

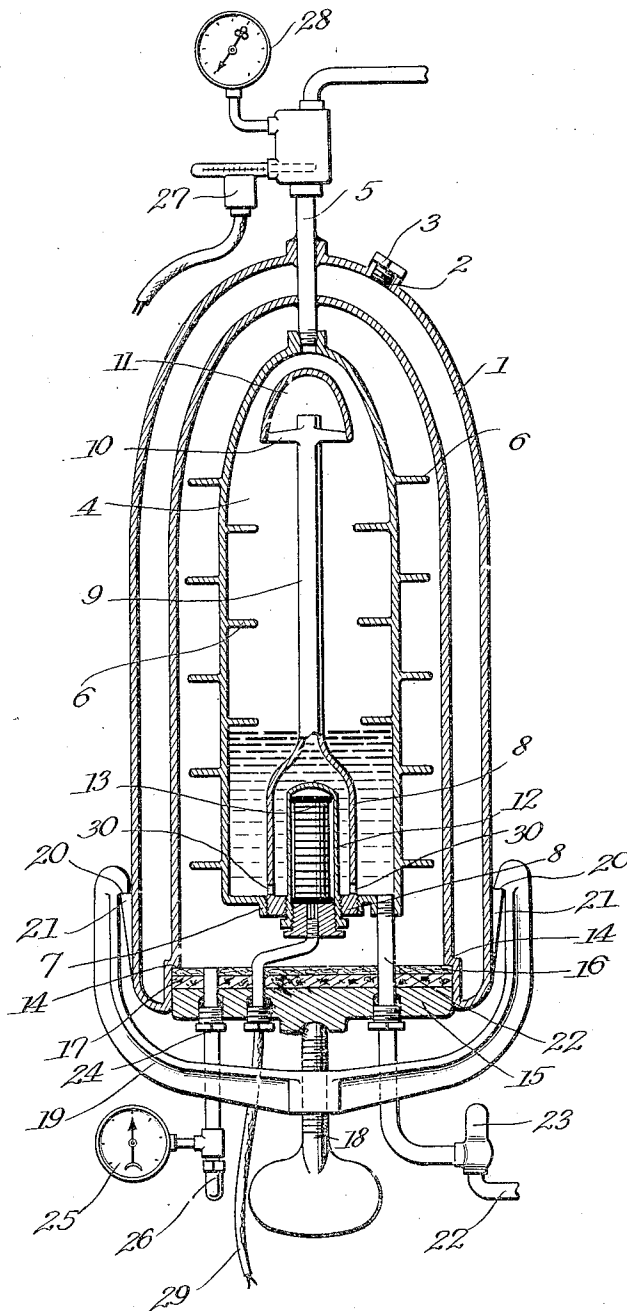
June 24, 1930.

R. D. SANDERS

1,766,802

FLUID HEATING APPARATUS

Filed April 18, 1929



Inventor

Richard D. Sanders,

By *Leachman, Bryant & Dorley*
Attorneys

UNITED STATES PATENT OFFICE

RICHARD D. SANDERS, OF NORFOLK, VIRGINIA

FLUID-HEATING APPARATUS

Application filed April 18, 1929. Serial No. 356,280.

The invention relates to an apparatus for heating certain liquids to obtain gases therefrom.

5 The object of the invention is to construct a comparatively simple apparatus which will produce extremely efficient results heretofore accomplished only by intricate and expensive methods.

10 Another object of the invention is to construct an apparatus inexpensive to manufacture and to maintain.

15 With these and other objects in mind, the invention is illustrated by the drawing, which is a vertical sectional view of one embodiment of my invention.

20 The device comprises a substantially cone-shaped double-walled member 1 of metal or other suitable material. Near the top thereof in the outer wall is a hole 2 with an air-tight plug 3. The purpose of the double walled member is to provide insulation for the apparatus within, and between the walls may be placed any suitable insulating material, although it has been found that to
25 create a vacuum between the inner and outer walls, better results are thereby obtained.

