

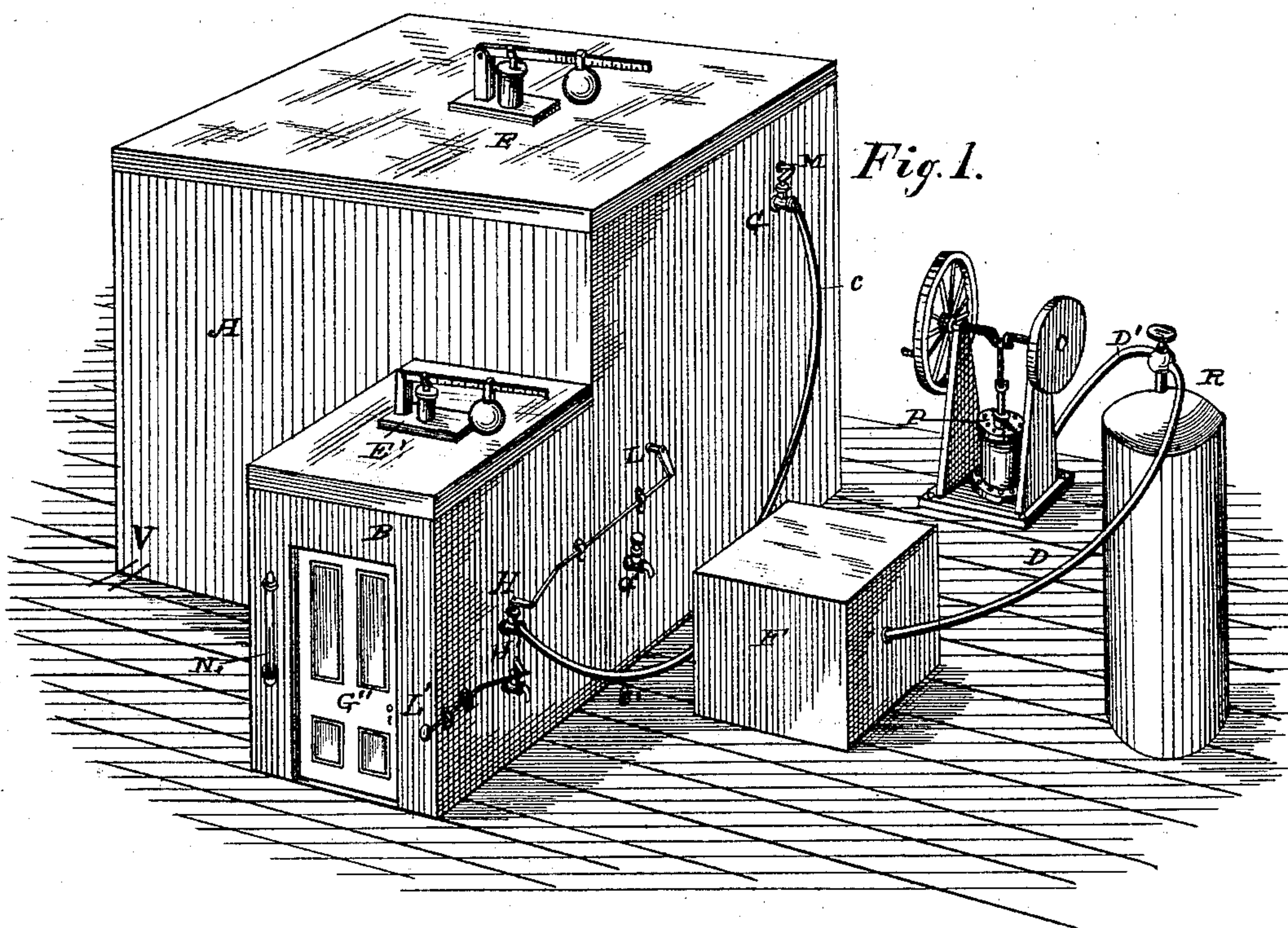
(No Model.)

