

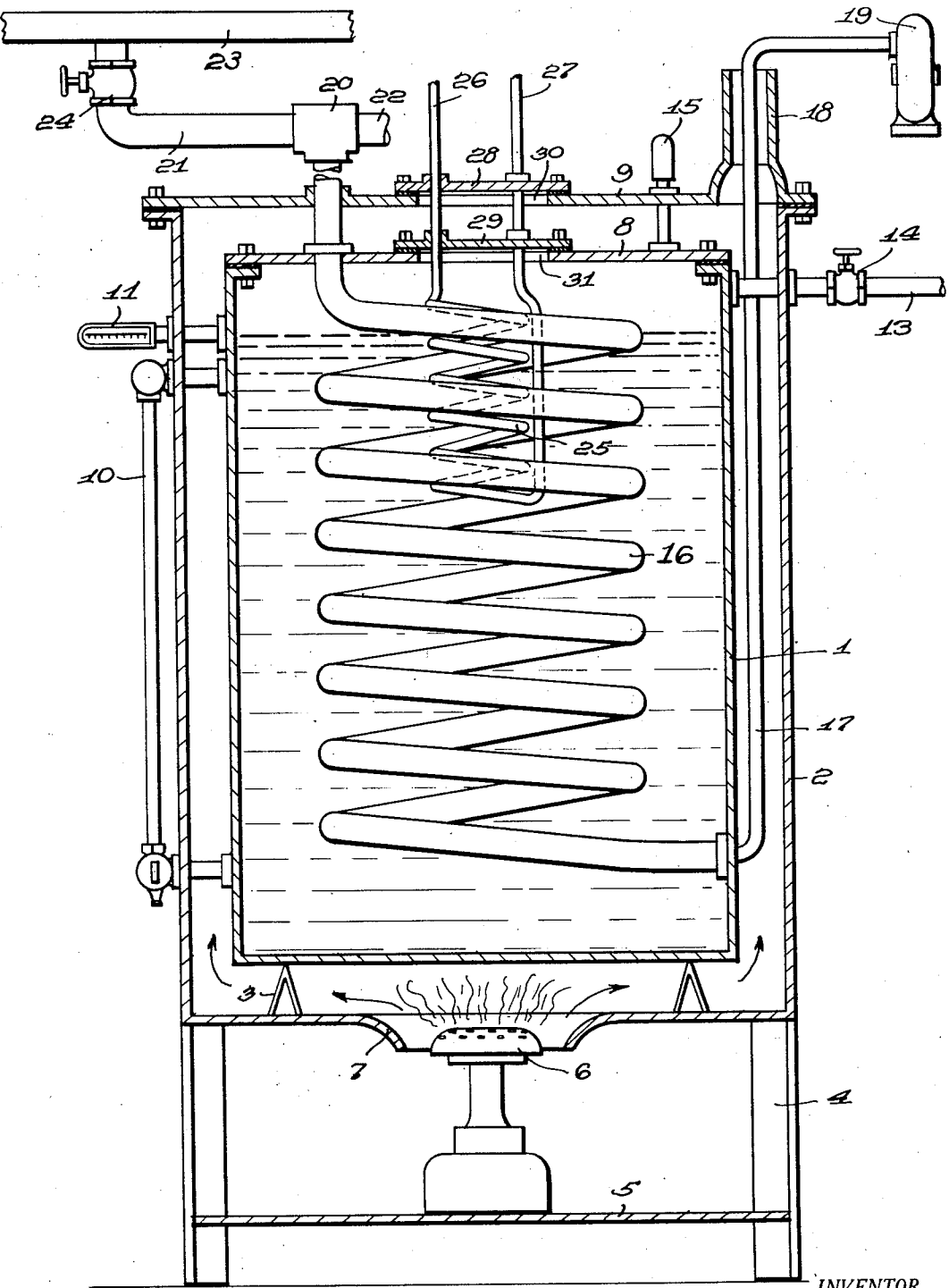
Feb. 11, 1930.

L. GRAFFLIN

1,747,070

HEATING APPARATUS

Filed Nov. 21, 1927



INVENTOR.

LEWIS GRAFFLIN,

BY

B. P. F. McKelvey

ATTORNEY.

UNITED STATES PATENT OFFICE

LEWIS GRAFFLIN, OF NORFOLK, VIRGINIA, ASSIGNOR TO THE TWO-SEASON PROCESS, INC., OF NORFOLK, VIRGINIA, A CORPORATION OF VIRGINIA

HEATING APPARATUS

Application filed November 21, 1927. Serial No. 234,793.

