

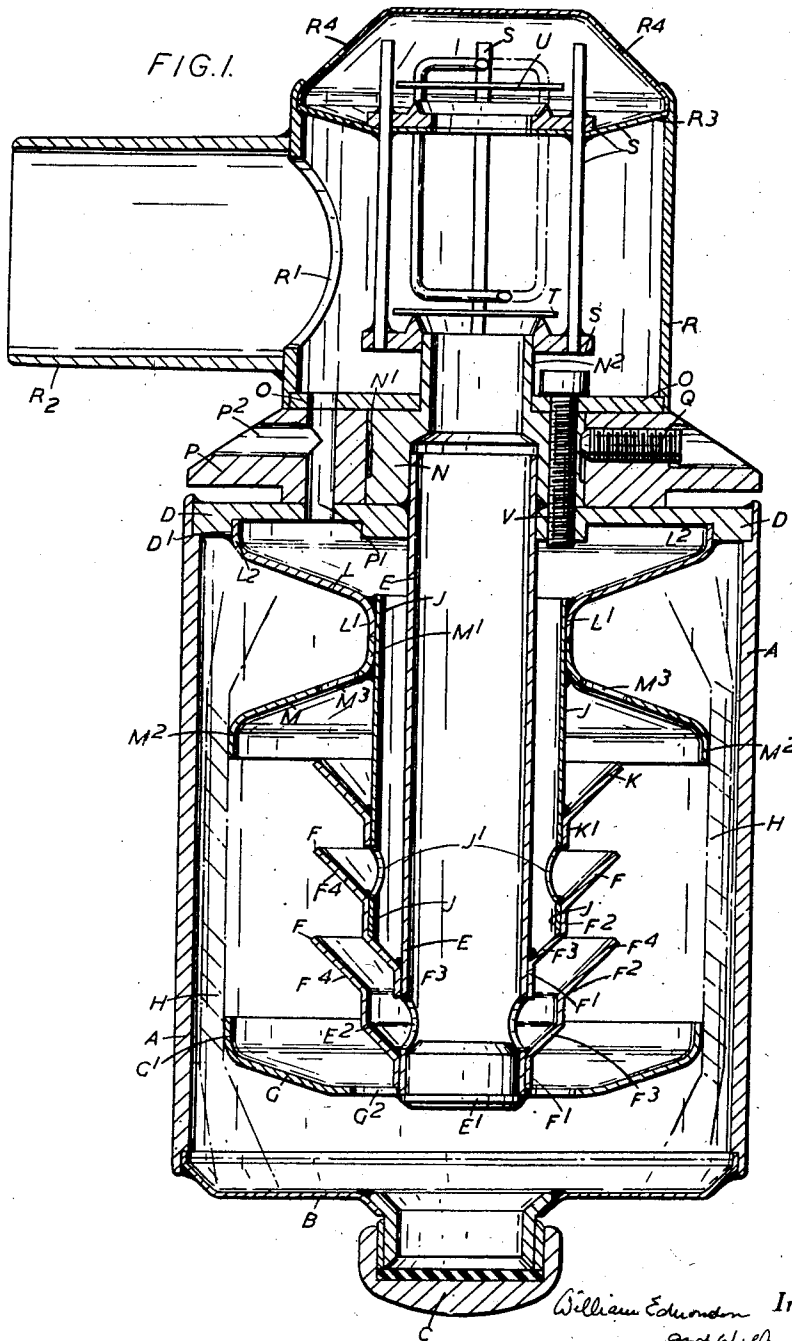
March 7, 1950

W. EDMONDSON ET AL
APPLIANCE FOR THE PRODUCTION AND ADMINISTRATION
OF GAS VAPOR MIXTURES

2,499,734

Filed Nov. 26, 1948

2 Sheets-Sheet 1



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FIG. 2.

