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P. P. ALEXANDER

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VAPORIZER

Filed July 16, 1928

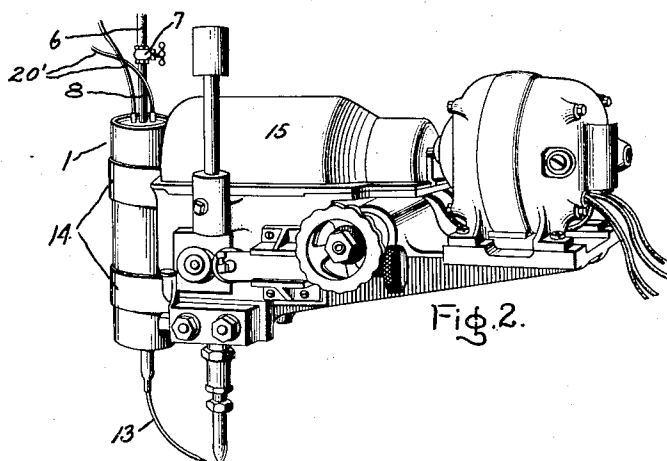


Fig. 2.

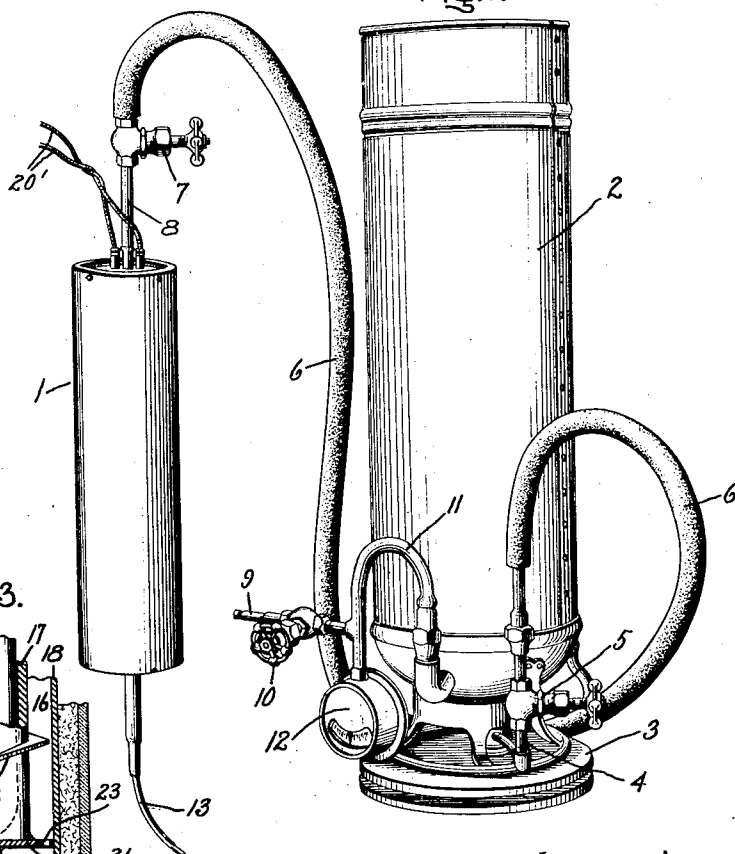


Fig. 1.

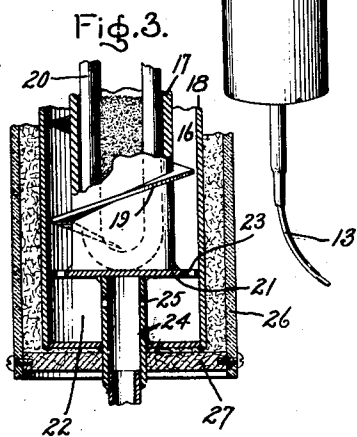


Fig. 3.

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UNITED STATES PATENT OFFICE

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VAPORIZER

Application filed July 16, 1928. Serial No. 293,255.

My invention relates to vaporizers by means of which liquid substances may be changed into vapors. More particularly my invention relates to an improved vaporizer for use in connection with arc welding apparatus when gaseous media or vapors dissociable into gaseous media are used during the welding operation to improve the physical characteristics of the weld. Among various substances recently called to the public's attention which when heated will supply a suitable vapor in which to conduct the welding operation are the alcohols, especially methanol. This substance which has the chemical formula CH_3OH will yield when decomposed by the arc a mixture of carbon monoxide and hydrogen in an atmosphere of which it is possible to produce welds of superior quality.

