May 28, 1968 G. K. PORTER 3,385,578

ANESTHESIA APPARATUS

Filed Sept. 28, 1966

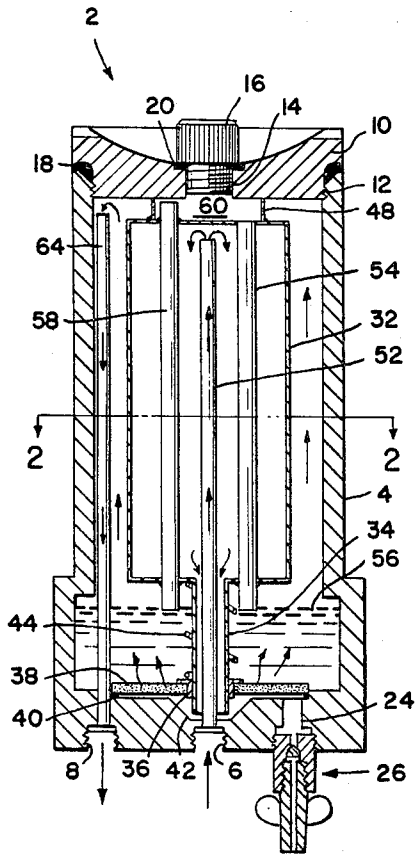


FIG. 1.

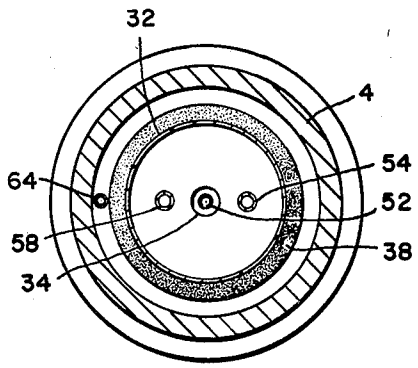


FIG. 2.

INVENTOR

GARY K. PORTER

BY Fisser Bonnell & Harding

ATTORNEYS

United States Patent Office 3,385,578 Patented May 28, 1968

3,385,578

ANESTHESIA APPARATUS

Gary K. Porter, Hatboro, Pa., assignor to Fraser Sweatman Incorporated, Buffalo, N.Y., a corporation of New York

Filed Sept. 28, 1966, Ser. No. 582,683
4 Claims. (Cl. 261—122)

This invention relates to anesthesia apparatus and more particularly relates to a vaporizer for mixing the vapor of a volatile liquid anesthetic agent such as ether with a gas vehicle such as oxygen.

Vaporizers for mixing volatile liquid anesthetics with a gas are well known to the art. With the heretofore known devices the patient is subjected to a substantial risk of series harm resulting from the overfilling of the liquid anesthetic into the vaporizer causing an overflow through the outlet conduit leading to the patient. It is one of the main purposes of this invention to solve this problem by providing a novel vaporizer having means which automatically limit the level of the liquid anesthetic when the vaporizer is charged therewith.

The invention and its operation will be clarified by a reading of the following description in conjunction with the drawings in which:

FIGURE 1 is a vertical section of a vaporizer in accordance with the invention; and

FIGURE 2 is a horizontal section taken on the plane indicated by the line 2—2 in FIGURE 1.

A vaporizer 2 in accordance with the invention has a metal tank 4 provided with a threaded gas inlet opening 6 for the reception of a gas supply line (not shown) and a gas-vapor threaded discharge opening 8 for connection to a discharge line (not shown). A cap 10 is threadably secured to the upper open end of tank 4 as indicated at 12. Cap 10 is provided with a large threaded fill opening 14 in which is removably secured a threaded plug 16. Gasketing 18 is provided between cap 10 and tank 4 and gasketing 20 is provided between plug 16 and cap 10. A drain opening 24 is controlled by drain valve 26.

A metal canister 32 is mounted within tank 4 with its extended neck 34 pointed downwardly. Neck 34 passes through a flanged collar 36 mounted in a porous ring 38 of, for example, sintered metal which rests on an O-ring 40 and overlies a recessed portion 42 in tank 4. Ring 38 is such that it will permit the passage of a gas such as oxygen with little resistance and will cause the gas to emerge as fine bubbles. Suitable sintered metals are known to the art with a typical commercially available one being "Porex" produced by the Moraine Products Division of General Motors Corporation. Plate 38 is held down by a compression coil spring 44 which surrounds neck 34 and extends between collar 36 and canister 32.

A ring 48 is fixedly secured to the upper end of canister 32 as viewed in FIGURE 1 and is forced upwardly against cap 10 by the action of spring 44.

A gas inlet line 52 extends upwardly from opening 6 through neck 34 and into the upper end of canister 32 as viewed in FIGURE 1. Conduit 52 is spaced from neck 34 permitting the gas discharging into canister 32 from conduit 52 to pass downwardly between conduit 52 and neck 34 into recessed portion 42.

