

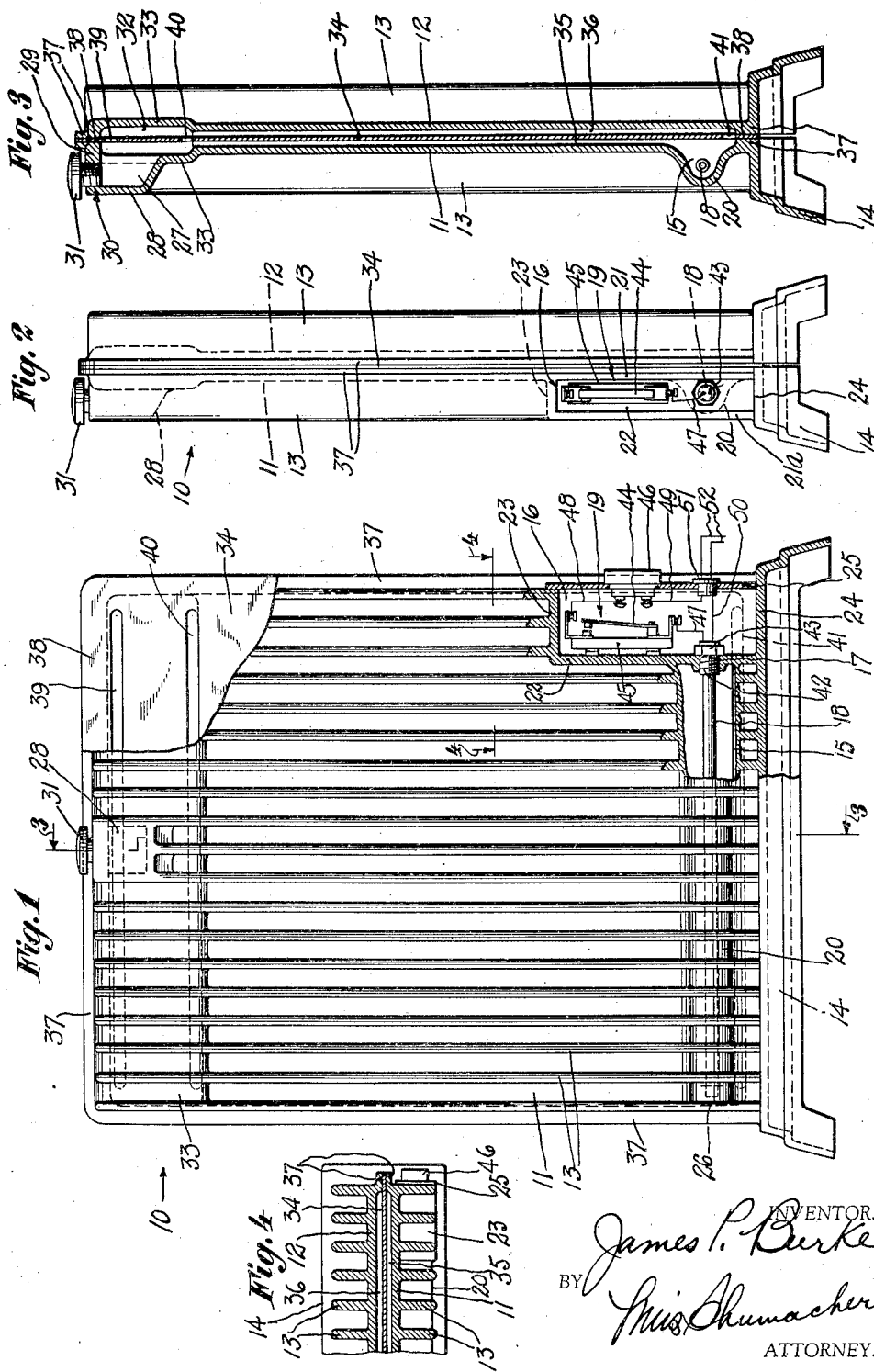
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HEATER

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HEATER

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This invention relates to devices such as heaters, radiators and the like, applicable for house heating and industrial use, and has particular reference to unitary or self contained heating systems, of a small and compact character, and which may be portable in nature and also to a method of heating.

One object of the invention is to provide a device of the character described, which is of particularly simple and compact construction and arrangement, and which is adapted to function with a high degree of efficiency.