An object of my invention is to provide a vaporizer of improved construction in which a liquid such as methanol may be vaporized efficiently and completely and from which the vapor generated therein is discharged in a dry state.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, will best be understood by referring to the following specification taken in connection with the accompanying drawings in which Fig. 1 is a perspective view of the vaporizer with auxiliary apparatus for supplying liquid thereto, Fig. 2 a perspective view of an automatic arc welding head to which the vaporizer has been attached for use in automatic arc welding, and Fig. 3 is a sectional view of the discharge end of the vaporizer illustrating the internal construction of the same.

In Fig. 1 of the drawings the auxiliary apparatus for supplying liquid to the evaporator 1 comprises a tank 2 mounted on a suitable base 3 and the pipe line 4 including valve 5 and hose 6 by means of which liquid is supplied from the tank to the vaporizer through needle valve 7 and pipe 8 which enters the vaporizing chamber of the vaporizer. It is important that pipe 8 be of a suitable length, diameter and/or material such that

heat cannot readily be conducted from the vaporizer to the valve 7 for if the valve 7 becomes sufficiently heated some vaporization of the liquid supplied will take place at the valve and the formation of gas bubbles in the pipe 8 resulting therefrom will prevent an even, uninterrupted supply of liquid to the vaporizer. Slight variations in the amount of liquid supplied to the vaporizer will cause enormous variations in the amount of vapor generated in the vaporizer. For example, under operating conditions using a vaporizer such as is being described for the production of methanol vapor, one cubic centimeter of liquid will give about 500 cubic centimeters of vapor.

The desired liquid, for example methanol, and a quantity of some suitable gas sufficient to create a relative high pressure within the tank 2 to force the liquid therefrom may be introduced into the tank through pipe 9, valve 10 and pipe 11. If the tank be placed in an elevated position relative to the vaporizer the force of gravity alone may be relied upon for feeding the liquid to the vaporizer. I prefer however to apply the pressure of a suitable gas to the surface of the liquid in the tank to positively feed the liquid to the vaporizer independently of the relative positions of the tank and vaporizer. While this liquid and gas is being supplied to the tank the valve 10 is open but as soon as the desired quantity has been supplied the valve 10 is closed and the apparatus for supplying the liquid and gas may thereafter be removed. In the drawings the apparatus for supplying the liquid and gas is not shown. The pressure in the tank 2 may be indicated by a pressure indicator or gauge 12. The flow of liquid to the vaporizer 1 may be controlled by both valves 5 and 7 although it will be preferable to open wide the valve 5 and secure the desired control by means of the valve 7 conveniently located at the vaporizer.

The vaporizer is of general utility and may be used for various purposes. When used in connection with automatic arc welding it may be desirable as shown in Fig. 2 to attach it by suitable clamps 14 to the automatic welding head 15 used to maintain the arc

length substantially constant during the welding operation by feeding the electrode wire to the weld at the proper rate of speed to replace it as it is melted away and deposited in the weld. I have found it desirable to direct the blast of vapor issuing from the vaporizer nozzle 13 about the arc and backward over the molten portions of the metal.

The construction of my vaporizer is best shown in Fig. 3 which is a sectional view of the lower portion thereof. Liquid is supplied to the vaporizing chamber 16, defined by the walls of containers 17 and 18, onto a baffle 19 mounted within the chamber in heat conducting relation with the wall of container 17. The baffle illustrated is of spiral or screw form and extends the full length of the chamber 16. Within the container 17 is a suitable heating means, for example an electric heater 20, which may be formed of sheathed wire such as described and claimed in the patent to Charles C. Abbott No. 1,367,341 granted February 1, 1921. This heater may be energized from any suitable supply of electric current through conductors 20' (shown in Fig. 1). The space between the heater element 20 and the wall of the container 17 is filled with copper filings or other suitable heat conducting material so that the heat generated within the heating element 20 is effectively conducted to and through the walls of the container 17 to the baffle 19 mounted thereon to which the liquid is supplied. The baffle 19 is spaced from the walls of the container 18 so that heat will not be conducted from the heating element 20 to the external container.

Within the lower portion of the vaporizer is a plate 21 which serves to define the lower portion of the chamber 16. The plate also forms in the lower portion of the container 18 a second chamber or well 22 which is connected with the vaporizing chamber 16 by passageways 23 located in the plate. Extending through the well or chamber 22 is a pipe 24 which makes contact with the plate 21 which in turn is directly in contact with the heating element 20 located in container 17. The pipe 24 serves as a discharge pipe for vapors generated in the vaporizer, the vapors entering the pipe through intake openings 25 located near the top portion of the well chamber 22 and to one side of the passageways 23 connecting the vaporizing chamber 16 and the well 22. By adopting this construction liquid falling into well 22 is prevented from entering pipe 24 and being discharged therethrough along with the vapor generated in chamber 16. Any excess liquid not vaporized in the chamber 16 will be collected in the well 22 and the vapors generated in the chamber 16 will pass through passageways 23 and intake openings 25 through the discharge pipe 24 to the nozzle 13 from which they will be discharged.

