

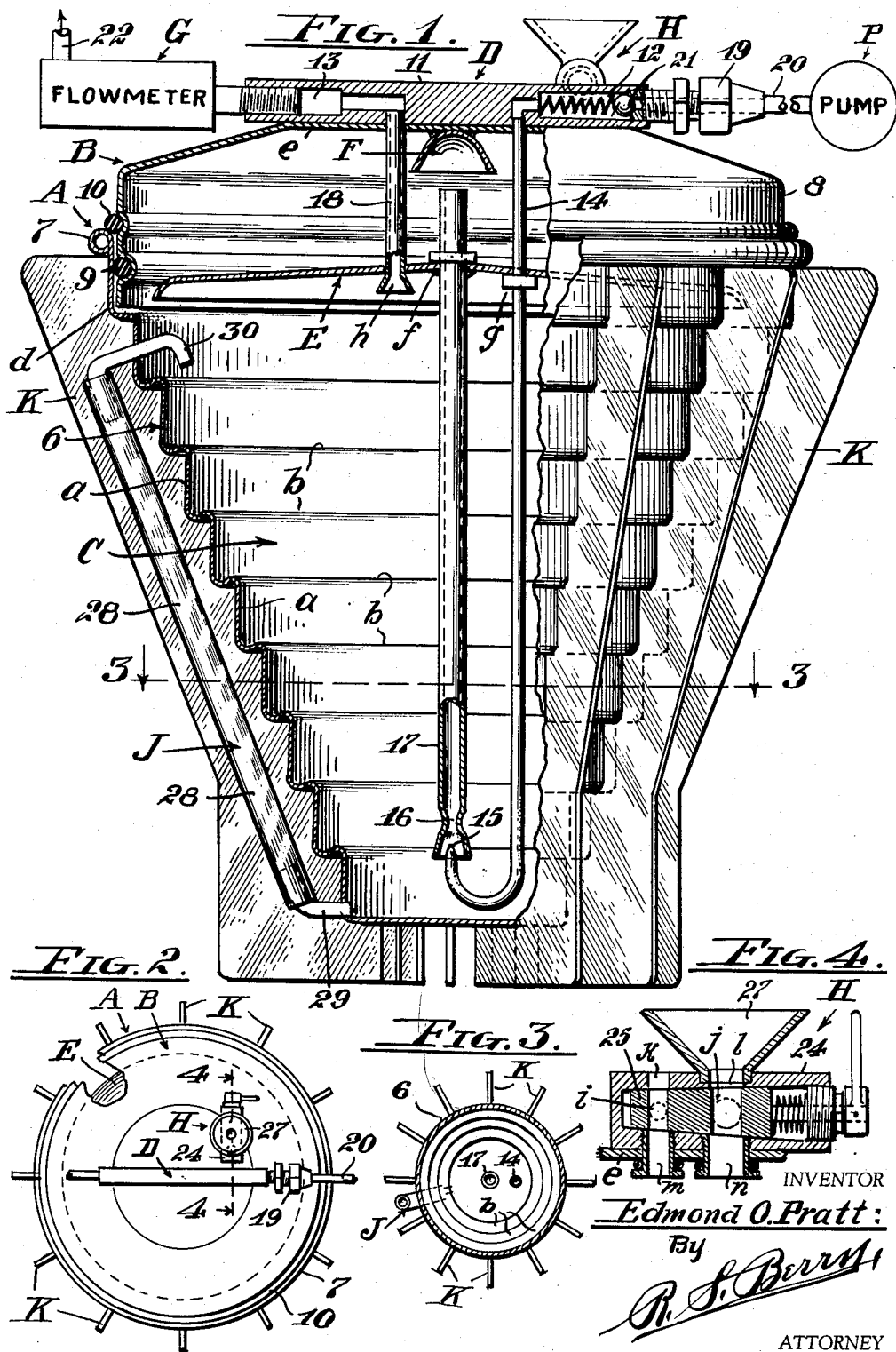
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ETHER VOLATILIZER

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ETHER VOLATILIZER

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5 Claims. (Cl. 261—14)

This invention relates to an apparatus for administering ether as an anesthetic and has as its primary object the provision of an apparatus for volatilizing ether which is capable of generating and maintaining a flow of gasified or volatilized ether of uniform concentration thereby facilitating its use in anesthetization and rendering such use more positive and definite in its effects than where the ether is volatilized under conditions resulting in excessive variations in its concentration.