Another object of the invention is the provision of an improved device of the nature set forth having relatively few and simple parts and which is rugged, durable and reliable in operation.

Another object of the invention is to furnish an improved radiator or heat transmitting means which may consist of castings which do not require the use of cores in the molding of the castings; and also to arrange such radiator with a plurality of compartments by the employment of a simple intermediate means in improved association with members at the sides thereof.

Another object of the invention is to provide a device of the type mentioned wherein means for imparting heat to the liquid is located within the radiator or heat containing casing in an improved manner.

Another and general object of the invention is the provision of a device of the class alluded to which shall be in the nature of an improved heater which functions with a relatively high temperature and nevertheless with little or no pressure; a supplemental object being to provide the means whereby the pressure is maintained at a constant low point, while the temperature may be varied within a considerable range; and in which device the heat source may be electrical and in improved coordination to produce a particularly simple, compact, and fool-proof device.

Another object of the invention is to provide an improved sanitary and healthful method for house heating, such that a radiator smaller than usual may be employed, and which will operate with a higher degree of rapidity and offer a wider range of temperature control, and which will afford greater economies and conveniences than heretofore obtainable.

Other objects and advantages of the invention will become apparent as the specification proceeds.

With the aforesaid objects in view, the invention consists in the novel combinations and arrangements of parts hereinafter described in their

preferred embodiments, pointed out in the subjoined claims, and illustrated in the annexed drawing, wherein like parts are designated by the same reference characters throughout the several views.

In the drawing:

Figure 1 is a view in side elevation of a device embodying the invention, with parts removed to show the construction.

Fig. 2 is a view in end elevation thereof with a cover plate removed.

Fig. 3 is a vertical sectional view taken on the irregular line 3—3 of Fig. 1.

Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 1.

The advantages of the invention as here outlined are best realized when all of its features and instrumentalities are combined in one and the same structure, but, useful devices may be produced embodying less than the whole.

It will be obvious to those skilled in the art to which the invention appertains, that the same may be incorporated in several different constructions. The accompanying drawing, therefore, is submitted merely as showing the preferred exemplification of the invention.

Generally described, the invention provides a radiator consisting of a pair of side plates and an intermediate plate, the side plates having external fins and having marginal abutment with the intermediate plate along the edges at opposite faces thereof according to an arrangement whereby compartments are provided on opposite sides of the intermediate plate, which compartments are filled with glycerine and intercommunicate for circulation of the glycerine in response to heat imparted thereto by an electrical resistance coil located in one of the compartments, so that a rather high temperature is obtainable, up to 500° F., without any boiling of the glycerine, the low pressure thus prevailing being further assured by the use of a temperature control, whereby the joints between the different plates may be of such character as not to require a high degree of tightness, so that an especially inexpensive structure is obtained having the numerous advantages hereinafter mentioned.

Referring in detail to the drawing, 10 denotes a device embodying the invention. The same may be illustratively exemplified in a radiator for house heating purposes, although the device is applicable for many different uses.

The device may include a pair of side sections, walls or plates 11, 12, each of which is substan-

tially plane throughout, and provided on the outside with a plurality of fins which extend preferably vertically and substantially from top to bottom of the plates. Each plate may have a base or anchor portion 14 which is in the nature of a downward extending flange, the flanges 14 for the different side plates cooperating to provide a boxlike base adapted to rest on the floor for supporting the radiator.

The plate 11 may have an internal recess portion 15 near the lower part and extending horizontally thereof, and an external recess 16 at an end of the plate and adapted to communicate with the internal recess through a closable opening 17. Thus, as hereinafter described, a heating element 18 may be removably longitudinally inserted into the internal recess 15 through the external recess, and the latter containing a temperature control 19 for regulating the heating element. The recess 15 may be considered internal in the sense that it is in full open continuous communication with the inner face of the plate 11, and it may be formed by outwardly concaving the plate 11 as shown at 20. The recess 16 has its inner side wall 21 constituting a plane continuation of the plate 11, and likewise includes a wall 22, and top and bottom walls 23, 24, respectively, as well as an outer wall 21a, to afford a box like structure. The latter opens outward, toward an end of the plate 11, so that the recess 16 may be termed external. It may, if desired, be closed by any cover plate 25 removably attached thereto in a suitable manner. The wall 22 may also form a closure for the adjacent end of the recess 15, the opposite end of which may be closed by a wall portion such as 26. The fins 13 adjacent to the box 16 may terminate thereat, and the portions of the fins at the concave wall 20 may be correspondingly reduced in size.

