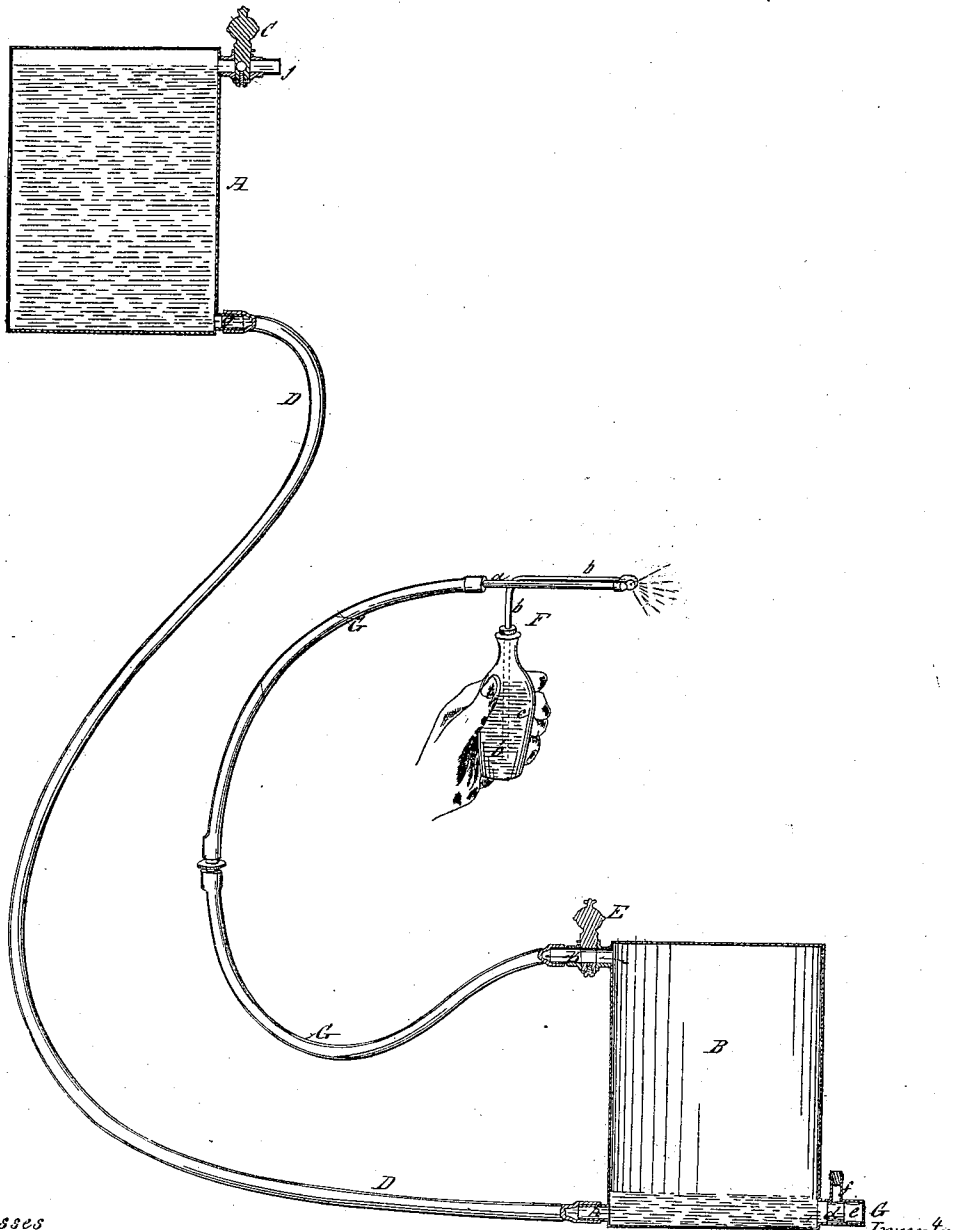


C. H. HUDSON.
APPARATUS FOR DIFFUSING LIQUIDS.

No. 77,286.

Patented Apr. 28, 1868.



Witnesses
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United States Patent Office.

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Letters Patent No. 77,286, dated April 28, 1868.

IMPROVED APPARATUS FOR DIFFUSING LIQUIDS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, CHARLES HODGE HUDSON, of the city of Roxbury, in the county of Norfolk, and State of Massachusetts, have invented an Improvement in Apparatus for Atomizing Liquids, which I call an "Exsufflator;" and I do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawing, which represents a vertical section of the air and water-vessels, the connecting-tubes being shown in view.

The use of atomized liquids in the treatment of disease, and in the production of local anæsthesia by refrigeration, is assuming importance in medical science, and various forms of apparatus have been devised for the atomization of the liquids employed, and their application in various modes and positions.