30 Within the member 1 is a container 4 of suitable metal having attached at its top an outlet pipe 5, which extends through the double walls of member 1 in an air-tight manner. Baffles 6 are arranged on the outside and on the inside of the container 4, and on the bottom thereof, is a screw-threaded opening 7. Screwed into opening 7 is a casing
35 8, which has integrally or otherwise attached thereto, a pipe 9, which extends upwardly to a point near the top of the container 4. Attached to a pipe 9 by means of arms 10, is a mushroom shaped member 11. It will be
40 noted that the member 11 is quite near the top of the container 4 and conforms to the shape thereof. The space between the top of the receptacle and the mushroom shaped member 11 is restricted in order that the gas
45 may be somewhat compressed before flowing into the outlet pipe; at the lower end of and entirely around casing 9 are holes 30.

Screw-threaded within the casing 8, is a second casing 12 which forms a protective
50 covering for the electrical heating element

13, which in turn is screw-threaded into the second casing 12. It is understood that other heating elements, such as a steam coil, could be used with identical results.

Fitted into the open end and against
55 shoulders 14 of the cone-shaped member 1 is a bottom member 15, of suitable metal having insulating layers of asbestos 16 and cork 17 on the top thereof. The bottom member 15 is securely held by any suitable means, 60 such as a screw 18 which passes through a substantially semi-circular yoke 19, the edges of which are slightly hooked as at 20 and rest upon the lugs 21.

65 An inlet pipe 22 passes through the bottom member 15 into the container 4. Conveniently placed in said pipe is a check valve 23 to prevent any backflow of the liquid from said container 4. A pipe 24 leading into and terminating in the space between the
70 container 4 and the outer member 1 has at its other end a gauge 25, the purpose of which is to indicate the pressure or vacuum therein, and a safety valve 26 which when correctly
75 set will allow excess pressure to escape as well as atmospheric pressure to enter should there be created too great a vacuum within this space.

Attached to the outlet pipe 5 is a suitable thermostat 27 and a gauge 28. The thermo-
80 stat is in circuit with the wires 29 leading to the electric heating coil and can be set for the heat necessary for any particular operation of the apparatus, and will automatically
85 break the circuit, and consequently shut off the current to the coil, should the heat become greater than desired. The gauge 28 indicates the pressure created in the container 4.

90 The operation of the apparatus is as follows: The liquid which is to be heated in order to obtain the desired gas is placed within container 4 through the inlet pipe 22 to a point substantially below the mid-point of the said container. The liquid will pass through the holes 30 of the casing 8 into the
95 space between said casing and the inner protective casing 12 about heating element. When the electric coil, as shown in the drawings, is energized and the liquid becomes heated, it will percolate through the pipe 9 100

and upon striking the mushroom shaped member, will spray onto the baffles and in so doing, the gases will pass off into the outlet pipe.

Should there be too much pressure created between the container 4, and the outer double walled member due to heat expansion, it will indicate upon the gauge 25 and extreme pressure will escape through the safety valve 26. When the apparatus cools, for example, after use, a vacuum will be created between the container 4 and the double walled member 1, and the valve 26 will then admit atmospheric pressure. After the heat becomes excessive within the container 4, the thermostat 27 will operate to deenergize the heating element 13 and vice versa.

With this apparatus, it is possible to produce gas from liquids with a small amount of heat. It has been found to be extremely efficient in manufacturing ammonia vapor for refrigerating purposes.

The apparatus can be easily disassembled by simply disengaging the screw 18 and slightly turning the semi-circular yoke off of the lugs, which allows the bottom member to come out of engagement with the double walled member 1. The casing, pipe and mushroom member can then be disengaged, as well as the protective casing, and heating element within the first named casing.

It is understood that various changes in the construction can be made by those skilled in the art without departing from the spirit of the invention set forth in the appended claims.

I claim:—

1. In apparatus of the class described, the combination of a primary fluid container having an outlet, an upwardly projecting secondary fluid container centrally disposed at the bottom of said primary container, a pipe extending from said secondary container and delivering to the upper part of said primary container, a showering head for diverting fluid delivered by said pipe downwardly into said primary container, heating means in said upwardly projecting secondary container, means responsive to temperature in the outlet of said primary container to control said heating means, and heat insulating means enclosing said primary container.