At the top of the device 10, one of the plates such as plate 11 may have a suitable internal recess 27, formed by outwardly concaving the plate 28, and whereby a top wall portion 29 is provided having an opening 30 removably closed as by a screw cap 31. The recess 27 is otherwise closed. The plate 12 may have a slight internal recess 32 in substantial register with the recess 27 and formed by outwardly concaving the wall portion 33 thereof.

It is thus seen that both plates 11 and 12 may be constructed as castings without the use of cores, which add greatly to the labor and cost of making castings. The fins are on one side of each plate and are uniform so that the casting can be easily pulled from the mold. The different chamber forming recesses are on the opposite sides of each plate and are fully open and free of reentrant parts, so that the corresponding mold section can be readily removed. The mold section for making the recess 16 can likewise be withdrawn without damage thereto, so that it may be used repeatedly. The plates 11 and 12 can also be constructed by die stamping, as will be readily apparent to those skilled in the art, except that one of the walls 21 or 21a may have to be separately made and attached. However, the most logical way of constructing the plates is as castings, because the considerable cost of very large dies and power presses is avoided, and the fins can be made solid and of sufficient body for adequate heat conduction, instead of hollow.

Intermediate of the castings or plates 11, 12 is a plate 34 which may, if desired, be plane throughout, although the different plates herein

referred to may be variously correspondingly shaped. The intermediate plate provides with the side castings a pair of chambers 35, 36 on opposite sides of the intermediate plate. To render the chambers fluid-tight, the side plates and the intermediate plate preferably have continuous marginal abutment or contact with each other on opposite faces of the plate 35, one or more of the plates being marginally flanged or lipped to space the main sections of the plates to furnish the chambers 35, 36. Desirably the plates 11 and 12 each have continuous turned marginal lips 37 adapted for uniform fluidtight abutment against the plane plate 34. In this position, the different plates may be releasably or permanently secured together in any manner, not shown, as by riveting, bolting, soldering, or spot welding, to draw the side plates together to cause the marginal lips to snugly contact the intermediate plate. It may be necessary to grind the marginal lips 37 for a smooth plane seating against the intermediate plate, or a packing may be placed along the lips to assure fluidtightness.

By the foregoing arrangement the plate 34, which may be a casting, but is preferably a sheet metal plate, not only acts as a baffle or partition between the chambers 35, 36, but also serves as a sealing device between the side castings 11 and 12. The plate 34 may consist of a relatively soft metal such as brass, copper, or alloy, or may have its edge portions 38 consisting of or coated with such alloy, thereby to deform under pressure to correspond to any irregularities in the seating faces of the lips 37 and thus to increase the fluidtightness of the joints. A power press may be used to exert the requisite pressure while the castings are being connected with the intermediate plate 34.

The construction described affords the compartments 35, 36 which are substantially coextensive in size with the plates and which may be continuous throughout on each side of the plate 34. These compartments may be intercommunicated in a suitable manner, preferably by the provision of one or more top openings 39, 40 in the plate 34, and a bottom opening 41 therein. These openings may be horizontal slots which lie wholly within the marginal lips and permit circulation of a heating medium in the compartments. If the intermediate plate 34 be omitted, the device 10 may operate efficiently in the manner of an ordinary steam or hot water radiator, in which circulatory flow is not required.

The heating means may utilize products of combustion, superheated steam, and the like, and the heating means 18 may be representative of a tubular heat conveying arrangement. Preferably the heater 18 exemplifies any suitable electrical device, which may include a resistance coil, extending in the recess 15 therealong to impart heat to the compartment 35. The device 18 is insertable through the opening 17 and may be mounted by means of a bushing 42 threaded into said opening and secured by a locknut 43. Mounted on the wall 22 is the temperature control 19 which may include a bimetallic strip 44 on an insulator base 45, suitably connected in circuit with the heating element and with a switch 46 mounted on the plate 25, as by means of conductor wires 47, 48, 49 and 50, the wires 49 and 50 leading to an outlet connection 51 connectible with the line circuit 52.

