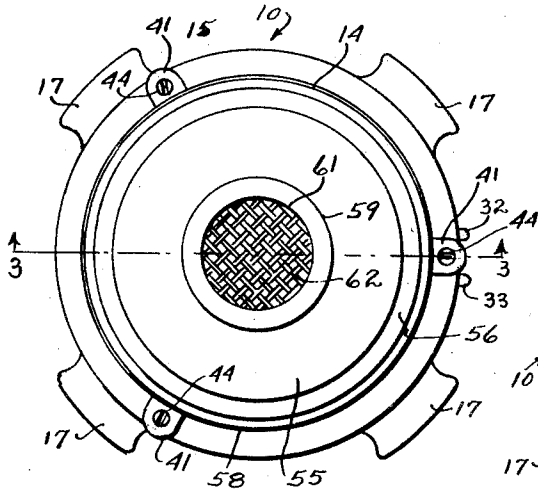


Fig. 1.

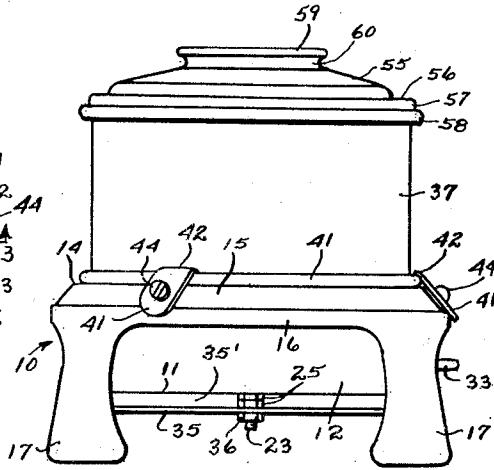


Fig. 2.

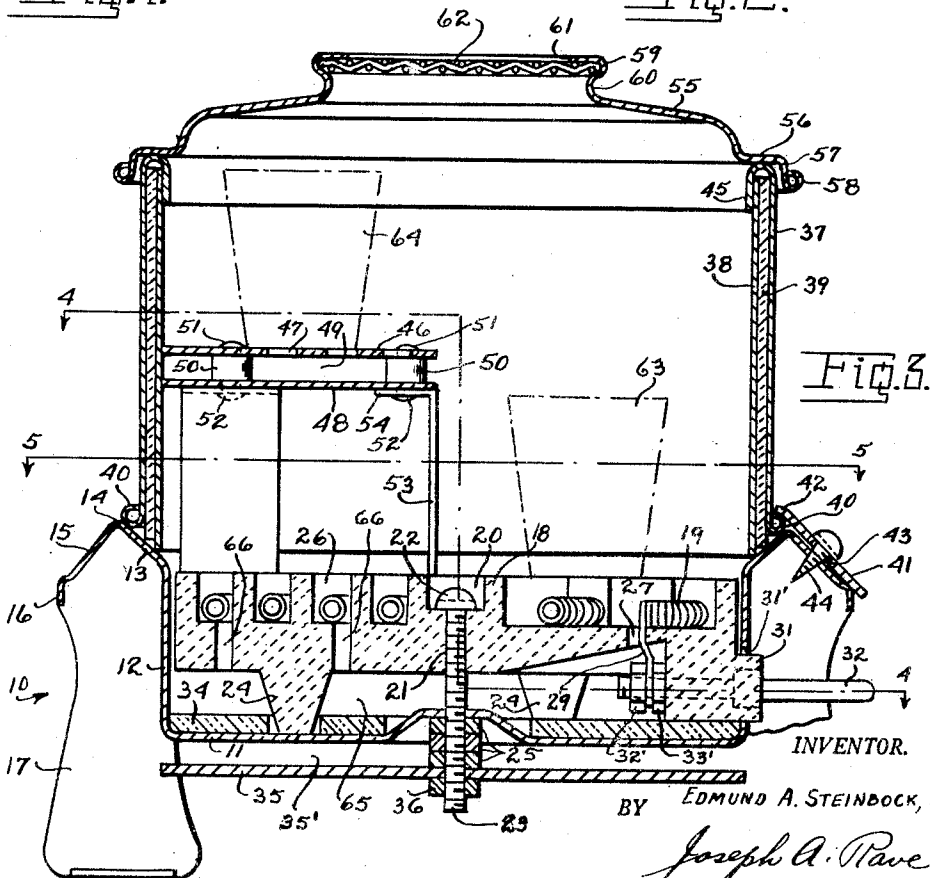


Fig. 3.