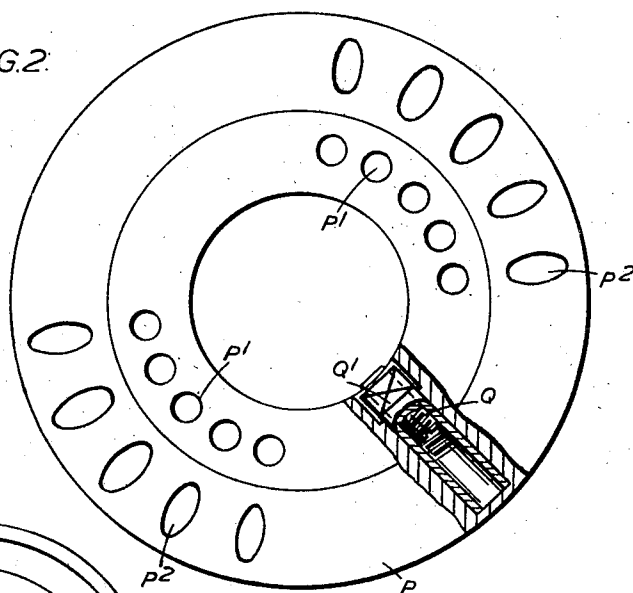


FIG. 3.

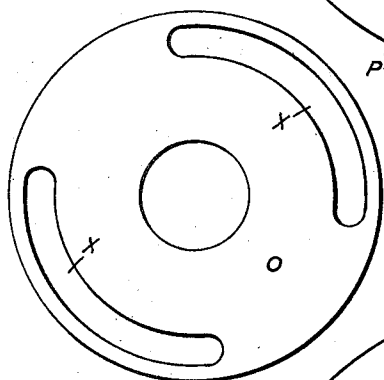
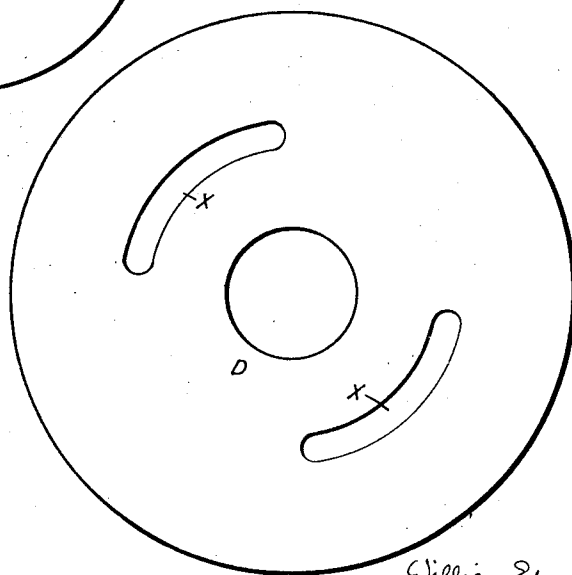


FIG. 4.



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APPLIANCE FOR THE PRODUCTION AND
ADMINISTRATION OF GAS VAPOR MIX-
TURESWilliam Edmondson and Wilfred Jones,
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4 Claims. (Cl. 128—197)

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This invention relates to a small portable analgesia appliance for the use of anaesthetists and general practitioners for midwifery and minor surgical cases where full anaesthesia is not required; also for light anaesthesia, and it is particularly intended for use as a trichlorethylene air inhaler but may be used for producing and administering other mixtures.

The invention has for its object to introduce an improved construction of appliance which will be as small and light as possible consistent with strength, so that it can be comfortably held in the hand, will prevent any splashing of the liquid, hereinafter referred to as mixture due to shaking or other causes, from passing in liquid form to the patient; will maintain consistency of mixture at a given setting in any position, that is to say, whether the appliance is held in a vertical, inclined, or horizontal position; will enable the mixture to be adjusted over a wide range so that differing requirements of the patient may be met, and so that the anaesthetist or doctor may study the effect of various settings and decide for himself on the one that proves to be most suitable, and will prevent the setting from being altered by the patient.

According to this invention, the appliance comprises a small vessel containing concentrically arranged perforated tubes encircled by baffle plates surrounded by a circular wick, in combination with a rotary air mixing valve interposed between two ported valve plates and provided with key actuated means, whereby it can be turned by the key to any required setting position and locked by the key. An expiratory and non-return valve is also incorporated in the appliance and the latter is provided with a lateral tube which can be plugged directly into a standard face piece.

In order that the said invention may be clearly understood and readily carried into effect, the same is described more fully with reference to the accompanying drawings, in which:

Fig. 1 is a view shewing the appliance in section.

Fig. 2 is a plan view of the rotary air mixing valve.