Another object is to provide a means for producing volatilized ether at an even slightly lower than room temperature and at slightly above normal atmospheric pressure and in such manner as to obviate condensation or freezing of fluid in the apparatus and without the aid of heating or temperature regulating appliances.

A further object is to provide a construction whereby the above recited results are obtained by directing an air stream at room temperature through a body of liquid ether in a fashion to cause the air stream to conduct the liquid ether to an elevated point in an enclosed chamber and there cause the liquid to be diffused and cascaded downward over the inner face of the chamber side walls and be collected in part in a series of separated open troughs on the latter and by effecting the recited operation at a maintained substantially even temperature by equipping the walls of the enclosed chamber with outwardly projecting radial vertically extending heat conducting fins adapted to absorb heat from the surrounding atmosphere and conduct it to the side walls of the chamber for absorption by the latter with resultant prevention of excessively low temperature in the volatilizer.

With the foregoing objects in view together with such other objects and advantages as may subsequently appear, the invention resides in the parts and in the combination, construction and arrangement of parts herein-after described and claimed, and illustrated by way of example in the accompanying drawing in which:

Fig. 1 is a view of the volatilizer partly in vertical section and partly in elevation;

Fig. 2 is a plan view with portions broken away;

Fig. 3 is a detail in horizontal section taken on the line 3—3 of Fig. 1; and

Fig. 4 is an enlarged detail in vertical section taken on the line 4—4 of Fig. 2 showing a valve controlled filler appliance with which the volatilizer is equipped.

Referring to the drawings more specifically A indicates generally a basin constituting an ether receptacle, which basin is of generally inverted truncated form and has an open upper end fitted with a removable cover B. The basin and cover are preferably formed of sheet metal such as copper and collectively form an enclosed volatilizing chamber C.

The side wall 6 of the basin A is formed with a series of inwardly offset steps comprising side walls *a* and dished top walls *b*, the walls *a* being here shown as extending parallel with the axis of the frusto-conical basin but which obviously may be slightly inclined. The walls *b* form shallow annular troughs for collecting bodies of

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liquid ether directed downwardly over the side wall 6 of the basin as will be later described.

The upper end of the basin A is formed with a marginal rolled rim 7 from which leads downwardly a slightly inwardly inclined side wall portion *d*. The rim 7 and wall *d* form a seat for the cover B, which as here shown embodies an annular side wall 8 the lower portion of which is adapted to be positioned within the open end of the basin A in close proximity with the wall *d*. The wall 8 carries a pair of spaced parallel circumferentially extending resilient sealing rings 9 and 10 of which the ring 9 bears tightly against the inner face of the wall *d* and the ring 10 seats snugly on the inner marginal portion of the rolled rim 7. By this arrangement the cover B may be readily removed from the basin A to give access to the interior thereof, when need be, by merely lifting the cover from the basin, yet when the cover is in place on the basin it will tightly close the upper end of the latter and seal the volatilizing chamber therein.

Fixedly mounted on the top wall *e* of the cover B and extending transversely thereof is a distributor D embodying an elongated bar 11 one end of which is formed with an intake passage 12 and the other end of which is formed with a discharge passage 13. The inner ends of the passages 12—13 terminate in spaced relation to each other and open downwardly through the top wall *e* to the interior of the cover B.

Leading downwardly from the inner end of the intake passage 12 is a tube 14 the lower end of which is turned upwardly adjacent the bottom wall of the basin and terminates in a nozzle 15 which opens to a venturi like throat 16 on the lower end of a vertically disposed open ended tube 17 extending axially of the basin A with its upper end opening adjacent to the under side of the top wall *e* of the cover B. The tube 17 is carried on a horizontally extending distributor disk E arranged adjacent the upper end of the tube 17 and through the center of which the latter extends, the disk E being affixed to the tube 17 as by a soldered joint *f*.

The disk E is arranged in the space bounded by the side wall 8 of the cover B and has its outer margin spaced from but adjacent to the inner periphery of the cover side wall. The disk E inclines downwardly from its juncture with the tube 17 and has its outer margin downturned and directed toward the uppermost trough *b*.

The disk E is here shown as carried in part on a collar *g* mounted on the tube 14 which latter extends through the disk. The disk is also partly supported on the flared lower end *h* of a vertical discharge tube 18 which extends upwardly through the disk D and connects with the inner end of the discharge passage 13.