The atomizing-tubes of Bergson are the basis of most of these forms of apparatus, the devices added to them being intended to produce the current of air necessary to the process. Bergson used, for the production of the air-current, two hollow rubber balls, connected with the air-tube of the atomizer by a piece of rubber tubing. One of the balls acted as an air-chamber, to maintain a uniform pressure in the stream of air, while the other, by being rapidly compressed and released by the hand of the operator, acted as a bellows to supply the current of air required. In another form of apparatus, a common forcing-syringe is used to drive the air-current through the tube leading to the air-tube of the atomizer. In both of these cases, the presence of an assistant is necessary, or the labor imposed upon the operating-hand of the surgeon has a tendency to unfit it for the delicate manipulation essential to the proper performance of its duties.

To obviate some of the difficulties attendant upon the use of the hand-apparatus, a steam-atomizer has been devised, in which the air-current is replaced by a jet of steam from a small boiler heated by a lamp. It is claimed, as the chief merit of this instrument, that, being self-acting, it produces an even and continuous flow of spray without inconvenience or labor. The warmth of the spray is also claimed as an advantage in some cases, but it is evidently objectionable when local anæsthesia is to be produced by refrigeration.

The nature of my invention consists in the construction of an automatic apparatus for producing, maintaining, and regulating an equal and continuous air-current by the application of hydrostatic pressure, the apparatus being simple, portable, and always ready for use, and free from the objections which exist to the hand and steam-instruments, and capable of being adapted to the ordinary head of water found in cities, supplied from elevated reservoirs on the modern system, all as hereinafter more particularly set forth.

To enable others to make and use my improved apparatus, I will proceed to describe its construction and operation, referring to the drawing, wherein A marks a can or vessel of suitable size, provided at top with a pipe, *j*, controlled by a cock, C, and at bottom with an outlet-pipe, *g*, to which is attached the upper end of a flexible rubber tube, D. The tube D may be from eight to fifteen feet long, and connected at its lower end to pipe *h* at the bottom of a second can, B. Can B is similar in size and general construction to can A. Its upper end is provided with a pipe, *k*, controlled by the cock E. To pipe *k* is attached one end of the flexible-rubber tube G, the other end of which is attached to the air-tube *a* of the atomizer. The other tube, *b*, of the atomizer descends through a cork into the bottle *c*, which serves to contain the liquid to be atomized, whether water, ether, rhigolene, or any other that may be required or preferred.

The lower end of can B is provided with a regulating-apparatus adapted to relieve any excess of pressure over the amount required, which may arise from too great a head of water. Such excess will generally exist in cases where the ordinary water-head of town and city water-works is employed. The regulating-apparatus is contained in the tube G, which has an overflow-pipe, *f*, controlled by a movable plunger, *d*, working against spring *e*, which may be of rubber or metal. The tension of the spring is so-adjusted that any excess of pressure will so compress it as to allow the plunger *d* to pass beyond the opening of the overflow-pipe, and permit the escape of water through that outlet.

The mode of operation of the apparatus is as follows: Cock E being closed, can A is filled with water through pipe *j*, and cock C is closed. Can A is then placed at a height of about eight or ten feet above can B, ten feet being the head which I have found to answer well in practice in ordinary cases. The atomizer being

in readiness, the cocks C and E are opened, when the water in can A descends tube D and rises in can B, driving out the air contained in that vessel through the flexible tube G, and out at the air-tube of the atomizer in a regular and continuous stream, the duration of which will depend upon the size of the cans employed. When the air rushes out of tube *a* of the atomizer, a tendency to a vacuum is created in the tube *b*, and the fluid contained in the bottle *c* flows out in a stream of fine spray, which is directed by the operator upon any part of the body designed to be subjected to its action. The can A having emptied itself, the tube G is detached from pipe *k*, and attached to pipe *j* on can A, and the relative positions of the two cans are reversed for a repetition of the operation.

When the aqueduct-head is to be used, it is only necessary to employ the can B. The water is admitted through tube D, and, rising in can B, forces the contained air through pipe G, as before described. If the pressure exceeds the head required, the plunger *d* is driven past the overflow-aperture *f*, and the excess of pressure is relieved by the escape of water through that outlet.

Two or more atomizers may be operated at the same time by my apparatus, without diminishing the pressure, by connecting with the air-vessel two or more tubes for the escape of air. In some surgical operations this is important:

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is--

1. In an apparatus for atomizing liquids, the use of a hydrostatic blower, substantially as described, in combination with an adjustable reservoir for supplying a head of water which will produce more or less pressure in the air-vessel or blower, as may be required.
2. The combination of the cans A and B and tube D, constructed and operating substantially as described.
3. In an apparatus for applying hydrostatic pressure to produce a current of air to operate an atomizer, a regulating-device, substantially as herein described, acting automatically, to adapt the apparatus to the use of an excessive head of water without affecting the strength or evenness of the air-current.
4. In an apparatus for applying hydrostatic pressure to produce a current of air to operate an atomizer, a regulating stop-cock in the tube leading from the air-vessel to the atomizer, to vary or stop the flow of air, substantially as described.

The above specification of my said invention signed and witnessed at Boston, this 30th day of August, A. D. 1866.

CHARLES HODGE HUDSON.

Witnesses:

SAM. W. BATES,
CHAS. F. STANSBURY.