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'2 Sheets-Sheet 2

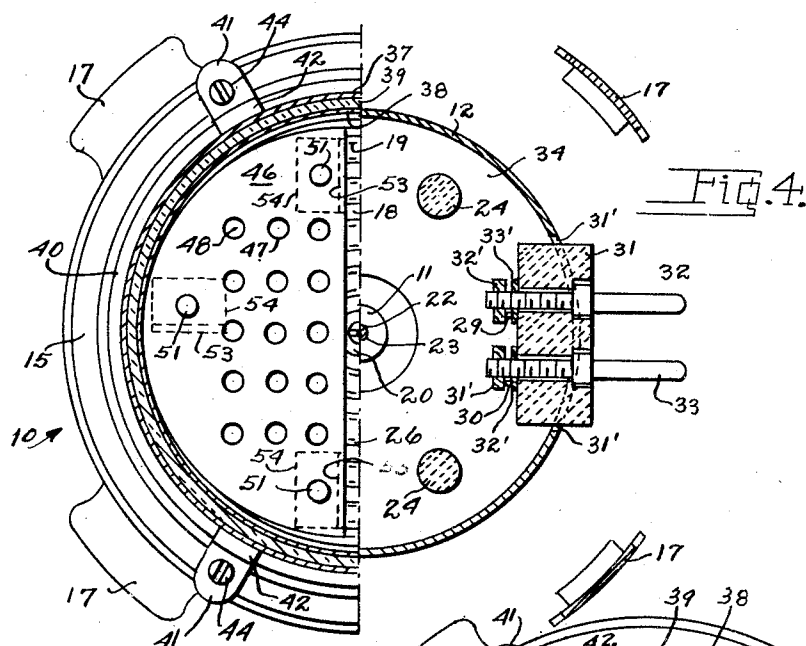


Fig. 4.

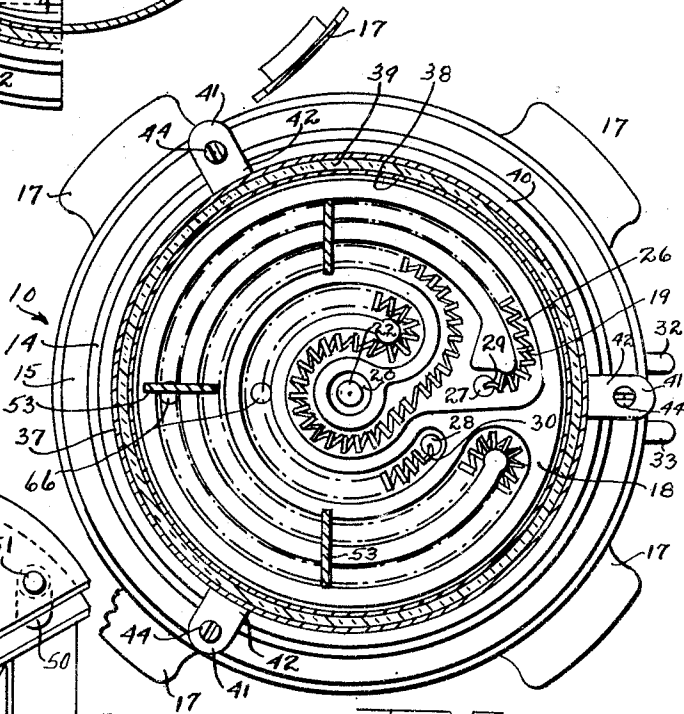


Fig. 5.