E. P. HOWLAND.

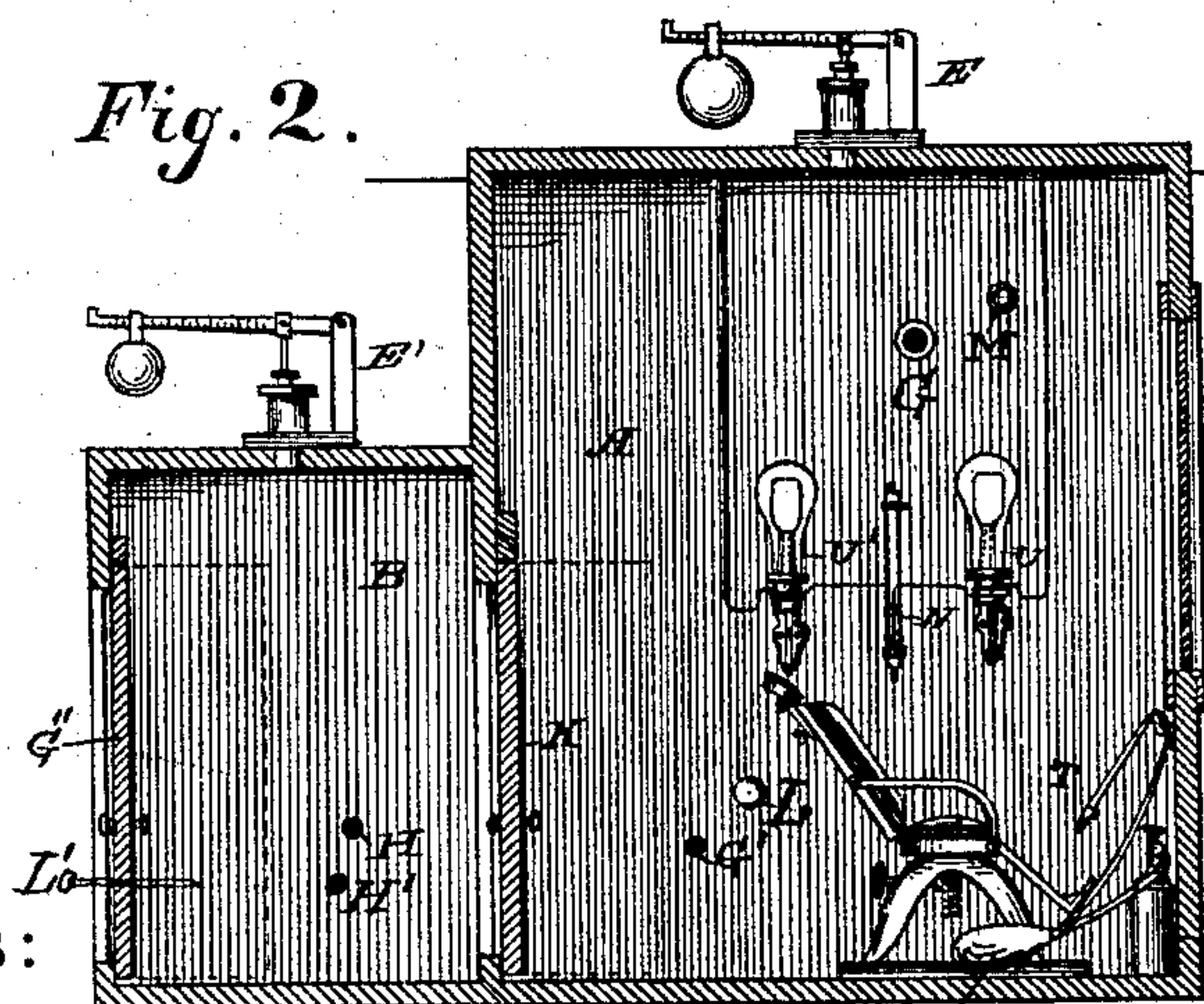
INHALING AIR CHAMBER FOR DENTAL AND SURGICAL OPERATIONS, &c.