The heating medium may be gaseous or liquid, but preferably I use a liquid having a very high boiling point such as glycerine. This liquid is

10 poured into the radiator through the opening 30, and is readily supplied to compartment 36 through the slots 39, 40 which communicate with the recesses 27, 32. The compartments 35, 36 may be filled to any suitable point above the opening 40. Since the compartments are quite narrow, and may each be only one quarter to three eighths of an inch in width, their volume is small, so that rather little glycerine is required.

15 By using a liquid such as glycerine, the heater 10 may have a temperature as high as 500° F., without any boiling. Hence the heater is a low pressure heater, the only pressure therein being that of the weight of the liquid. Hence the joints described can be readily used without leakage. Likewise slight imperfections in the castings will not cause leakage, especially in view of the viscosity of the liquid. Further, glycerine being an insulator, will not short circuit the electrical heater element 18. Since glycerine is hygroscopic, any slight absorption of moisture thereby will keep the radiator filled. Preferably the radiator is completely closed to prevent overflow due to excessive absorption of liquid. The heater may be positioned in garages and the like where quick heat is required, and where very low temperatures may occur, without freezing and breakage of the radiator. Because of the lack of strains to which the heater would otherwise be subjected, the heater structure may be relatively light and need not be very strong.

25 If desired, a slightly higher temperature may obtain in the compartment 35 than in 36, depending on the supply of heat, and also depending on the temperature of the glycerine as it may affect its viscosity and hence rapidity of circulation. Thus one side of the radiator may advantageously have a higher temperature, for example, the side away from a building wall, than the side nearest the same.

30 The invention thus provides a complete, self contained compact and simple portable heating unit operative independently of any other, adapted to be quite rapidly brought to a high temperature, and functioning safely without internal pressure, by the use of a suitable liquid that is feasible for use at all temperatures and which will keep almost indefinitely, and the heater construction utilizing the simplest castings and joints in advantageous coordination with the qualities of the liquid. Any other suitable liquid may be used in place of glycerine, and the heater compartments may have a width such as will permit rapid circulation of the liquid or operate to slightly retard the same. If glycerine is used, the same is preferably free of water.

35 It will be appreciated that various changes and modifications may be made in the device as shown in the drawing, and that the same is submitted in an illustrative and not in a limiting sense, the scope of the invention being defined in the following claims.

I claim:

65 1. A heater comprising a plurality of one piece shallow plate like sections adapted to be joined at their edges to provide a chamber therebetween, each section having radiation fins on the outside thereof, a plate wholly plane throughout extending along and between the sections connected continuously thereto between all the edges thereof to divide said chamber into a plurality of compartments, and said plate providing vertically spaced openings for intercommunicating said compartments, for circulation of a heating

fluid between the different compartments, and means to supply heat to one of the compartments.

2. A chambered heater having rigid cast outer plates providing a chamber and having external fins and an internal substantially plane sheet metal wall dividing the chamber into a plurality of compartments intercommunicated for the circulation of a heat transmitting liquid and being otherwise closed, and means for supplying heat to one of the compartments, said plates and said wall being marginally interconnected with the plates clamping said wall therebetween to re-enforce the wall.

3. A heater including a pair of one piece members and an intermediate plane element, said member and marginal portions of said element being continuously interconnected along the plane of the element to provide a plurality of intercommunicating but otherwise closed compartments through which a liquid is adapted to circulate as a result of differences of temperature in said liquid, one of said members having an internal recess, and a heating device in the recess for imparting heat to the liquid.

4. A radiator having a plurality of externally finned marginally flanged sections, a flat plane plate therebetween, the flanges continuously abutting the plate on opposite sides thereof to provide compartments with the plate, said compartments being narrow and having substantial horizontal and vertical dimensions, the latter having vertically spaced openings between the compartments, one section having an internal opening lateral recess adjacent the bottom thereof, a heating element for said fluid located in said recess, and one section having a lateral liquid filling recess at the top thereof.

5. A radiator having a plurality of plane plates having external fins, a plane sheet metal plate intermediate of the first mentioned plates, the latter having continuous marginal lips continuously contacting the intermediate plate adjacent to the edges thereof and along opposite faces of said intermediate plate to provide narrow compartments defined by said lips, said plates being otherwise continuously spaced from each other, said intermediate plate having vertically spaced openings spaced from the edges thereof for intercommunicating said compartments for circulation of a liquid, and means for supplying heat to one of said compartments.