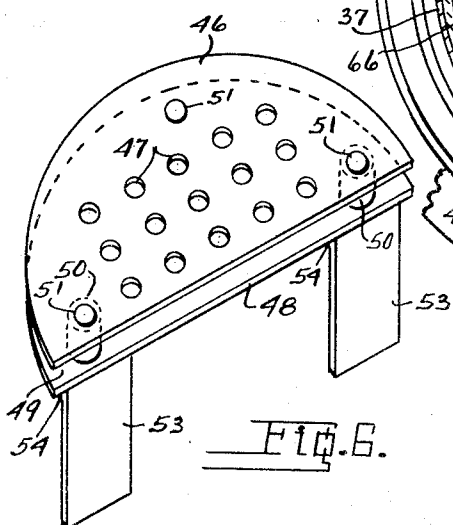


Fig. 6.

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ELECTRIC RESISTANCE FURNACE

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6 Claims. (Cl. 219—35)

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This invention relates to improvements in electric furnaces and particularly to burn-out furnaces as used in preparing cementitious refractory molds prior to the casting of metal therein.

Cementitious refractory molds are used in a number of arts, particularly in the making or casting of dental restorations. As is customary, a pattern of the casting is first made with said pattern formed of wax or other dissippable material with said pattern subsequently encased in a cementitious material generally composed of a binder, a filler and a thermal expanding agent to augment the inherent expansion of the binder. The mold after hardening is then placed in a furnace to dissipate or burn out the pattern and thereby provide the mold cavity. At the same time the mold is heated to substantially the pouring temperature of the metal to be poured therein which effects a thermal expansion of the mold to compensate for metal shrinkage from the molten to the solid state. The heating of the mold also eliminates all water and moisture from the mold prior to the pouring therein of the molten metal.

Some molds are to be heated to a temperature of around 1200° F. while others are heated to a temperature of around 900° F. In order to control such temperatures in a given furnace it would be necessary to provide a current metering mechanism which would result in the pricing of a furnace for accomplishing this purpose beyond the reach of dentists and the like.

It is, therefore, the principal object of the present invention to provide a furnace so designed and arranged as to automatically give mold temperatures of 1200° F. and 900° F. so that, if desired, molds may be simultaneously burned out at these temperatures.

Another object of this invention is the provision of a small burn-out furnace of the radiant heat type that is simple of construction yet efficient in operation.

A further object of this invention is the provision of a furnace to accomplish the above objects that requires no attention but the mere act of turning on the current to automatically obtain given mold temperatures such as those set forth above.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification considered in conjunction with the accompanying drawings forming a part thereof and it is to be understood that any modifications may be made in the exact structural details there shown and described,

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within the scope of the appended claims, without departing from or exceeding the spirit of the invention.

In the drawings:

5 Fig. 1 is a top plan view of an electric furnace embodying the principles of the present invention.

Fig. 2 is an elevational view of the furnace of Fig. 1.

10 Fig. 3 is an enlarged vertical sectional view through the furnace as seen from line 3—3 on Fig. 1.

Fig. 4 is a staggered horizontal sectional view on a slightly smaller scale through the furnace 15 as seen from line 4—4 on Fig. 3.

Fig. 5 is a horizontal sectional view on a slightly smaller scale as seen from line 5—5 on Fig. 3.

Fig. 6 is a perspective view of a means for supporting a mold in the furnace to burn out 20 same at a given temperature below that normally attained in the furnace.

Throughout the several views of the drawings similar reference characters are employed to denote the same or similar parts.

25 The furnace of the present invention comprises a base or supporting member 10 having a cup or bowl portion including a bottom 11 from the perimeter of which upstands sides 12 terminating in an outwardly, upwardly flaring flange 13. The flange 13 in turn terminates in a bead 14 30 from which outwardly and downwardly projects a flange 15 terminating in a depending apron 16. At equally spaced points on the apron 16 are supporting legs 17 which project below the bowl bottom 11. The number of legs 17 is a matter 35 of choice there being four shown in the example illustrated in the drawings.