Figs. 3 and 4 are plan views of the ported valve plates.

A form of appliance for carrying out the invention comprises a tubular cylinder A, closed at one end by a cover plate B that is welded or otherwise fixed to it and provided with a screw cap C, or other closure for charging and emptying purposes. The other end is fitted with a ported valve plate D that is formed with an axial hole for the

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passage of a tube E which extends into proximity to the cover plate and is closed by a flanged plug E¹. Fixed on the latter, between the flange and the end of the tube, is an annular disc G which may be slightly dished and have a flange G¹ extending around its outer edge, and a ring of holes G² extending around its inner edge. The flange on the disc points away from the screw cap and is situated a short distance away from the tubular wall and contacts with the inner surface of a tubular wick H, which extends from the cover plate B to the ported valve plate D or thereabouts.

Formed in the tube in proximity to the plug, are one or more holes E², and fixed on the tube at each side of the hole or holes, is a conical baffle plate F. Each of these baffle plates is formed with two cylindrical portions F¹, F² and two conical portions F³, F⁴. The cylindrical portion F¹ of one baffle plate extends around the tube at one side of the hole or holes E² and abuts against the flanged disc G, and the other cylindrical portion F¹ of the other baffle plate F extends around the tube at the other side of the hole or holes. The cylindrical portion F² on the baffle plate, last mentioned, forms a seating for an outer tube J which encircles the tube E. The tube J is formed with one or more holes J¹ which occupy a position between the conical baffle plate F in which it is seated, and another conical baffle plate K, which is formed with a cylindrical portion K¹ to fit on the tube J on which it is fixed.

The end of this tube terminates a short distance away from the ported valve plate D in which the inner tube is fixed, and is encircled by two conical baffle plates L, M. The baffle plate L has an internal flange L¹ which is fixed on the outer tube and an external flange L² which may be the same diameter as the flange G¹ at the end of the inner tube. The external flange L² is fixed in a circular recess D¹ in the valve plate D and supports that end of the outer tube J. The conical baffle plate M has an internal flange M¹ which is fixed on the outer tube J and an external flange M² which extends into proximity to the tubular wall of the apparatus and contacts with the tubular wick H. It is also formed with one or more holes M³ in proximity to its inner flange, and when the two conical flanges are assembled on the outer tube, they form an annular V-shaped channel in which the end of the circular wick may terminate.

The inner end of the tube E projects through a hole in the valve plate D, and forms a spigot for a tubular boss N which is fixed on the spigot and to the valve plate. Rotatable on the tubular boss between the valve plate D and a smaller

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fixed valve plate O, is a rotary valve plate P having one or more ports P¹, which may consist of an interrupted circle of holes formed through it forming two perforated portions between two blank portions as shewn in Fig. 2. Each of these holes has a radial or other passage P² which communicates with the atmosphere. Each fixed valve plate D and O may be formed with two curved ports X situated between two blank portions as shewn in Figs. 3 and 4, the curved ports in one plate being situated at an angle of 90° to the ports in the other plate so that the holes in the rotary valve can be brought wholly or partly into registration with the ports in either plate or be entirely closed by being presented to the blank portions in either plate.

The rotary valve P can be fixed in any of its adjusted positions by means of a screw Q which can be turned by a key to cause its inner end to bear against an annular groove N¹ formed in the tubular boss N on which the valve is rotatable and fix the latter in its set position. For this purpose the screw may be formed with a hexagonal or other non-circular hole, and the key, when inserted in the hole, can be used as a lever for turning the valve to any of its adjusted positions. This key must be kept by the anaesthetist or other authorised person, so that the setting can not be interfered with by the patient or be accidentally disturbed by an unauthorised person. In the construction shewn in Fig. 2, the screw is situated in a headed sleeve Q¹ (Fig. 2) that is placed in a hole formed in the rotary valve P, the head of the sleeve and a portion of the hole being so shaped as to prevent rotation of the sleeve. The latter is threaded internally for a portion of its length to enable the screw to be clamped against the bottom of the groove N¹ but prevent it from coming out of the sleeve and becoming lost. In this construction the key is inserted in the sleeve for turning the valve. The exterior of the rotary valve may be graduated to work in conjunction with an indication mark to show the position to which the valve has been set.

