(No Model.) 2 Sheets—Sheet 1.

A. M. LONG.

APPARATUS FOR COMBINING ANÆSTHETIC AGENTS.

No. 301,377. Patented July 1, 1884.

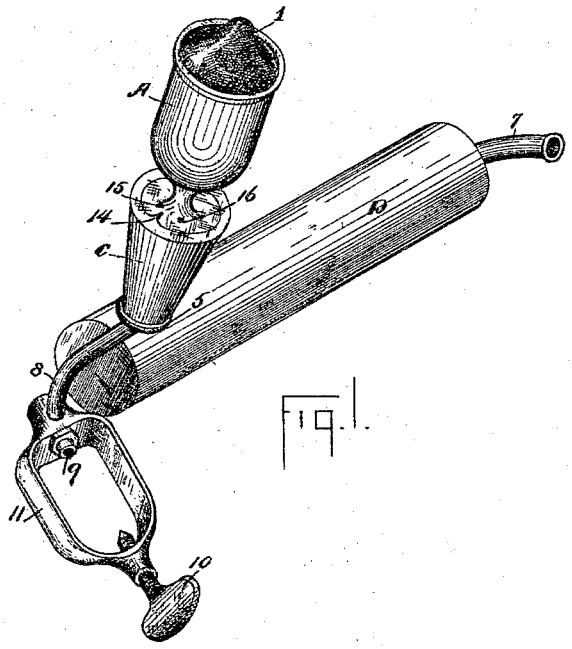
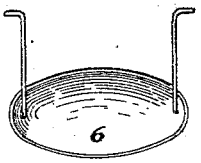


Fig. 1.

Fig. b.



Witnesses;
Edwin F. Murdock
A. J. Willard

Inventor;
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By A. Peck.
Atty.

(No Model.) 2 Sheets—Sheet 2.

A. M. LONG.

APPARATUS FOR COMBINING ANÆSTHETIC AGENTS.

No. 301,377. Patented July 1, 1884.

Fig. 2.

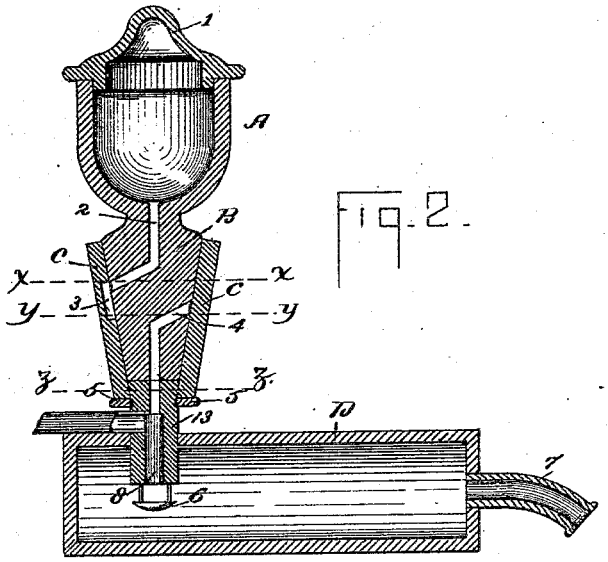


Fig. 3.

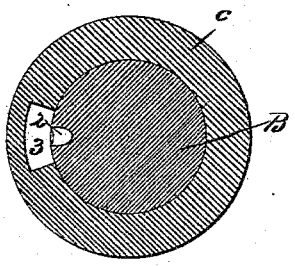


Fig. 4

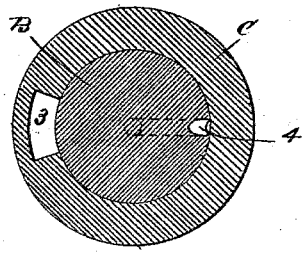
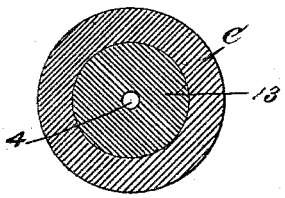


Fig. 5.



Witnesses:
E. Murdock
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UNITED STATES PATENT OFFICE.

AMOS M. LONG, OF MONROE, MICHIGAN.

APPARATUS FOR COMBINING ANÆSTHETIC AGENTS.

SPECIFICATION forming part of Letters Patent No. 301,377, dated July 1, 1884.

Application filed March 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, AMOS M. LONG, a citizen of the United States, residing at Monroe, in the county of Monroe and State of Michigan, have invented a new and useful Improvement in Apparatus for Combining Anæsthetic Agents, of which the following is a specification.

The object of my invention is to provide a simple and effective apparatus for combining the vapors of chloroform with nitrous-oxide gas for the purposes of inhalation. I secure this object by bringing the gas into intimate contact with a given quantity of chloroform, thus vaporizing the liquid and securing its thorough combination with the nitrous-oxide gas.

Figure 1 represents a perspective elevation of the apparatus. Fig. 2 represents a sectional elevation showing the arrangement of the several parts of the device. Fig. 3 represents a transverse section drawn on line *x x* of Fig. 2. Fig. 4 represents a transverse section drawn on line *y y* of Fig. 2. Fig. 5 represents a transverse section drawn on line *z z* of Fig. 2. Fig. 6 represents the evaporating-plate within the diffusion-chamber.

Like letters and figures represent like parts.

A is the cup which holds the chloroform; B, the cup-standard, in which orifices or tubes are made for the liquid to pass from the cup to the measuring-chamber, and from the chamber to the diffusion-chamber, into which the cup-standard is fitted.

