March 17, 1942. J. MANZER 2,276,407

HEATING APPARATUS

Filed April 6, 1940 2 Sheets-Sheet 1

Fig. 1.

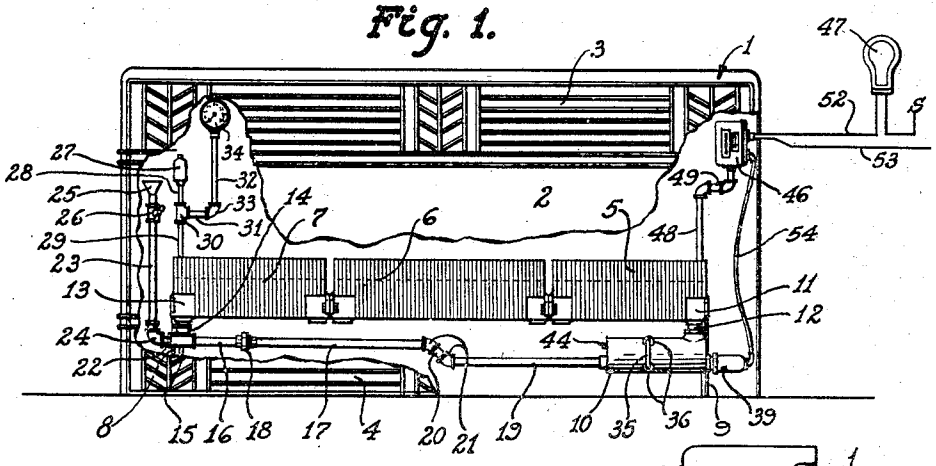


Fig. 2.

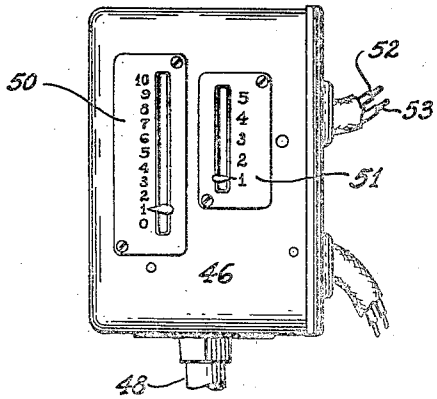


Fig. 3.

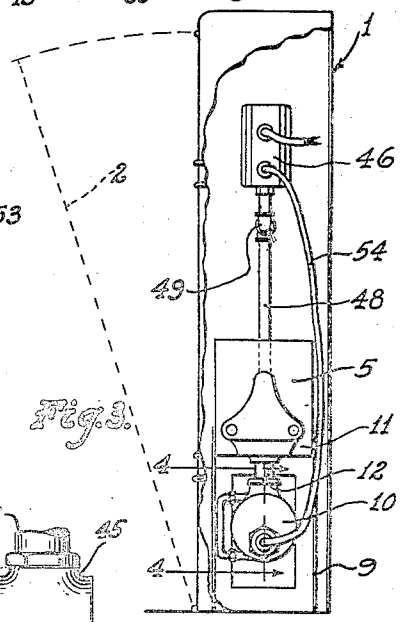


Fig. 4.

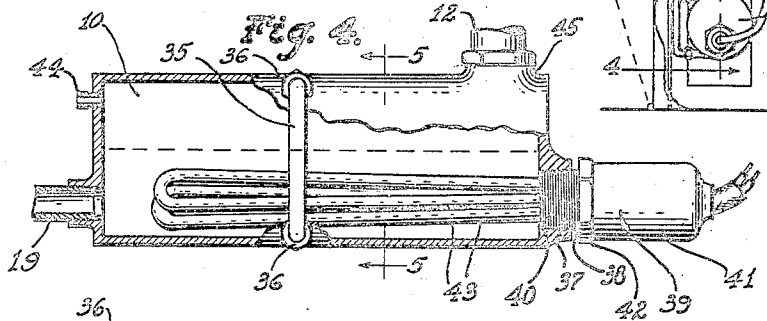
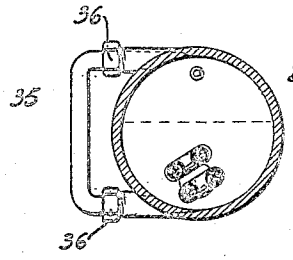


Fig. 5.