Within the bowl 11 is a refractory element or brick 18 adapted to receive and support the heating element 19 shown in the drawings as the usual electric resistant wire. The brick 18 is provided substantially at its center with a recess 20 from which extends an aperture 21. The 40 recess 20 is adapted to receive the head 22 of a bolt 23 that passes through the aperture 21 of the brick 18 for securing said brick in position. The brick 18 is provided with supporting bosses 24 which rest on the bowl bottom 11 for 45 thereby elevating the brick above said bottom. In order to secure the brick in operative position lock nuts 25 are employed on the bolt 23 to engage the bowl bottom 11 exteriorly thereof and secure the brick in position between said lock nuts 25 and bolt head 22.

50 The brick 18 has let into it through its upper

surface a series of channels 26 for the most part concentric of one another and forming a continuous channel from approximately point or aperture 27, formed through the brick, to the point or aperture 28, likewise formed through the brick, and through which apertures 27 and 28, respectively, extend ends 29 and 30 of the heating element or electric current resistance wire 19. It should be noted that the turns or coils of the wire 19 are judiciously spaced from one another so that a substantially uniform heat is radiated from all points on the surface of the brick 18 which constitutes the effective bottom of the furnace. In other words the coils of the heating element or wire 19, where they are forced to make sharp turns are further spaced from one another than where the arc is less severe since the closer the turns or coils are to one another the greater the heat radiation at that point.

The brick 18, see Figs. 3 and 4, has projecting from its underside at one point a block 31 in which is secured a pair of studs 32 and 33. The block 31 projects through an opening in the base or bowl wall to be exteriorly thereof to afford access to the studs on pins 32 and 33. The opening in the base or bowl wall is somewhat greater than the size of the block 31 thereby providing a space 31' around the said block, see Figs. 3 and 4, the purpose of which space 31' will be later made clear. The studs 32 and 33 are adapted to be connected with the usual electric appliance cord which extends from a current source. The inner ends of the studs 32 and 33 have respectively connected with them, through nuts 32' and 33', the ends 29 and 30 of the heater element or wire 19.

In order to protect the surface supporting the furnace, the bowl bottom 11 has disposed thereon interiorly of the bowl a heat resisting layer 34, generally, a sheet of asbestos. To further protect the said supporting surface there is provided a baffle plate 35 conveniently attached to the bolt 23 by means of a nut 36 that clamps the said baffle plate between itself and the lock nuts 25 thereby providing an air insulating space 35' between the baffle plate 35 and bowl bottom 11.

The body of the furnace comprises a pair of concentric cylinders 37 and 38 spaced from one another with a layer of heat insulation, asbestos for example, 39 between the said cylinders. The furnace body, cylinders 37 and 38 and heat resisting material 39, are supported on the base member flange 13, see Fig. 3, with said outer cylinder 37 having its lower edge rolled to form a bead 40. The bead 40 is conveniently utilized as the means for clamping the furnace body to the base, as will presently be described, although any other suitable or desirable means may be employed for attaching these parts to one another.

The specific attaching means illustrated in the drawings comprises a plurality of clamping plates 41 each having its inner end arced as at 42 to overlie and conform with bead 40. Substantially centrally of each of the clamp plates there is provided an aperture 43 through which projects a sheet metal screw 44, the screwing home of which forces the clamp plate 41 into engagement with the bead 40 tending to clamp the said bead against the base flange 13 all as is obvious from the disclosure in Fig. 3.

The clamping of the furnace body outer cylinder 37, through an integral inwardly turned flange 45, at the upper end of said outer cylinder

37, automatically forces the inner cylinder 38 and heat resisting material 39 against the flange 13.