The tubular boss N on which the rotary boss is free to turn is reduced in diameter at N² to form a shoulder which acts as a seating for the smaller valve plate O and such portion of reduced diameter passes through the valve plate and centralizes it. The peripheral portion of the plate enters a circular rebate in the wall of a cap R that is soldered or otherwise secured to it, and this wall is formed with an opening R¹ around which is fixed or formed a lateral tube R² which can be plugged directly into a standard face piece.

Fixed on the top of the portion of reduced diameter of the tubular boss, is a valve arrangement S containing a non-return valve T and an expirator valve U, the said arrangement being further supported by entering a circular rebate R³ in the top of the cap wall. The cap or cover for the latter wall may comprise a metal stamping that is suitably shaped to fit in the rebate and be secured by turning the end of the rebated portion over inwardly, or it may be fixed in any other suitable manner. The cap is formed with one or more apertures R⁴ which communicate with the atmosphere.

Extending through the fixed disc, tubular boss and cover plate is a tube V provided with a head which projects beyond the fixed disc.

When the appliance is in use, as the patient inspires, air is drawn through the branch pas-

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sages P² in the rotary valve, and the stream of air is then divided or controlled according to the setting of such valve. For example, if the latter is set in a position in which mixture "off" may be indicated, all the air passes through the branch passages and through the port or ports in the smaller fixed valve plate, the port or ports in the larger fixed valve plate being covered by the blank portion or portions of the rotary valve. If the setting is "full on" air drawn through the branch passages passes through the port or ports in the larger fixed valve plate, the port or ports in the smaller fixed valve plate being closed by the blank portion or portions of the rotary valve. It then passes between the inner and outer concentric tubes and emerges through the hole or holes in the outer tube trichlorethylene chamber where it becomes mixed with the trichlorethylene vapour. It then passes through the port or holes in the inner tube, along the latter, past the non-return valve and to the patient.

On expiration, the gas passes through the expiratory valve and to the atmosphere through the holes R⁴ in the cap.

During expiration, the non-return valve closes and prevents wastage of the mixture by expiration through same.

The construction and arrangement of baffle plates prevent the liquid from splashing into the face piece in whatever position the apparatus is held.

Consistency of mixture is obtained for any given setting of the valve, in whatever position the appliance is held.

The adjustment of the mixture percentage is made by inserting the key into the set screw, unscrewing the latter slightly rotating the valve, using the key as a lever, and locking by gently tightening the screw.

What we claim as our invention and desire to secure by Letters Patent of the United States is:

1. A portable analgesia appliance of the character described, including the combination of a casing; a plurality of perforated tubes concentrically disposed within the casing; a plurality of baffle plates encircling said perforated tubes; a substantially cylindrical wick surrounding the baffle plates; a pair of ported valve plates fixed within said casing; and a rotary air-mixing valve disposed between said ported valve plates.

2. A portable analgesia appliance of the character described, including the combination of a casing; a plurality of perforated tubes concentrically disposed within the casing; a plurality of baffle plates encircling said perforated tubes; a substantially cylindrical wick surrounding the baffle plates; a pair of ported valve plates fixed within said casing; a rotary air-mixing valve disposed between said ported valve plates; and an expiratory non-return valve operably mounted in said casing.

3. A portable analgesia appliance of the character described, including the combination of a casing; a plurality of perforated tubes concentrically disposed within the casing; a plurality of baffle plates encircling said perforated tubes; a substantially cylindrical wick surrounding the baffle plates; a pair of ported valve plates fixed within said casing; a rotary air-mixing valve disposed between said ported valve plates; a key; and a key actuated means for turning the rotary air-mixing valve to any selected position by means of the key and locking the latter valve in the selected position by said key.

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4. A portable analgesia appliance of the character described, including the combination of a casing; a plurality of perforated tubes concentrically disposed within the casing; a plurality of baffle plates encircling said perforated tubes; a substantially cylindrical wick surrounding the baffle plates; a pair of ported valve plates fixed within said casing; a rotary air-mixing valve disposed between said ported valve plates; an expiratory non-return valve operably mounted in said casing; a key; and a key actuated means for turning the rotary air-mixing valve to any selected position by means of the key and lock-

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ing the latter valve in the selected position by said key.

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WILFRED JONES.

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The following references are of record in the file of this patent:

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