By connecting the discharge pipe in the manner shown it will be readily heated by the heating element 20 and because of this heating vapor generated in the chamber 16 will not be condensed in the pipe 24.

The vaporizer as a whole is enclosed in an insulating casing 26 closed at its ends by asbestos boards 27 between which and container 18 asbestos flour or other suitable heat insulating material may be placed. In the illustration the various parts are shown joined one to another by means of welding with the exception of the insulating casing 26 and the ends 27 which are screw connected. It is, of course, obvious that any suitable means may be used for joining the several parts in the assembled relationship described so long as vapor-tight joints are formed in the vaporizer.

The method of operation is as follows: A suitable amount of liquid and gas is introduced into the tank 2 through the pipe 9, valve 10 and pipe line 11, after which the valve 10 is closed. Valve 5 previously closed is now opened to its full extent and after the heater 20 has been energized for a sufficient length of time to heat the interior of the vaporizer valve 7 is opened to such an extent that the desired amount of liquid flows from the tank 2 through the pipe 4, valve 5 and hose 6 into the vaporizer. The liquid supplied to the vaporizer falling upon the heated spiral baffle 19 is vaporized and the resulting vapor flows from chamber 16 to the chamber 22 through the passageways 23 connecting the two chambers. Into chamber 22 any excess liquid not vaporized in the chamber 16 will likewise descend and collect. Means may be provided for withdrawing superfluous liquid from this chamber but generally such means are not found necessary if the heater is maintained at the correct temperature and the valve 7 is properly adjusted to supply the correct amount of liquid to chamber 16. From the chamber or well 22 the vapor flows through the intake openings 25 into the discharge pipe 24 which is heated by reason of being in contact with the heating element 20. The vapor on traversing the heated discharge pipe 24 remains in the dry state in which it exists within the vaporizer and is supplied at the point of consumption in this dry state.

It is apparent to those skilled in the art that various modifications may be made in the vaporizer described without departing from my invention which has been shown and described in connection with one arrangement which clearly illustrates it and I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A vaporizer comprising a container, heating means in said container, means for introducing liquid into said container in contact with the upper portion of said heating means, and a pipe extending through the bottom of said container into thermal contact with said heating means for conducting vapor from said container, said pipe having its intake opening located a substantial distance above and arranged to prevent the collection of liquid falling to the bottom of said container.

2. A vaporizer comprising heating means, a baffle supported in heat conducting relation therewith, a chamber within which said baffle is located the free ends of said baffle being spaced from the external walls of said chamber, means for heat insulating the external surface of said chamber, means for introducing a liquid into said chamber and onto said baffle, and means in heat conductive relation with said heating means for conducting vapor from said chamber.

3. A vaporizer comprising heating means, a baffle in heat conductive relation therewith, a chamber within which said heating means and said baffle are located, means for introducing a liquid into said chamber and onto the top portion of said baffle, means for controlling the rate of flow of liquid to said chamber, a second chamber for collecting excessive liquid located beneath said first chamber, a passageway connecting said chambers, and means in heat conducting relation with said heating means for conducting vapor from said second chamber.

4. A container, a heat insulating covering for said container, means for dividing the top portion of said container into a heating chamber and a vaporizing chamber, heating means in said heating chamber, a baffle in said vaporizing chamber supported on said heating chamber in heat conductive relation with the heating member in said chamber and spaced from the external walls of said vaporizing chamber, means for introducing a liquid into the top portion of said vaporizing chamber onto said baffle, a well in the bottom portion of said container for collecting excess liquid descending from said vaporizing chamber, means connecting said vaporizing chamber and said well, and a vapor discharge pipe extending through said well and connected in heat conductive relation with said heating chamber having intake openings near the top portion of said well.

5. A vaporizer comprising an electric heater, a container for said heater, a packing having good heat conducting properties between said heater and the walls of said container, a second container in which said first container is located in spaced relationship to form a vaporizing chamber, a spiral baffle mount-

ed in heat conducting relation on the external wall of said first container, means for introducing a liquid into the top portion of said vaporizing chamber onto said spiral baffle, a well in the bottom portion of said vaporizer, means for connecting said well with said vaporizing chamber, a vapor discharge pipe extending through said well into heat conductive relation with the heating element and having intake openings located near the top portion of said well and to one side of the connecting passageway between said vaporizing chamber and said well, and means for heat insulating the external surface of said vaporizer.

In witness whereof, I have hereunto set my hand this 12th day of July, 1928.

PETER P. ALEXANDER.