No. 280,040.

Patented June 26, 1883.



*Fig. 2.*



Witnesses:

*Aug<sup>d</sup> Jordan*  
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# UNITED STATES PATENT OFFICE.

EDWIN P. HOWLAND, OF WASHINGTON, DISTRICT OF COLUMBIA.

INHALING AIR-CHAMBER FOR DENTAL AND SURGICAL OPERATIONS, &c.

SPECIFICATION forming part of Letters Patent No. 280,040, dated June 26, 1883.

Application filed May 12, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN P. HOWLAND, of Washington, in the District of Columbia, have invented certain new and useful improvements  
5 in condensed-air chambers in which to administer nitrous oxide and air or nitrous oxide and oxygen to persons to produce anæsthesia for dental and surgical operations; and I do hereby declare that the following is a full,  
10 clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of a condensed-air chamber constructed in accordance with  
15 my improved method. Fig. 2 is a sectional view of the same.

Letters of like name and kind refer to like parts in each of the figures.

The design of my invention is an apparatus  
20 for the purpose of administering nitrous oxide and air or nitrous oxide and oxygen in a condensed-air chamber, to produce anæsthesia in persons to whom it is administered, and at the same time oxygenate the blood and pro-  
25 duce anæsthesia for short or long dental and surgical operations, without the dangerous and unpleasant effects of ether and chloroform, and at the same time have the air of the chamber free from impurities and germs of bacteria that  
30 might inoculate the patient during operations from infected air in contact with open wounds. In the administration of nitrous oxide for dental and surgical operations as ordinarily administered, the gas has to be almost absolutely  
35 free from air or oxygen, and does not arterialize the blood, and, if continued without breathing air or oxygen, will produce asphyxia, thereby requiring great skill and experience in administering it for prolonged operations,  
40 and therefore the gas has not come into general practice for these operations. A certain amount of nitrous oxide taken into the lungs in a given time is necessary to produce anæsthesia, and it can be diluted with any innocu-  
45 ous gas and still produce anæsthesia, provided this amount is inhaled in the given time. Under pressure in a chamber more gas is breathed in a given time, as the nitrous oxide is condensed the same as the air in the cham-  
50 ber, and under a pressure of two atmospheres two volumes of nitrous oxide would be con-

densed into one volume, so that the nitrous oxide could be diluted with equal measures of atmospheric air and still the quantity of nitrous oxide inhaled would be the same as if breathed  
55 ordinarily, and the quantity of air breathed sufficient to arterialize the blood. When a mixture of nitrous oxide and oxygen is breathed in a condensed-air chamber, a less degree of compression of air in the chamber will pro-  
60 duce anæsthesia and oxygenation of the blood than when the mixture is nitrous oxide and air.

My invention to obtain the results stated consists, principally, of an air-chamber, cham-  
65 ber-recess, filtering-chamber, condensed-air reservoir, pump, pipes, cocks, valves, doors, sliding rods, a condensed nitrous oxide and air or nitrous oxide and oxygen reservoir, gas-  
bag, and breathing apparatus. 70

I will now proceed to more particularly describe the construction and operation of my invention, referring in so doing to the draw-  
75 ings annexed by letters of reference marked thereon.

A is a strongly-constructed air-chamber for withstanding pressure, in which dental and surgical operations are performed.

B is a chamber-recess, with an outer door, G', and an inner door, K, so arranged that  
80 persons can pass into and out of the air-chamber A without interrupting operations or discharging air from air-chamber A; H, cock in chamber-recess B, connected by pipes C' and D with filtering-chamber F and condensed-air  
85 reservoir R, so that condensed air can be admitted to chamber B and discharged from cock H' without affecting or changing the pressure of the air in the air-chamber A, consequently  
90 not altering the proportions of gas being breathed by the patient.