6. A radiator comprising a plurality of side plates, an intermediate plate, the side plates having continuous marginal abutment with the intermediate plate at opposite sides thereof, at the ends, top and bottom thereof, to form compartments on opposite sides of the intermediate plate, the latter having vertically spaced openings for intercommunicating said compartments, and means for supplying heat to one of the compartments.

7. A heater including a pair of substantially flat side plates, an intermediate plate with which the side plates have marginal abutment to furnish compartments on opposite sides of the intermediate plate, and the latter having vertically spaced openings for intercommunicating said compartments, a liquid in the latter, the side plates having external fins, one of the side plates having an external recess and an internal recess, a heating element insertable into the internal recess through the external recess and having connection with a wall portion of the said side plate to seal the internal recess, a thermostatic control for the heating element in the external

recess, and the said side plate having a closable filler opening for the liquid, and said compartments being otherwise permanently closed.

8. A radiator comprising a plurality of side plates, an intermediate plate, the side plates having continuous marginal abutment with the intermediate plate at opposite sides thereof to form compartments on opposite sides of the intermediate plate, the latter having vertically spaced openings for intercommunicating said compartments, and means for supplying heat to one of the compartments, one of the side plates having a recess at one side of the intermediate plate and having full open communication with one of the compartments, and the heat supplying means being located in said recess.

9. A low pressure, high temperature house heater including a pair of castings adapted to be made without the use of cores, said castings each including a flat plate having fins on one side and a continuous marginal flange on the other side, a flat plate between the castings with the edge portions of which the flanges of the different castings have abutment on opposite faces of the plate, the latter having vertically spaced openings for intercommunicating the compartments formed on opposite sides of the central plate, said compartments being relatively narrow so as to have a relatively small capacity in proportion to the relatively large area of the compartments, a liquid in the compartments having a boiling point greatly in excess of that of water so as to be capable of being heated to a high temperature without generating pressure in the compartments, and means for supplying heat to one of the compartments.

10. A heater including a pair of substantially flat side plates, an intermediate plate with which the side plates have marginal abutment to furnish compartments on opposite sides of the intermediate plate, and the latter having vertically spaced openings for intercommunicating said compartments, a liquid in the latter, the side plates having external fins, one of the side plates having an external recess and an internal recess, a heating element insertable into the internal recess through the external recess and having connection with a wall portion of the said side plate to seal the internal recess, and a thermostatic control for the heating element in the external recess.

11. A low pressure, high temperature house heater including a pair of castings adapted to be made without the use of cores, said castings each including a flat plate having fins on one side and a continuous marginal flange on the other side, a flat plate between the castings with the edge portions of which the flanges of the different castings have abutment on opposite faces of the plate, the latter having vertically spaced

openings for intercommunicating the compartments formed on opposite sides of the central plate, said compartments being relatively narrow so as to have a relatively small capacity in proportion to the relatively large area of the compartments, a liquid in the compartments having a boiling point greatly in excess of that of water so as to be capable of being heated to a high temperature without generating pressure in the compartments, and means for supplying heat to one of the compartments, one of said castings having a first and a second recess at one side of the intermediate plate, said first recess having full open communication with one of the compartments, said heating means being located in said first recess, and said second recess being external of said compartments, and control means for the heating means located in the second recess.

12. A low pressure, high temperature house heater including a pair of castings adapted to be made without the use of cores, said castings each including a flat plate having fins on one side and a continuous marginal flange on the other side, a flat plate between the castings with the edge portions of which the flanges of the different castings have abutment on opposite faces of the plate, the latter having vertically spaced openings for intercommunicating the compartments formed on opposite sides of the central plate, said compartments being relatively narrow so as to have a relatively small capacity in proportion to the relatively large area of the compartments, and means for supplying heat to one of the compartments.

13. A low pressure, high temperature house heater including a pair of castings adapted to be made without the use of cores, said castings each including a flat plate having fins on one side and a continuous marginal flange on the other side, a flat plate between the castings with the edge portions of which the flanges of the different castings have abutment on opposite faces of the plate, the latter having vertically spaced openings for intercommunicating the compartments formed on opposite sides of the central plate, said compartments being relatively narrow so as to have a relatively small capacity in proportion to the relatively large area of the compartments, and means for supplying heat to one of the compartments, one of said castings having a first and a second recess at one side of the intermediate plate, said first recess having full open communication with one of the compartments, said heating means being located in said first recess, and said second recess being external of said compartments, and control means for the heating means located in the second recess.

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