# United States Patent [19]

**Lee**

[11] **3,790,749**

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[54] **ELECTRIC LEAD POT WITH INCREASED EFFICIENCY**


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[52] **U.S. Cl.** ..... **219/424**, 219/421, 219/425, 219/436, 219/521

[51] **Int. Cl.** ..... **F27b 14/06**

[58] **Field of Search** ... 219/406, 407, 420, 421, 423, 219/424, 425, 426, 427, 429, 433, 434, 436, 521; 13/22



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[57] **ABSTRACT**

An electrically heated lead melting device includes a thin steel pot disposed within a bright aluminum housing of high reflectivity, with a substantially dead air chamber therebetween. An electric heating coil surrounds the pot within the chamber, with the straight cold ends of the coil passing horizontally into a control box mounted on a base. A single screw and the said coil ends provide the sole support for the pot-housing assembly, which is disposed substantially above the base. The control box may contain suitable temperature regulation mechanism. The construction provides a minimum of contact between the box and base, as well as providing for upward movement of cooling air through the box.


**4 Claims, 5 Drawing Figures**

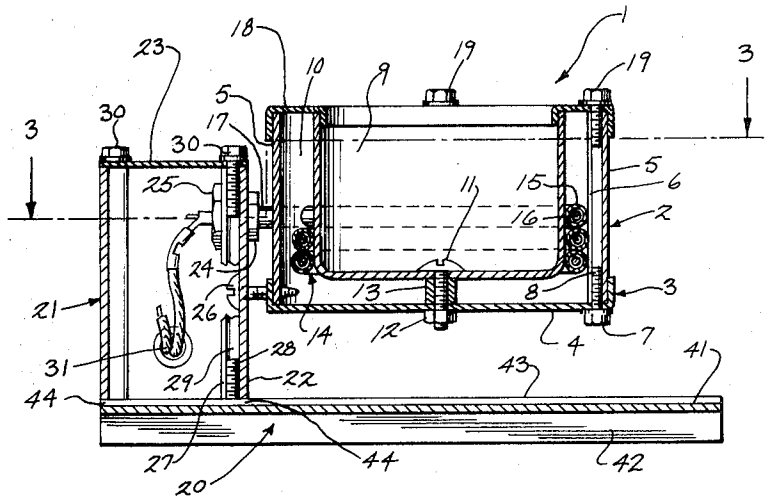


Fig. 1

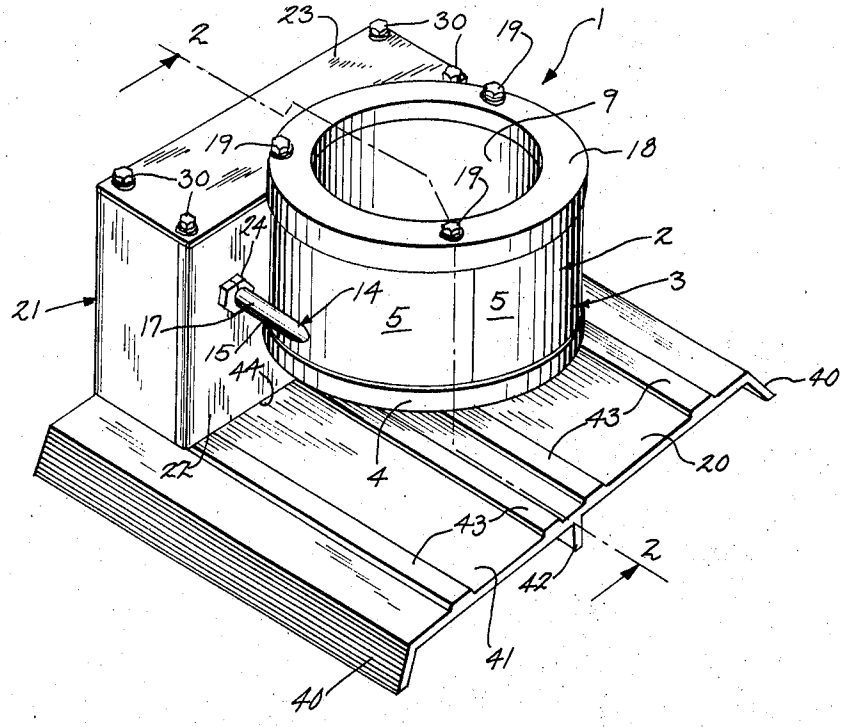

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Fig. 2

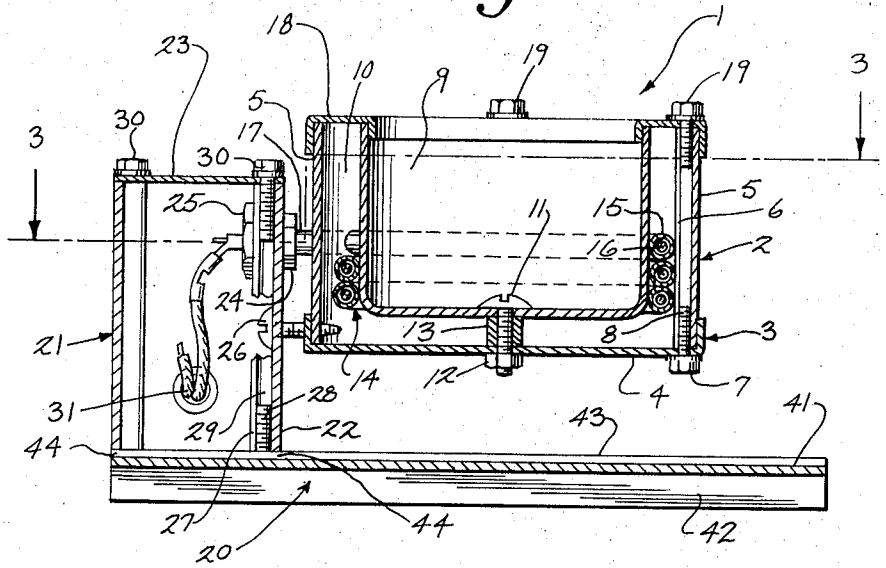

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Fig.3

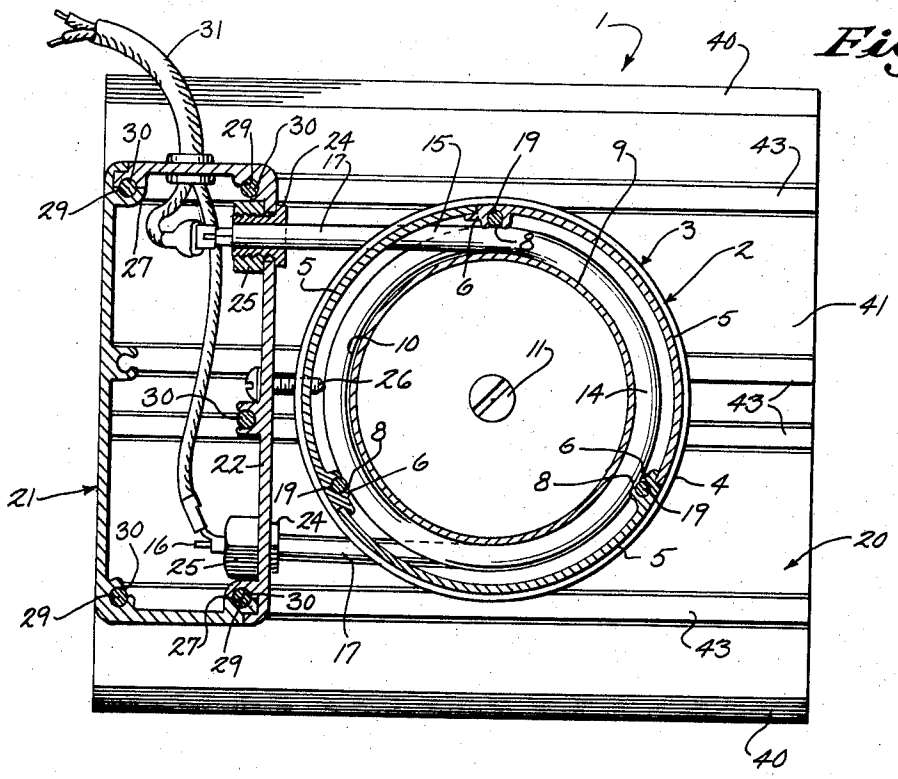



Fig.4

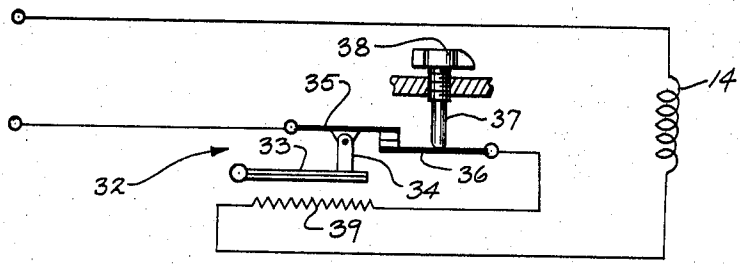
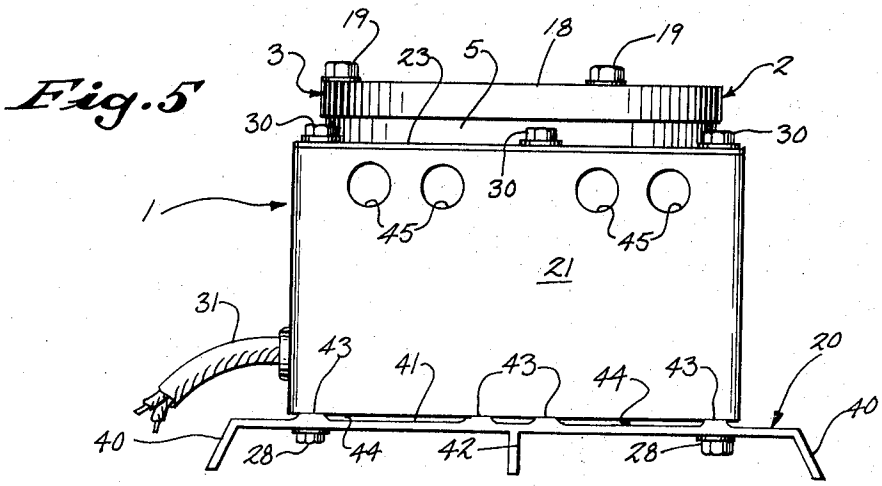



Fig.5



# ELECTRIC LEAD POT WITH INCREASED EFFICIENCY

## BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to electrically heated metal melting pots, which may be used for melting any suitable metal such as alloys of lead, tin and antimony, For convenience, the specification and claims will refer to "lead pots" and "lead," although the invention is not limited to these.

Heretofore, most such pots have been of heavy cast iron construction, with optional insulation comprising asbestos, fiber glass and the like. Such pots have been cumbersome, due to their large mass. In addition, they have been relatively inefficient and required a long melt time while consuming large amounts of electrical energy.

The lead pot device of the present invention solves all of the aforementioned problems and provides a structure which is surprisingly efficient in operation as well as being light in weight.

Broadly in accordance with the invention, the device is constructed to reduce heat conduction and outward radiation to a degree never before accomplished, to the knowledge of the inventor. Not only is the pot effectively isolated from its controls and support, so that very little conduction can take place; but also the construction provides for reflection of heat back to the pot walls.

More specifically, an electrically heated lead melting device includes a thin steel pot disposed within a bright aluminum housing of high reflectivity with a substantially dead air chamber therebetween. An electric heating coil surrounds the pot within the chamber, with the straight cold ends of the coil passing horizontally into a control box mounted on a base. A single screw and the said coil ends provide the sole support for the pot-housing assembly which is disposed substantially above the base. The control box may contain suitable temperature regulation mechanism. The construction provides a minimum of contact between the box and base, as well as providing for upward movement of cooling air through the box.

## DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the best mode presently contemplated by the inventor for carrying out the invention.

In the drawings:

FIG. 1 is a perspective view of a lead pot device constructed in accordance with the invention;

FIG. 2 is a longitudinal section taken on line 2—2 of FIG. 1;

FIG. 3 is a horizontal section taken on line 3—3 of FIG. 2;

FIG. 4 is a schematic circuit diagram of a form of heater control; and

FIG. 5 is a rear elevation of the device.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the drawings, the lead pot device 1 includes a heating assembly 2 for melting lead from a solid to a liquid state. Assembly 2 comprises an outer housing 3 having an upwardly flanged base wall 4 which supports a multi-sectioned side wall 5. The sections of wall 5 are held together by cooperative elongated vertical key members 6 and lower screws 7 passing through base 4 and threadably received within elongated slots 8 disposed parallel to members 6.



A cup-like lead pot 9 of very thin wall steel is disposed within housing 3 for receiving lead, and is spaced substantially from the housing walls forming a chamber 10. Pot 9 is free of direct engagement with housing 3, but is supportingly connected to base 4 in a manner to provide for very limited heat conduction from the pot to the housing. For this purpose, a bolt 11 extends downwardly through the pot bottom and housing base, with a suitable tightening nut 12; and a spacer 13 is disposed on bolt 11 between said bottom and base.

The structure provides means within chamber 10 to heat pot 9. For this purpose, an insulated electric heating coil 14 comprising an outer steel sheath 15 enveloping a heating wire 16 of nicrome or the like, is closely disposed about pot 9. The straight ends 17 of coil 14 are rigid and are at slightly different vertical levels and extend horizontally outwardly through small apertures in housing side wall 5.

A downwardly flanged ring 18 encloses the top of chamber 10 and joins housing 3 and pot 9. The securement is by screws 19 received within the upper ends of slots 8.

Heating assembly 2 is adapted to be disposed a substantial distance above and free of a supporting base 20. For this purpose, an upwardly extending control box 21 is mounted on base 20 in a manner to be described, and is provided with a side wall 22 and cover plate 23. Coil ends 17 extend horizontally through wall 22 and are fastened within box 21, as by bushings 24 and nuts 25. In addition, a horizontal screw 26 extends through and between the box side wall 22 and the lower portion of heating assembly side wall 5, including the flanged portion of base 4. Assembly 2 is thus spaced horizontally from box 21, and is provided with a three point support comprising the coil ends 17 and screw 26.

Box side wall 22 is also shown as being multi-sectioned, with sections being held together by cooperative elongated corner key member 27 and screws 28 passing through base 20 and threadably received within elongated slots 29 disposed parallel to keys 27. Cover plate 23 is secured to the box by screws 30 passing downwardly into the upper portions of slots 29.

The control for heating coil 14 may be of several types. In the simplest arrangement, shown in FIG. 3, coil 14 may be connected directly to the power cord 31 in box 21 and will be of such wattage that it will automatically maintain the desired lead melt temperature without the need for a thermostat. That is, coil 14 will lose as much heat energy as it receives and will reach a point of equilibrium at the desired temperature. A wattage factor of 275 has been found to be satisfactory with the present device.