My invention relates to apparatus for effecting heat exchange, and has particular reference to such apparatus which may be used for heating a room, dwelling or building.

An object of the invention is to provide apparatus of the above mentioned character having means whereby a traveling current of air is caused to pass through a heated body of water, in a manner to effect the maximum heat exchange.

A further object of the invention is to provide apparatus of the above mentioned character which has a high operating efficiency and may be operated at a low cost.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, the figure is a central vertical longitudinal section through apparatus embodying the invention.

In the drawings, wherein for the purpose of illustration, is shown a preferred embodiment of my invention, the numeral 1 designates a preferably vertically arranged tank or receptacle, for holding water or the like. This tank or receptacle may preferably be cylindrical and is arranged in concentric relation within a jacket 2, which is vertically arranged, and preferably cylindrical. The tank 1 is held in concentric relation to the jacket 2 by spacing elements 3, as shown. The jacket 2 is carried by legs 4, carrying a support 5, upon which is mounted an oil burner 6, preferably of the Bunsen type. Instead of using an oil burner, a gas burner, electrical burner, or any other suitable source of heat may be employed, with some degree of success. The burner element of the oil burner is arranged within a depending lip 7, formed in the bottom of the jacket 2, whereby the products of combustion from the burner pass about and surround the water tank 1, and travel within the jacket 2. The water tank 1 is closed to the atmosphere, by means of a cover 8, which may be bolted or otherwise secured to the tank with suitable packing between the engaging parts. The

top of the jacket 2 is closed by a cover 9, bolted to the top of the same.

The numeral 10 designates a water gauge, having communication with the interior of the tank 1, to define the level of the water therein, and a thermometer 11 is also provided in communication with the interior of the tank 1, for determining the temperature of the water therein. Water is supplied to the tank 1 through a pipe 13, having a cut-off valve 14. The numeral 15 designates a pressure relief valve in communication with the interior of the tank 1, and which may be adjusted to regulate the maximum pressure to be maintained within the tank 1.

Extending longitudinally or vertically within the tank 1 is an air heating coil 16. I have found that satisfactory results may be obtained by having this coil about four inches in diameter, but the invention is in no sense restricted to this diameter as it may be varied at will. The length of the coil varies with the size of the apparatus, and the manner in which it is desired to retard the passage of air through the heated water. By increasing the length of the coil, the passage of the air is further retarded. The coil 16 is preferably in the form of a cylinder and is concentrically arranged within the cylindrical casing 1, and spaced therefrom. The level of the water within the tank 1 is preferably maintained at such an elevation that all or the major portion of the coil is maintained submerged in the water. The invention is in no sense restricted to submerging the coil into water as satisfactory results may be obtained by carrying a relatively low water level and effecting heat exchange with steam or vapor. At its lower end, the coil 16 has connection with an air supply pipe 17, passing upwardly through the heating jacket 2 and through a stack 18, for the discharge of the products of combustion. The pipe 17 is connected with the outlet side of a rotary blower or fan 19, driven by a motor or the like. The upper or outlet end of the coil 16 extends through openings in the covers 8 and 9, and is connected with a coupling 20, having connection with pipes 21 and 22, which lead to suitable points in the room or building to be heated.

As illustrated in connection with the pipe 21, it leads to a register 23, and this pipe may be equipped with a valve 24.

The numeral 25 designates a refrigerating coil, which is preferably cylindrical and vertically arranged within the turns of the coil 16, in spaced concentric relation thereto. The turns of this coil are of smaller diameter than the turns of the coils 16, and hence the refrigerating coil is spaced from the air receiving coil, but is arranged in close relation thereto. The refrigerating coil is preferably arranged near the top of the air receiving coil, so that the chilled water will descend in the tank 1. The ends of the refrigerating coil 25 are connected with inlet and outlet pipes 26 and 27, which pass through openings in and are carried by covers 28 and 29, and form gas-tight joints therewith. The cover 28 is bolted or otherwise detachably secured to the cover 9, with suitable packing between the engaging parts. The cover 29 is bolted or otherwise detachably secured to the cover 8, with packing between these parts. These covers extend over manholes 30 and 31, of sufficient diameter for the passage of the refrigerating coil 25. The purpose of this construction is to permit of removal of the refrigerating coil as a unit, through the manholes 30 and 31, which manholes will then be closed by suitable covers.