Interiorly of the furnace is a removable shelf or support comprising a supporting shelf or plate 46 having a plurality of apertures 47, see Figs. 3, 4 and 6, therein. Beneath the shelf 46 is a baffle plate 48 of the same area as the shelf 46 but imperforate which acts as a baffle between the heating element and the shelf 46. The shelf 46 and baffle plate 48 have provided between them an air space 49 afforded by a plurality of shouldered studs 50 which have their ends projecting through the shelf 46 and plate 48 to be upset as riven heads 51 and 52. The portion of the studs 50 which projects below the baffle plate 48 is employed for a dual purpose, namely, that of attaching to the removable shelf or support legs 53. As illustrated in the drawings use is made of three legs 53 each of which has its upper end upset and inwardly projecting, as at 54, to provide means for attaching the legs to the shelf or support. As seen in Figs. 3 and 5, the legs 53 have considerable width whereby they may span the channels 26 in the brick 18 in order to firmly support the removable shelf.

The upper end of the furnace body is closed by a removable cover 55 which has, near its periphery, a relatively flat radially projecting portion 56 that rests on the upper end, or inturned flange 45 of the furnace body, with said radially projecting portion 56 terminating in a depending flange 57 which has its free end rolled on itself as a bead 58. The cover 55 has centrally thereof an upstanding portion 59 connected with the cover 55 by a reduced neck portion 60 which forms a convenient means to be gripped by a pair of tongs or the like in removing the cover from the furnace. The upstanding portion 59, of the cover, is centrally apertured, as at 61, with the opening through said aperture guarded by a wire screen or the like 62 that prevents foreign materials from being inadvertently inserted within the furnace.

As was noted above the furnace of the present invention is intended for burning out cementitious molds, particularly, those used by dentists and the like. One such mold, indicated by the reference character 63, is illustrated in phantom lines as supported on the brick 18, or the floor of the furnace, while a second such mold, indicated by the reference character 64 and illustrated in phantom lines, is illustrated as supported on the removable shelf or support 46. These molds in being dried out and in having the patterns therein dissipated, give off smoke, fumes, steam, and the like, which is discharged from the furnace through the opening 61 in the removable cover 55. In order to assist in this discharge from the furnace the space 65, between the lower surface of the brick 18 and upper surface of the heat insulation layer 34, is connected with the atmosphere through the space or opening 31' around the terminal block 31 and is further connected with the interior of the furnace through judiciously placed apertures, such as 66, see Fig. 3, through the brick 18. By this construction there is provided a circulation from the atmosphere through opening 31', space 65, apertures 66, 27 and 28, interior of the furnace, and cover opening 61 back to the atmosphere.

It has been found that the temperature within the mold 63 after approximately forty minutes, starting with a cold furnace, is 1200° F. and which temperature within the mold is maintained until

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the current to the heating elements or wire 19 is turned off. It has also been found that the temperature within the mold 64 after approximately forty minutes from the turning on of the current is 900° F. and which temperature is then maintained until the current is shut off. It is understood that the amount of heating element or resistance wire 19 if varied would increase or decrease the said mold temperatures depending upon whether the wire was lengthened or shortened. It is also understood that the amount of opening 61 in the cover 55 bears a relation to the heat input but in all cases the temperatures in the molds 63 and 64 have a definite proportion to one another whereby molds that may be burned out at different temperatures can be simultaneously burned out in the same furnace or if desired the support or shelf 46 removed from the furnace and a plurality of molds placed on the brick 18 or furnace floor and each burned out at the higher temperature or molds may be burned out solely on the shelf or support 46 at the lower temperature.

From the foregoing, it is believed now evident that there has been provided a radiant heat furnace that may be employed, simultaneously, for use at two different specific heats and which heats are automatically attained and in which the furnace is of extremely simple construction for replacement of parts as desired. In other words the body portion of the furnace may be removed by simply opening or releasing the clamp plates 43 after which the brick 18 may be removed by simply removing the bolt 43 and these parts replaced if desired and particularly should a heating element or resistance wire burn out or break.

What is claimed is:

1. In a radiant heat furnace for subjecting material to a heat treatment comprising a base including a bowl, an electrical radiant heating element within the bowl, a refractory support for the heating element serving also as the floor for the furnace on which material is supported, and a removable support on said furnace refractory floor for supporting additional material above said furnace refractory floor, comprising a perforated supporting shelf, an imperforate baffle an appreciable distance in spaced relation below said shelf, and means for securing said shelf and baffle to one another in said spaced relation and supporting the same above the furnace refractory floor.