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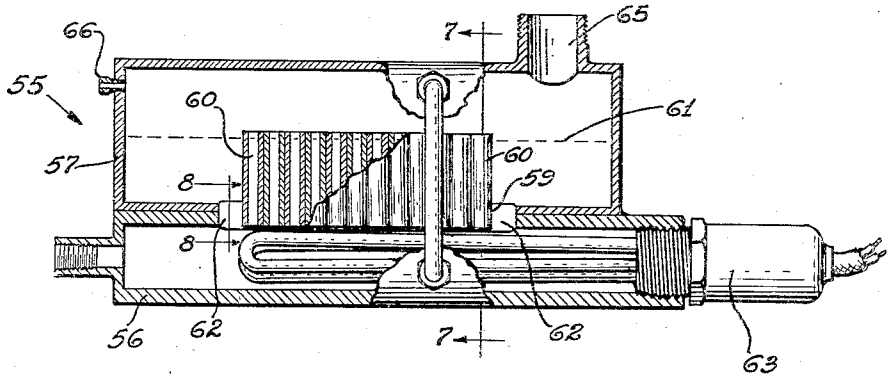
ATTORNEY

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HEATING APPARATUS

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Fig. 6.



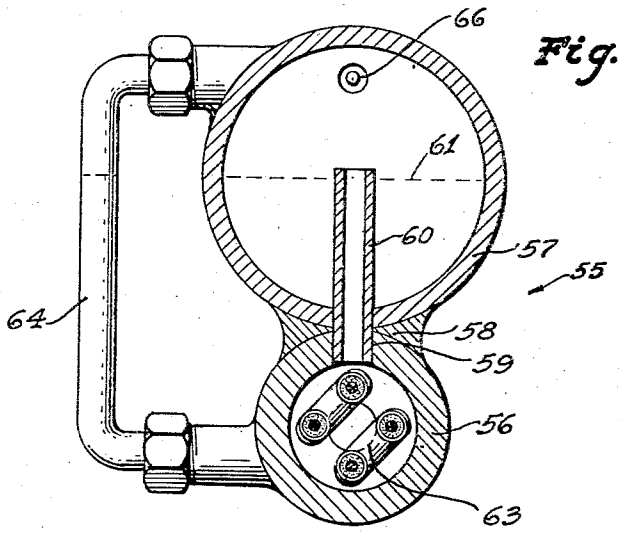
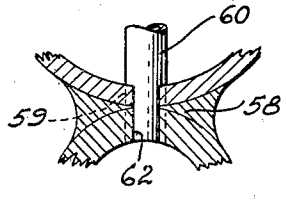


Fig. 7.

Fig. 8.



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UNITED STATES PATENT OFFICE

2,276,407

HEATING APPARATUS

Jerry Manzer, Coldwater, Mich.

Application April 6, 1940, Serial No. 328,328

7 Claims. (Cl. 219—38)

This invention relates generally to heat exchange apparatus, and primarily to a steam heating system.

Of the various types or kinds of heating systems, steam has proven to be particularly desirable, but like all efficient systems, the initial cost, installation, and maintenance is rather expensive, and beyond the means of many who desire same.

One particular object of the present invention is to provide a portable steam heating system, which may be easily and quickly moved about to the desired location within the room or space to be heated.

Another important object is to provide an inexpensive unit, in which electricity is preferably employed for operating the same, the construction and arrangement being such that it is only necessary to plug the unit into the standard outlet box of an electric circuit.