In some instances, a thermostatic control remote from assembly 2 may be desirable. As shown schematically in FIG. 4, a thermostat 32 is provided in box 21 and comprises a bi-metallic element 33 pivoted at one end and connected through a connector member 34 to a movable switch portion 35. The other switch portion 36 is infinitely and selectively controlled through a desired range by a probe 37 which is vertically adjustable

by a knob **38.** The switch is connected in the line with coil **14.**

It has been found that thermostats which are in direct contact with the high heat of a lead pot are short-lived. Therefore, and in accordance with one aspect of the invention, the thermostat is remote from assembly **2,** and is responsive to a combination of the temperature of the ambient relatively cool air within box **21** and the thermostat's own internal heater. For this purpose, a heater such as a resistance element **39** is placed in series with the control switch. Thus, thermostat **32** is only partially responsive to heat emanating from assembly **2.**

One of the major aspects of the invention is the substantially improved isolation of lead pot **9** from the remaining structure, thus remarkably increasing the efficiency of the unit. In accordance with this aspect of the invention, housing **3** is constructed of bright aluminum which has the characteristic of having a very low coefficient of radiation, while having a very high reflectivity. A very high proportion of heat radiated outwardly from pot **9** will be reflected back thereto by the highly reflective bright aluminum inner surface of the housing walls. Furthermore, bolt **11** and spacer **13** will permit only a very small amount of heat conduction. In addition, the air in chamber **10** acts as an insulating blanket. Also the small amount of heat which may radiate outwardly from the walls of housing **3** will be substantially dissipated, due to the spacing between assembly **2** and box **21** as well as base **20.**

Base **20** and box **21** are preferably of the same material as housing **3.**

Conduction of heat between assembly **2** and control box **21** can only occur through sheaths **15** of the two straight coil ends **17** which are designed to be cold (not heated by wire **16**) and screw **26.** Since sheath **15** and screw **26** are very small relative to the overall device, conduction is held to a minimum due to the small contact area.

It is important that base **20** does not heat up so that it damages the table it is resting on and/or becomes dangerous to touch. The reduction of radiation to base **20** from assembly **2** has been dealt with above. Furthermore, means are provided to reduce transfer of heat by conduction through control box **21** to a minimum. For this purpose, base **20** is provided with angled longitudinal edges **40** which raises the primary planular upper surface **41** above the supporting table. If desired, one or more longitudinal strengthening ribs **42** may extend downwardly along the base. As shown, surface **41** has a plurality of narrow longitudinal raised ribs **43.** The control box side walls **22** are disposed transversely across and sit on ribs **43** thereby forming air inlet slots **44** at least along two sides of the bottom of the box. A plurality of air discharge vent holes **45** adjacent the top edge portion of side wall **22** cooperate with slots **44** to create upward air convection through the box to cool it as well as thermostat **32.** In addition, there is only limited contact between the box walls and ribs **43.** These two factors serve to further isolate base **20** from assembly **2.**

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

**1.** A lead pot comprising:

a. a pot for receiving lead to be melted and having side and bottom walls,

b. a housing having side and bottom walls disposed in spaced relation from the respective walls of said pot and forming a chamber therebetween,

c. an insulated electric heating coil surrounding said pot in said chamber and with said coil having horizontally disposed straight cold rigid end portions extending through said housing,

d. said housing being constructed of a material of high heat reflectivity with a bright inner surface for reflecting heat which has radiated outwardly from said pot back to said pot,

e. a base,

f. a box having a vertical wall mounted on said base,

g. a connector member extending between said housing and said vertical wall,

h. means connectively mounting said rigid end portions to said vertical wall,

i. said connector member and rigid end portions carrying said housing substantially above and free of said base and spaced from said box and providing the sole means for conduction of heat between said pot and said box to thereby substantially isolate them from each other.

**2.** In the lead pot of claim **1,** means for substantially reducing heat conduction between said box and said base, said last-named means comprising:

a. a plurality of narrow raised ribs on said base,

b. said box being mounted transversely across said ribs to provide minimum box-to-base contact.

**3.** In the lead pot of claim **1:**

a. a plurality of raised ribs on said base,

b. said box being mounted transversely across said ribs and forming therewith cooling air inlet slot means,

c. and vent means in the upper portion of said box for discharging air rising by convection through said box.

**4.** In the lead pot of claim **3:**

a. thermostatic control means for said heating coil and disposed remote from said housing and within said box,

b. said control means being only partially responsive to heat received from said lead pot and being cooled by said rising air.

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