2. In a radiant heat furnace for subjecting material to a heat treatment comprising a base including a bowl, an electrical radiant heating element within the bowl, a refractory support for the heating element serving also as the floor for the furnace on which material is supported, a removable support on said furnace refractory floor for supporting additional material above said furnace refractory floor, comprising a perforated supporting shelf, an imperforate baffle an appreciable distance in spaced relation below said shelf, means for securing said shelf and baffle to one another in said spaced relation and supporting the same above the furnace refractory floor, said furnace having an open upper end, a removable cover for closing the furnace and having a ventilating discharge therethrough, and means for affording a circulation through the furnace to the ventilating discharge.

3. A radiant heat furnace for subjecting a pair of molds each to a different internal heat comprising a housing base including a bottom and a bowl, a furnace body upwardly of said base,

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a refractory within said bowl forming the floor of the furnace body chamber for supporting a mold, an electrical radiant heat element associated with said refractory for delivering a given amount of heat, a support for a second mold within the furnace body remote from the furnace refractory floor and its heating element, and a ventilated cover for the furnace body above the molds, said second mold remote support being removable from the furnace body and comprising a shelf and depending legs supported on the said furnace refractory floor.

4. A radiant heat furnace for subjecting a pair of molds each to a different internal heat comprising a housing base including a bottom and a bowl, a furnace body upwardly of said base, a refractory within said bowl forming the floor of the furnace body chamber for supporting a mold, an electrical radiant heat element associated with said refractory for delivering a given amount of heat, a support for a second mold within the furnace body remote from the furnace refractory floor and its heating element, and a ventilated cover for the furnace body above the molds, said second mold remote support comprising a perforated shelf, an imperforate baffle below the shelf, means for securing the perforated shelf to the imperforate baffle, and legs secured to and depending from the baffle to the refractory for support thereby.

5. A radiant heat furnace for subjecting a pair of molds each to a different internal heat comprising a housing base including a bottom and a bowl, a furnace body upwardly of said housing base, a refractory within said bowl forming the base of the furnace for supporting a mold, means supporting the furnace refractory base upwardly of the housing base bottom with a space therebetween an electrical radiant heat element associated with said refractory for delivering a given amount of heat, a support for a second mold within the furnace body remote from the refractory and its heating element, a ventilated cover for the furnace body above the molds, and means for including ducts through the furnace base into the space between the housing base bottom and the furnace refractory base and ducts through said furnace refractory base effecting a circulation past the heating element through the furnace body and ventilated cover.

6. A radiant heat furnace for subjecting a pair of molds each to a different internal heat comprising a housing base including a bottom and a bowl, a furnace body upwardly of said housing base, a refractory within said bowl forming the base of the furnace for supporting a mold, means supporting the furnace refractory base upwardly of the housing base bottom with a space therebetween an electrical radiant heat element associated with said refractory for delivering a given amount of heat, a support for a second mold within the furnace body remote from the refractory and its heating element, a ventilated cover for the furnace body above the molds, means for including ducts through the furnace base into the space between the housing base bottom and the furnace refractory base and ducts through said furnace refractory base effecting a circulation past the heating element through the furnace body and ventilated cover, said base bowl including a bottom, heat insulation between the housing base bottom and furnace refractory base filling a portion of said space between said housing base bottom and furnace refractory base, and

a baffle secured to, in spaced relation, below the said housing base bottom.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 14,730	Maves	Sept. 30, 1919

Number	Name	Date
1,050,105	Copeman	Jan. 14, 1913
1,479,951	Bjornstad et al.	Jan. 8, 1924
1,526,369	Pollard	Feb. 17, 1925
1,661,464	Campbell	Mar. 6, 1928
1,834,353	Shoudy	Dec. 1, 1931
1,926,344	Meyer	Sept. 12, 1933
1,986,088	Wild	Jan. 1, 1935
2,221,595	Lockwood	Nov. 12, 1940