Another object is to provide a comparatively light weight, compact, and durable unit which is silent and automatic, and particularly economical in operation.

An additional object is to provide a steam heating unit, in which the boiler thereof is placed exteriorly of the unit, but in close proximity thereto so as to provide auxiliary heating means, and at the same time assist in heating or warming at least a portion of the unit prior to the time steam is generated into the unit.

A further object is to provide a unit that will generate steam and radiate heat practically instantaneously.

A still further object of the invention is to provide a unit in which the parts thereof are so constructed and arranged that same may be easily and quickly assembled, and accessible for inspection after assembly.

Other objects and advantages of the invention will be apparent after considering the description hereinafter set forth in conjunction with the drawings annexed hereto.

Referring to the drawings:

Figure 1 is a front view in elevation of one embodiment of the heating unit, portions of which are broken away for the purposes of illustration;

Figure 2 is a front view of a conventional control switch, which is adapted to be operatively connected to the unit for maintaining a predetermined steam pressure in the system;

Figure 3 is an end view in elevation, on a larger scale, of the unit shown in Figure 1, portions of which are broken away to obtain a better picture of certain parts;

Figure 4 is an enlarged horizontal sectional view of the boiler construction;

Figure 5 is a transverse section taken substantially on line 5—5 of Figure 4;

Figure 6 is directed to another embodiment of the invention, showing a horizontal sectional view of an improved boiler construction;

Figure 7 is an enlarged transverse sectional view of this improved boiler, taken substantially on line 7—7 of Figure 6; and

Figure 8 is a partial section taken substantially on line 8—8 of Figure 6.

Referring first to Figures 1 through 5 of the drawings, wherein one embodiment to which the invention is susceptible is depicted, numeral 1 represents a conventional radiator cabinet or housing, of the so-called floor cabinet type, having an adjustable or pivotally mounted front wall or panel 2, whereby to permit easy access to the radiator and various connected parts therewithin. The front wall is preferably provided with grilles 3 and 4, adjacent its upper and lower extremities, respectively, in order to improve the circulation of the air.

The radiator, convector, or heating unit is preferably comprised of a plurality of sections 5, 6, and 7 suitably communicatively connected together, and disposed centrally within the cabinet, slightly above the lower grille 4. Any standard or special type of sections may be used, but those having radiating fins as shown, have proven most satisfactory. Also, any number of sections may be used, depending on the amount of radiation required. As herein shown, the unit is supported in spaced relation to the floor, and independently of the cabinet by means of a pair of adjustable standards 8 and 9. If found desirable the unit may be carried, or connected to a wall in back of where the cabinet is to be placed.

A relatively small substantially cylindrical boiler 10 is carried by and communicatively connected to the header 11 of the heating section 5, by a supply main 12 through which steam is adapted to pass successively into the sections 5 through 7. The boiler may be otherwise supported and disposed, but is preferably placed directly below and as near to the heating unit as is possible.

The return from the heating unit or radiator to the boiler will now be described. The header 13 of the heating section 7 is provided with a short pipe connection 14 to which is attached a T 15. A pipe 16 is connected to one end of this T, and to the pipe 17 by a union 18. The pipe

17 in turn is connected to a pipe 19 by a short length of pipe 20 through the intermediation of a pair of elbows 21. The pipes 16 and 17 are preferably declined to insure an efficient gravity return, whereas 19, which is connected to the lower extremity of the boiler 10, may be more or less horizontal. The pipe 20 is preferably arranged at an angle of forty five degrees, in order to further assist in a quick return of the condensate, prevent the backing up of any water into the heating unit, and particularly maintain the last section 7 filled with dry steam while the system is in operation. Obviously, the return may be otherwise constructed and arranged, but the one just described has proven exceptionally efficient.