2. In apparatus of the class described, the combination of a primary fluid container having an outlet, an upwardly projecting secondary fluid container centrally disposed in said primary container and in communication therewith, a pipe leading from said secondary container to the upper portion of said primary container, a showering head to divert fluid delivered by said pipe downwardly into said primary container, means responsive to temperature in the outlet of said primary container to control said heating means, and heat insulating means enclos-

ing said primary container and spaced therefrom.

3. In apparatus of the class described, the combination of a primary fluid container having an outlet, an upwardly projecting secondary fluid container centrally disposed at the bottom of said primary container and in communication therewith, a pipe leading from said secondary container to the upper portion of said primary container, a showering head to divert fluid delivered by said pipe downwardly into said primary container, means responsive to temperature in the outlet of said primary container to control said heating means, heat insulating means enclosing said primary container and spaced therefrom, and means for controlling pressure in the interspace between said primary container and said insulating means.

4. In apparatus of the class described, the combination of a primary fluid container having an outlet, an upwardly projecting secondary fluid container centrally disposed in the bottom of said primary container and in communication therewith, a pipe leading from said secondary container to the upper portion of said primary container, a showering head to divert fluid delivered by said pipe downwardly into said primary container, temperature responsive means in the outlet of said primary container to control said heating means, heat insulating means enclosing said primary container and spaced therefrom, and means automatically to control pressure in the interspace between said primary container and said insulating means.

5. In apparatus of the class described, the combination of a primary fluid container having an outlet at its top, a secondary fluid container at the lower end of said primary container and communicating therewith, a pipe leading from said secondary container and delivering to the upper part of said primary container, means interposed between said pipe and the outlet of said primary container to divert fluid delivered by said pipe downwardly into said primary container, heating means in said secondary container, means responsive to temperature in the outlet of said primary container to control said heating means, a vacuum chamber enclosing said primary container and spaced therefrom, and means automatically to control pressure in the interspace between said vacuum chamber and said fluid container.

6. In apparatus of the class described, the combination of a primary fluid container having an outlet, a secondary fluid container in said primary container and in communication therewith, a pipe leading from said secondary container and delivering to the upper part of said primary container, means between the delivery end of said pipe and the outlet of said primary container to divert fluid delivered from said pipe downwardly

into said primary container, heating means in said secondary container, means automatically to control said heating means, a vacuum chamber enclosing said primary container and spaced therefrom, a removable insulated closure for said vacuum chamber, and means carried by said closure automatically to control pressure in the interspace between said vacuum and said primary container.

sure in the interspace between said vacuum chamber and said fluid container, and a supply pipe for said primary container and conducting means leading to said heating means mounted on said removable closure.

In testimony whereof I have hereunto set my hand.

RICHARD D. SANDERS.

7. In apparatus of the class described, the combination of a primary fluid container having an outlet, a secondary fluid container in said primary container and in communication therewith, a pipe leading from said secondary container and delivering to the upper part of said primary container, means between the delivery end of said pipe and the outlet of said primary container to divert fluid delivered from said pipe downwardly into said primary container, heating means in said secondary container, temperature responsive means automatically to control said heating means, a vacuum chamber enclosing said primary container and spaced therefrom, a removable insulated closure for said vacuum chamber, and means carried by said closure automatically to control pressure in the interspace between said vacuum and said primary container.

8. In apparatus of the class described, the combination of a primary fluid container having an outlet, a secondary fluid container within and in communication with said primary container, a pipe leading from said secondary container to the upper part of said primary container, means interposed between the end of said pipe and the outlet of said primary container to divert fluid delivered by said pipe downwardly into said primary container, heating means in said secondary container, temperature responsive means to control said heating means, a vacuum chamber enclosing said primary container and spaced therefrom, a removable insulated closure for said vacuum chamber, and means carried by said removable closure to control pressure in the interspace between said vacuum chamber and said fluid container.

9. In apparatus of the class described, the combination of a primary fluid container having an outlet, a secondary fluid container within and in communication with said primary container, a pipe leading from said secondary container to the upper part of said primary container, means interposed between the end of said pipe and the outlet of said primary container to divert fluid delivered by said pipe downwardly into said primary container, heating means in said secondary container, a heat insulating chamber enclosing said primary container and spaced therefrom, a removable insulated closure for said heat insulating chamber, means carried by said removable closure to control the pres-

70

75

80

85

90

95

100

105

110

115

120

125

130