A conduit 54 extends downwardly through canister 32 to a point slightly below the desired liquid level indicated at 56, albeit the lower end of conduit 54 could be carried down lower. A conduit 58 extends from a point within ring 48 downwardly through canister 32 to the desired liquid level 56. It will be noted that ring 48, cap 10 and canister 32 in effect form a chamber 60 with conduit 54 extending downwardly from the bottom chamber 60 and the conduit 58 extending downwardly from a point substantially above the bottom of chamber 60. Conduits 54 and 58 are secured to canister 32 by brazing or the like.

OPERATION

In order to fill the vaporizer 2, plug 16 is removed and the liquid anesthetic agent is poured through opening 14 into chamber 60. The liquid runs downwardly through conduit 54 through canister 32 and into tank 4. As liquid passes downwardly through conduit 54 the displaced air passes upwardly through conduit 58 into the upper part of chamber 60 and out opening 14, it being appreciated that this is the only escape route for the air when openings 6 and 8 are connected to a gas inlet and a gas-vapor discharging line respectively. When the liquid rises to the level indicated at 56 air can no longer flow through conduit 58, and hence the flow of liquid into tank 4 ceases thus preventing charging more liquid into tank 4 than is desired and positively preventing the possibility of liquid anesthetic from passing out through conduit 64 which connects the upper part of tank 4 to discharge opening 8. With plug 16 replaced in opening 14, the vaporizer 2 can now be operated by passing gas, for example, oxygen through conduit 52 from whence it passes downwardly into recessed portion 42 and thence upwardly through sintered metal ring 38 and through the liquid anesthetic in the form of bubbles to facilitate the vaporization thereof. The gas-vapor mixture passes upwardly in tank 4 to enter conduit 64 and thence pass to the exterior of the vaporizer.

The cleaning or replacing of sintered ring 38 is very readily accomplished by simply removing cap 10 which permits canister 32 to be pulled out of tank 4. Sintered ring 38 may then be lifted out directly. This simple construction facilitates cleaning and replacement of parts.

It will be understood that the above described embodiment is merely by way of illustration and is not intended to be limiting.

What is claimed is:

1. A vaporizer for mixing the vapor of a volatile liquid anesthetic agent with a gas vehicle comprising:
- a tank to contain the liquid anesthetic agent having an opening in its upper end,
- means for passing bubbles of a gas through the liquid anesthetic agent,
- conduit means having an inlet end in said tank and discharging to the exterior of the vaporizer to provide for the discharge of the gas vapor mixture from the vaporizer, and
- means for preventing overfilling of the tank comprising means forming a chamber in the tank communicating with said tank opening,
- an air conduit extending downwardly from a point within the chamber and above the bottom of the chamber to the desired liquid level in the tank; and
- a liquid fill pipe extending from the bottom of the chamber downwardly at least as far as the air conduit.

2. A vaporizer for mixing the vapor of a volatile liquid anesthetic agent with a gas vehicle comprising:
- a tank to contain the liquid anesthetic agent having an open upper end,
- closure means removably secured to said upper end and having a fill opening,
- closure means removably secured to the fill opening,
- a porous ring spaced from the bottom of the tank below the operating level of the liquid anesthetic,
- an inverted canister in the tank having its neck extending down through the center of the porous ring,
- means to supply a gas to the canister and to cause the gas to flow upwardly through the porous ring,
- conduit means having an inlet end in the upper portion of the tank and discharging to the exterior of the vaporizer to provide for the discharge of the gas-vapor mixture,

means mounted on the exterior of the upper end of the canister to form with the canister and the first mentioned closure means a chamber below the fill opening,

an air conduit extending downwardly from a point above the bottom of the chamber and through the canister to the maximum desired liquid level in the tank, and

a liquid fill pipe extending downwardly from the bottom of the chamber and through the canister at least as far as the air conduit.

3. A vaporizer in accordance with claim **2** having compression spring means urging the porous ring downwardly and the canister upwardly.

4. A vaporizer in accordance with claim **3** in which the means to supply a gas includes a conduit passing upwardly through the center of the canister neck and spaced therefrom.

References Cited

UNITED STATES PATENTS

156,949	11/1874	Rush	261—17
2,342,602	2/1944	Reitz	128—188
2,437,526	3/1948	Heidbrink et al.	261—121 XR
2,485,739	10/1949	Johnstone	261—122
2,623,014	12/1952	Kloth	261—121

FOREIGN PATENTS

614,143	2/1961	Canada.
640,274	4/1962	Canada.

HARRY B. THORNTON, *Primary Examiner.*

E. H. RENNER, *Assistant Examiner.*