Means are provided for easily and quickly replenishing the water within the boiler when the steam pressure within the system is low, and this preferably includes a short length of pipe 22 connected to the T 15. A vertical refill pipe 23 is connected to the pipe 22 by an elbow 24. The upper extremity of the refill pipe 23 may be provided with a funnel 25 whereby to facilitate replenishment of the water. A conventional valve 26 is required to shut the refill unit off from the boiler. Although the funnel and valve may be positioned lower than that shown, it has been found desirable to conceal them from view directly behind the ungrilled portions of the front panel 2, and at a convenient height, for accessibility when the panel is moved forwardly as indicated by the dotted lines in Figure 3. If found desirable, the valve 26 could be placed in close proximity to the elbow 24 or the T 15, in which event, the pipe 23 could be used as a standpipe with a sufficient auxiliary or supplemental supply of water, open to the atmosphere, to replenish the boiler over a predetermined period, and at the same time function substantially the same as an evaporating pan, by admitting vapor to the heated air to thereby condition same as it is emitted from the cabinet by radiation and convection. Moreover, a tank could be associated with the refill apparatus for holding a supply of water.

A conventional air valve 27 is also connected to the header 13 of section 7 for venting any cold air existent in the circulating system. A pair of vertical pipes 28 and 29 attached together by a T 30, connects the valve 27 to the header. A short horizontal section of pipe 31 is attached to this T, and a vertical pipe 32 is connected to the pipe 31 by an elbow 33. A steam gauge 34 is attached to the pipe 32, and is preferably arranged directly in back of the grille 3, so that one may glance therethrough to take a reading. Obviously, this gauge may be otherwise positioned; in fact it could be connected directly to the header. All of the various pipes above referred to, provide passages which are more or less communicatively interconnected. The pipes are all preferably threadedly connected together, the connections being so arranged that the pipes and other parts may be readily assembled and disassembled. The majority of the parts, including the radiator and pipes are preferably concealed from view by the panel, thus enhancing the general appearance of the entire unit.

Referring specifically to the construction of the boiler 10, the same is preferably made relatively small, approximately three or four inches in diameter, and ten or eleven inches in length, so as to contain approximately one quart of water when about two thirds full, or the level of the water is slightly above the center of the boiler, as indicated by the dotted line in Figure 4. A conventional U-shaped water glass 35 is detachably connected to the upper and lower extremities of the boiler by couplings 36, to provide a gauge whereby one may quickly ascertain whether or not water should be added to the boiler. The ends of the glass are preferably fitted into tubular protuberances formed on the boiler. One end of the boiler near the bottom is reenforced to provide a protuberance 37, internally threaded as indicated at 38.

An electric immersion water heater generally designated 39 is detachably connected to the boiler, and among other things, includes an externally threaded portion 40 cooperable with the threaded portion 38, a handle part 41, a polygonal nut portion 42 whereby the heater may be tightly secured in place, and a plurality of elongated substantially U-shaped heating elements 43. These elements may be of the conventional type, and are arranged substantially horizontally the full length of the boiler slightly above its bottom wall. In any event, the water level must be above the top of the heater elements while the system is in operation. This heater has a relatively high wattage, in the neighborhood of 2000 watts, so that the water in the boiler may be heated to generate steam practically instantaneously, whereupon it is rapidly forced into and through the system, including the heating sections 5 through 7. Ordinarily, in this system, steam is generated approximately between one and two minutes, the radiator emitting heat practically directly thereafter.

As a precautionary measure the boiler is desirably provided with a safety plug 44 adjacent the upper extremity of one end. This plug may be of the conventional type having a fusible element therein, which will melt at a predetermined temperature, and open the interior of the boiler to the atmosphere, when for example, the boiler inadvertently becomes dry, and its metal is excessively heated directly by the immersion heater.