2 is the supply orifice or passage. 3 is the measuring-chamber. C is the sleeve in which said chamber is formed.

4 is the discharge-orifice, which drains the measuring-chamber when the sleeve is so turned as to bring the chamber and the orifice together.

The indicator 14 (shown in Fig. 1) is intended to guide the operator in the filling and draining of the measuring-chamber. The indicator is part of or rigidly attached to the sleeve. When placed at 15, the measuring-chamber is brought opposite the supply-orifice, and is thus filled with the fluid. By turning the sleeve so that the indicator rests at 16, the chamber is brought opposite the discharge orifice or tube, thus allowing the fluid to pass down into the vaporizing-plate, where it is brought into contact with the current of nitrous-oxide gas passing into the diffusion-chamber D through supply-pipe 8.

13 is a ferrule, which fits firmly into the top of the diffusion-chamber D, and into which the lower end of the standard B is fitted. This ferrule has a screw-thread cut on its outer surface, upon which the sleeve-shoulder 5 is made to run. The purpose of this shoulder is to hold the sleeve C in position and to tighten it when necessary.

7 is the pipe leading from the diffusion-chamber D to the holder, from which the gas is to be inhaled. It is placed at the center of the cylindrical chamber-head, so as to secure the best attainable circulation and mixture of the nitrous-oxide gas and the chloroform vapors before they pass into the holder for administration.

The diffusion-chamber may be of any size which convenience or necessity suggests; but a cylinder from two to three inches long and from three-quarters of an inch to an inch in diameter will be found sufficient for ordinary use.

The cup, standard, and chambered sleeve may be made of any suitable material, glass, however, being preferable, on account of its being entirely free from the objection urged against the use of metallic holders for vaporizing fluids.

The ferrule 13 at the base of the cup-standard and the shoulder upon which the sleeve rests should be made of metal.

The vaporizing-plate 6 should be slightly concave on its upper surface, and may be made of any suitable material, preferably glass, and held in position immediately below the mouth of the gas-supply pipe within the diffusion-chamber by any approved means.

The measuring-chamber may be formed in a slide having a vertical or horizontal movement while passing from the supply to the discharge orifice, instead of the rotary movement of the sleeve, as shown. I prefer, however, the chambered sleeve as being best adapted to secure the objects in view.

The discharge-orifice leading from the meas-

uring-chamber may be channeled on the periphery of the standard, and instead of a circular a channel of an oblong cross-section may be made, as best calculated to secure a free descent of the fluid, the sleeve covering the exterior of the channel, so as to form a closed passage.

If a metallic cup should be used, a glass-holder for the chloroform may be constructed so as to be placed within the cup, and the measuring-chamber filled directly therefrom.

The mode of operating this device is as follows: When the combination of the gas and chloroform is to be made, the apparatus is attached to the feed-pipe of the main supply-tank by means of the yoke 11 at the end of supply-pipe 8. At 9 the supply-pipe connects with the main pipe, and is held thereon by the yoke and set-screw 10. The chloroform is then placed in the cup, and to it may be added equal parts of alcohol. The cover 1 is then securely fastened. When the holder is attached to pipe 7, the gas is turned on, the measuring-chamber filled with the fluid, as already described, and drained into the diffusion-chamber, the fluid not taken up by the gas at the moment of contact falling upon the vaporizing-plate, where it quickly passes off into vapor and becomes absorbed by the nitrous-oxide gas.

What I claim as new and of my invention and for which I desire to secure Letters Patent of the United States is—

1. In an apparatus for combining anæsthetic agents, the combination of cup A, standard B, sleeve C, measuring-chamber 3, supply orifice or tube 2, discharge-orifice 4, evaporating-plate 6, diffusion-chamber D, gas-supply pipe 8, outlet-pipe 7, ferrule 13, and sleeve-shoulder 5, arranged and combined substantially as set forth and described.

2. In an apparatus for combining anæsthetic agents, an evaporating-plate within a chamber and adjusted to receive and hold in a current of gas the fluid to be vaporized, in combination with an inlet pipe or opening for the fluid, an inlet-pipe for the gas, and an outlet-pipe for the combined gas and vaporized fluid, substantially as set forth.

3. In an apparatus for combining anæsthetic agents, in combination with a cup and standard, a sleeve on said standard, a measuring-chamber formed in the inner surface of the sleeve, the exterior surface of the standard acting as a wall to said chamber, a pipe or orifice leading from the cup to the periphery of said standard, a pipe or orifice leading from the periphery of the standard to the evaporating-chamber, said pipes or orifices communicating alternately with the measuring-chamber by the rotation of the sleeve on said standard, substantially as set forth.

4. In an apparatus for combining anæsthetic agents, a sleeve having a measuring-chamber formed in its inner surface, in combination with a standard upon which said sleeve revolves, the periphery of which forms a wall of the measuring-chamber, and containing inlet and outlet orifices communicating with said measuring-chamber alternately by means of the revolution of said sleeve, substantially as set forth.

5. In an apparatus for combining anæsthetic agents, an evaporating-plate within a chamber and adjusted to receive and hold in a current of gas the fluid to be vaporized, in combination with a measuring-chamber and its discharge-orifice, and the gas-supply pipe, substantially as set forth.

6. In an apparatus for combining anæsthetic agents, in combination with a measuring-chamber and the inlet and outlet pipes thereof, an indicator, as shown and described, attached to a sleeve on the cup-standard, whereby the connection of the measuring-chamber and said inlet and outlet pipes may be indicated, substantially as set forth.

AMOS M. LONG.

Witnesses:
THOMAS PLUES,
GEORGE H. ELLIS.