The operation of the apparatus is as follows:

When the apparatus is used as a heating unit, the refrigerating coil 25 may be removed from within the water tank 1, and the manholes 30 and 31 completely closed by suitable covers. These covers have gas-tight joints with the covers 8 and 9. The tank 1 is gas-tight and closed to the atmosphere, whereby a pressure above atmospheric pressure, may be built up and maintained therein. A pressure of about a pound and a half above atmospheric pressure has been found to give satisfactory results, while this may be varied. The products of combustion from the burner 6 now discharge into the jacket 2 and pass upwardly about the tank 1 and escape through the stack 18, such products of combustion completely surrounding the tank 1. The water within the tank is thus heated. When the apparatus is operating as a heating unit, it is preferred to maintain a relatively low water level, and the tank may be about one-fourth filled with water, although the level may be widely varied. The motor 19 is set into operation and air under suitable pressure is forced through the pipe 17 into and through the air receiving coil 16. The air receiving coil suitably retards the passage of the air therein, so that it may effect a proper heat exchange with the steam or water vapor or water, within the tank 1. The heated air then discharges from the top of the air receiving coil 16 and passes into the pipe

21 and is then conducted to registers or the like, at suitable points in the room or building.

When the apparatus is to be used as a cooling unit, the burner 6 is, of course, not employed and the refrigerating coil 25 is arranged within the air receiving coil 16, as shown in the drawings. The water level within the tank 1 is then raised so that the tank is filled throughout the major portion of its length. It is preferred that the elevation of the water be such that the refrigerating coil is substantially completely submerged. By maintaining the refrigerating coil substantially completely submerged, frosting of the same is prevented and defrosting of the coil at intervals, is eliminated. The air is forced into the air receiving coil by means of the blower 19, as described, and heat exchange is effected, and the cooled air is then passed to the registers or the like, at different points in the room or building.

While I prefer to employ water in the tank 1, as a heat exchange medium, yet other fluids may be employed.

I also contemplate connecting the coil 16 with a hot water heating system used in dwellings or the like. When this is done, the blower 19 would be omitted and the pipe 17 connected in the hot water system at a suitable return point, while the upper end of the coil 16 would be connected in the hot water system at a suitable discharge point.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In apparatus of the character described, a water holding tank closed to the atmosphere whereby pressure in excess of atmospheric pressure may be built up therein, means for supplying water to the tank, a heating jacket surrounding the same, means to discharge a heating fluid into the jacket, and a fluid heating coil arranged within the tank and partly or wholly submerged in the water within said tank.

2. In apparatus of the character described, a water receiving tank closed to the atmosphere whereby pressure above atmospheric pressure may be built up therein, means for supplying water to the closed tank, a heating jacket surrounding the tank, means to discharge a heating fluid into the jacket, an air receiving coil arranged within the tank and partly or wholly submerged within the water therein, a blower connected with the intake end of the coil, and outlet means connected with the outlet end of the coil.

3. In a heater of the character described,

a water holding tank closed to the atmosphere whereby pressure in excess of atmospheric pressure may be built up therein, a heating jacket completely surrounding the tank and spaced therefrom, said jacket being provided at one end with an inlet opening for a heating fluid and at its opposite end with an outlet opening, a coil arranged within the tank and partly or wholly submerged in the water therein, a pipe extending longitudinally between the jacket and tank for the major portion of the length of the jacket for preheating the air within the pipe and connected with the intake end of the coil, a blower connected with the pipe to force air through the coil at a pressure in excess of atmospheric pressure, and an outlet pipe connected with the coil.

4. In heating apparatus, a vertical water holding tank closed to the atmosphere whereby pressure above atmospheric pressure may be built up therein, a vertical heating jacket completely surrounding the tank and spaced therefrom, the tank extending throughout the major portion of the length of the jacket, said jacket being provided at its bottom with an opening for the intake of a heating fluid, an outlet stack connected with the top of the jacket, a vertically arranged air heating coil disposed within the water holding tank and extending longitudinally throughout the major portion of the length of said tank, said coil being partly or wholly submerged in the water held within said tank, an air outlet pipe connected with the upper end of the air heating coil, an air supply pipe extending vertically through the stack and the jacket and passing downwardly through the jacket throughout the major portion of the length of the same and connected with the lower inlet end of the coil, the arrangement being such that the air is preheated within the air supply pipe prior to passing into the coil, and a blower connected with the air supply pipe.

In testimony whereof I affix my signature.

LEWIS GRAFFLIN.