The end wall of the boiler opposite the one to which the heater is attached, may be provided with an integral protuberance, internally threaded to receive the return pipe 19. This protuberance, including the protuberance 37, is desirably disposed above the bottom of the boiler. The upper extremity of the boiler near one end may have a protuberance 45, internally threaded to receive the main supply pipe 12. All of the protuberances or projections referred to, are preferably welded to the boiler, and of course, may be exteriorly threaded in lieu of being internally threaded.

The boiler may be located adjacent the radiator wherever desired, but as herein shown, is preferably arranged as near thereto as is practically possible, so that the steam will pass directly into the radiator, and thus prevent dissipation of heat, which would occur if located quite some distance therefrom. Moreover, the boiler being a separate part of the system will radiate heat in addition to that produced by the radiator, and being directly below the section 5, functions to keep the latter slightly warm at certain intervals. In effect, the boiler serves as a small auxiliary radiator.

Means are arranged in conjunction with the heating system for automatically operating it, and will now be described. The means proven most satisfactory for accomplishing this action includes a switch 46 adapted to regulate and

maintain a predetermined pressure in the system, and a thermostat 47 connected in a series circuit with the switch and the immersion heater 39. Since the switch and thermostat are of the standard conventional type, only a brief description of them is deemed necessary. The switch 46 is communicatively connected to the header 11 of section 5 by a riser 48, and a number of connections 49, which position the switch in an offset relation to said section, behind the grille 3, so that one may view the dials 50 and 51 thereof.

The circuit, among other things, includes a line leading from the source S to the thermostat, a line 52 from the thermostat to the switch, a line from the switch to the immersion heater, and a line back to the switch and connecting with the outgoing line 53. The lines connecting the switch and heater are preferably confined within a conduit or cable 54.

As stated above the control switch 46 is provided with dials 50 and 51. Dial 50, which is marked with ten graduations, indicates the pounds pressure cut in, whereas dial 51, marked in five graduations, indicates the pounds cut out. To set the switch whereby to maintain a predetermined differential pressure within the system, for example, a pressure of two pounds, it is only necessary to set each of the markers on the dials at the graduation 1. To obtain a three pounds pressure in the system, the markers may be set at 1 and 2, on dials 50 and 51, respectively.

In operation, when the thermostat registers a fall in temperature, the immersion heater functions to heat the water in the boiler to generate steam until the desired pressure has been obtained, whereupon the switch 46 opens the circuit to the immersion heater, and if the temperature has not attained that to which the thermostat has been set, then the circuit to the heater is automatically closed by the switch, provided of course, the pressure in the system falls a predetermined amount.

Referring now to Figures 6 through 8, wherein an improved boiler construction is shown, 55 generally designates a unit consisting of a boiler 56 and a generator 57. The generator is placed upon the boiler and welded thereto along the sides to provide an integral junction 58. The boiler is preferably made smaller and longer than the generator, and with a slightly heavier wall structure. The junction includes the thickness of the wall of the generator, wall of the boiler, and the welds. Centrally disposed intermediate the extremities of the junction there is provided a plurality of vertical apertures 59, preferably twelve in number. A row of relatively short tubes 60, preferably about two inches in length and one eighth inch inside diameter, are welded together as a unit, the unit is fitted into the apertures, and then welded in place, whereby to provide a plurality of passages communicatively connecting the boiler and generator together. The lower extremities of the tubes are substantially flush with the inner face of the wall of the boiler as clearly shown in Figures 7 and 8, and their upper extremities project slightly above the level of the water line indicated at 61. The boiler and generator are adapted to contain approximately one and one half pints of water, so that the water level is approximately at the half way mark in the generator. The junction 58 is also preferably provided with a pair of openings 62, one adjacent each extremity of the row of tubes in order to establish auxiliary or supplemental communication between the boiler and generator.

The boiler is provided with an immersion heater 63, the elements of which are disposed centrally and longitudinally within the boiler under the passages formed by the tubes and openings above referred to. The generator is provided with a water gauge 64, a protuberance 65, and a plug 66, which more or less correspond to those described in connection with the boiler 10.