L is a sliding rod connected with cock H, and passing through a stuffing-box into air-  
95 chamber A, and used for opening and shutting cock H.

L' is a sliding rod connected with cock H', and passing through a stuffing-box to outside of chamber-recess B, and used for opening and  
100 shutting cock H'.

F is a filtering-chamber filled with material, through which the air in passing is freed from  
impurities and infectious germs.



R is a large condensed-air reservoir, filled by pump P through pipe D'.

G is a cock in air-chamber A, and connected by pipes C and D with filtering-chamber F and air-reservoir R, so that condensed air can be admitted to air-chamber A. G' is a cock for discharging air from air-chamber A.

M is an automatic valve to open and shut cock G at required pressure in air-chamber A, so that in filling chamber-recess B with condensed air from reservoir R no condensed air can be drawn from air-chamber A through pipe C and equal pressure kept in air-chamber A at all times.

E is an automatic valve for regulating the pressure of air in air-chamber A and for ventilation of chamber.

E' is an automatic valve for regulating the pressure of air in the chamber-recess B.

R' is a condensed-gas reservoir for nitrous oxide and air or nitrous oxide and oxygen.

S is a gas-bag in connection with gas-reservoir R' and mouth-piece T, through which the patient inhales.

U and U' are incandescent electric lamps for illuminating the air-chamber A.

V are wires in connection with electric supply for cauterization and surgery.

N and N' are gages for registering pressure of air in air-chamber A and chamber-recess B.

The chambers are operated as follows: The air-chamber A, having been previously filled with condensed air to the required pressure, the patient and attendants enter the chamber-recess B through the door G''. The cock H is then opened till the pressure in the chamber-recess B is the same as in air-chamber A, when the door K is opened and the patients and attendants enter the air-chamber A. The condensed nitrous oxide and air or nitrous oxide and oxygen is then administered to the patient for any length of time that it is necessary to perform the dental or surgical operation. In passing out of air-chamber A when operations are being performed the chamber-recess B is entered through the door K, the cock H' is opened, and the condensed air is discharged from chamber-recess, when egress can be had through door G'' without affecting pressure in air-chamber. In passing out of air-chamber A, if the con-

denser air in chamber-recess B has been discharged, the cock H is opened by the sliding rod L till the condensed air in chamber-recess B has the same pressure as air-chamber A. When the chamber-recess is entered by door K, the condensed air is then discharged from chamber-recess by cock H', when egress can be had through door G''. In entering air-chamber A when chamber-recess B is filled with condensed air, the condensed air in chamber-recess B is first discharged by opening the cock H' by means of the sliding rod L, when the chamber-recess is entered by door G'', and then filled with condensed air by opening cock H till the pressure is same as air-chamber, when the air-chamber can be entered by door K.

Having thus fully set forth the nature and merits of my invention, what I desire to claim and secure by Letters Patent is—

1. The combination of the air-chamber A with chamber-recess B, filled with condensed air independently from air-chamber A, as and for the purposes shown and described.
2. The combination of the air-chamber A and chamber-recess B with the air-filtering chamber F, to free the air from impurities and infectious germs before entering air-chamber A and chamber-recess B, substantially as and for the purpose set forth.
3. The combination of the air-chamber A and chamber-recess B with the sliding rods L and L', for opening and shutting cocks H and H', for the purpose of letting condensed air into and out of chamber-recess B, substantially as set forth and described.
4. The combination of the air-chamber A, chamber-recess B, and other devices, as described, with the automatic valve M, for opening and shutting cock G at required pressure in air-chamber A, so that in filling chamber-recess B with condensed air from reservoir R no condensed air can be drawn from air-chamber A through pipe C, and equal pressure kept in air-chamber A at all times, substantially for the purpose shown.

EDWIN P. HOWLAND.

Witnesses:

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