This embodiment of the invention is adapted to be hooked up with a circuit corresponding to the one above referred to, and in operation, the boiling water is projected upwardly through the tubes 60 with considerable force into the generator to generate steam practically instantaneously, whereupon the steam is caused to pass into the radiator. During this operation, some of the hot water which is projected into the generator is caused to circulate back into the boiler through the openings 62 to be re-boiled. This embodiment generates steam somewhat faster than the embodiment shown in Figures 1 through 5, for the reason that the boiler contains a smaller quantity of water, which may be heated to generate steam slightly in advance of the time required to boil the water contained in the generator.

Both embodiments of the invention are quick, positive, and efficient in operation, and there are no parts which are likely to get out of order. In fact, when subjected to customary use they will operate for a long period of time, in certain instances several months before they need attention, and then only for the purpose of adding water to the boiler.

It is to be understood that means other than an electric immersion heater may be employed for heating the water in the boiler of either embodiment of the invention. For example, an oil burner; or a jet or jets of burning gas could be projected through a tube within the boiler, or against the wall of the latter.

Having thus described my invention, it is to be understood that other various slight changes might be made in the general forms and arrangements of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

What I desire to obtain and secure by Letters Patent is:

1. A first boiler, a second boiler overlying and engaging the first boiler, means permanently uniting the boilers together adjacent the place of engagement, a narrow elongated slot providing communication between the boilers, a unit consisting of a plurality of parallel tubes permanently secured in said slot providing passages between the boilers, and said tube unit being of a length less than the length of the slot whereby an auxiliary passage is provided between the boilers adjacent each extremity of the unit.

2. A first boiler, a second boiler superimposed upon and united to the first boiler throughout its entire length, a narrow elongated slot provided in the wall of each boiler, said slots cooperating to provide an opening, a unit consisting of a plurality of parallel tubes permanently secured in said opening providing passages between the boilers, and an auxiliary passage provided between the boilers adjacent each extremity of the unit.

3. A pair of horizontal boilers integrally connected together throughout their entire lengths to provide a junction, a longitudinally extending slot provided in the junction, and a plurality of tubes secured in an upstanding position in said slot providing a plurality of passages communicatively connecting together the interiors of said boilers.

4. A pair of horizontal boilers, one above the other engaging each other throughout their entire lengths, means along the sides and ends of the boilers for uniting them together, a longitudinally extending narrow opening provided between the boilers where engaged, and a row of relatively short tubes permanently united together and to the boilers disposed in said opening providing a plurality of passages establishing communication between the interiors of the boilers, the upper extremities of the tubes terminating adjacent the center of the upper boiler and the lower extremities terminating substantially flush with the inner wall of the lower boiler.

5. A horizontal boiler, a generator of a size larger than the boiler superimposed upon and permanently united to the boiler by continuous welds surrounding the sides and ends of the boiler and generator to provide a unitary junction, a longitudinally extending narrow opening provided in the junction, and a row of tubes constituting a unitary assembly secured in a vertical position within the opening and in the same plane as the axes of the boiler and generator providing passages between the boiler and generator.

6. A first horizontal tubular boiler, a second horizontal tubular boiler of a size somewhat smaller than the first boiler engaging the first boiler substantially throughout its entire length, means permanently uniting the boilers together at least adjacent their extremities, a longitudinally extending narrow slot provided in the second boiler, and a plurality of tubular means permanently secured in said slot and projecting into said first boiler providing a plurality of passages communicatively connecting the interiors of the boilers together.

7. A first horizontal tubular boiler, a second horizontal tubular boiler of a size somewhat smaller than the first boiler running substantially the full length of the latter, means permanently uniting the boilers together in close proximity to each other, a longitudinally extending narrow slot provided in the second boiler, and a plurality of tubular means permanently secured in said slot and projecting into said first boiler providing a plurality of passages communicatively connecting the interiors of the boilers together.

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