The intake passage 12 is connected at its outer end through a coupling 19 with a conduit 20 leading from a suitable source of supply of air under pressure such as a pump P. The passage 12 is equipped with a spring pressed normally closed check valve 21 adapted to open under the pressure of air delivered to the passage 12 from the conduit 20.

Mounted on the underside of the top wall *e* of the cover B in overlying relation to the open upper end of the tube 17, is a spreader F for directing fluid discharged thereagainst from the tube 17 and delivering it downwardly onto the inclined upper face of the disk E.

The outer end of the discharge passage 13 connects through a flow meter G with a discharge conduit 22 leading to the usual anesthetic applicator, not shown.

The cover B is equipped with a filler appliance H particularly shown in Fig. 4, which appliance embodies a housing 24 fitted with a rotary tapered valve 25 formed with a pair of longitudinally spaced transversely extending parallel passages *i* and *j* which when the valve 25 is in one position opens ports *k* and *l* in the housing 24 to

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passages *m* and *n* leading through the top wall *e* of the cover B to the interior of the latter, the valve 25 closing the ports *k* and *l* and passages *i* and *j* on being turned a quarter turn from the position shown in Fig. 4. The port *l* is equipped with a filling hopper 27.

When the valve 25 is positioned as shown in Fig. 4 on pouring ether into the hopper 27 it will be delivered through the port *l* and passages *j* and *n* into the space defined by the cover B and disk E and will be directed by the latter into the basin A. Air displaced by the in-
 10 flowing ether will be vented through the passages *m* and *i* and port *k*.

As a means for determining the volume of ether contained in the basin at any time the latter is equipped with a level indicator J consisting of a transparent tube 28 arranged contiguous the outer face of the side wall of the basin vertically thereof with one end of the tube 28 opening to the interior of the basin adjacent the bottom thereof through a connection 29 and with its upper end opening to the interior of the basin through a connection
 30 30.

A feature of the invention resides in equipping the basin A with a plurality of spaced heat conductive radial fins K extending vertically of the side wall 6 of the basin throughout the length thereof in abutting relation thereto with the inner portions of the fins conforming to the stepped contours of the basin. The lower ends of the fins are extended below the bottom wall of the basin to provide legs on which the latter may be supported.

In the operation of the invention a suitable quantity of ether is delivered into the basin through the appliance H as before described, sufficient ether being supplied to submerge the lower end of the tube 17 and nozzle 15. On thus placing the requisite amount of ether within the basin the valve 25 is turned to its closed position whereupon, when it is desired to vaporize the ether, air under low pressure is directed from the pump P through the conduit 20 from whence it flows past the valve 21 through the intake passage 12 and through the tube 14 and nozzle 15 so that on discharge from the nozzle the air stream will act to force ether through the throat 16 upwardly through the tube 17 from which the resultant mixture of air and ether will be directed into the space in the cover B above the disk E and will be directed over the margin of the latter into the basin A.

The ether thus delivered into the basin A will be in a thinly diffused state and on being directed over the downturned margin of the disk E will be directed downwardly in a finely divided state into the uppermost trough *b* wherein a shallow body of the ether may accumulate and on filling the uppermost trough *b* will overflow the latter and pass successively downward into and from the progressively offset troughs over the walls *a* in cascade fashion.

The flowing ether as well as any static body thereof in the basin will tend to evaporate and charge the air content of the chamber C with ether vapors, which action will be augmented by the stream of air delivered to the chamber C as above described flowing over the diffused liquid ether and passing to discharge through the tube 18, as well as by the intimate contact of the air stream with the ether flowing through the tube 17 and diffused above the distributor disk E.

The developed ether vapors will be directed, under the pressure of air delivered to the chamber C, to discharge through the tube 18, discharge passage 13, flow-meter 22, and conduit 23 to the usual ether applicator, not shown.

The unvaporized ether will flow progressively downward into the successive troughs *b* over the successive upstanding walls *a* while undergoing at least partial volatilization, such portion of the ether filling the successive troughs *b* with possibly a portion of the unvaporized ether returning to the body of ether contained in the

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lower portion of the basin F for subsequent circulation through the apparatus as above described.

While the air delivered to the chamber C is at room temperature it will be reduced on being brought into contact with the liquid ether which will be maintained at a substantially uniform temperature slightly less than room temperature by reason of the induction of heat through the walls of the volatilizer augmented by the increased surface area afforded by the fins K. By this arrangement
 5 either excessive overheating or cooling of the ether is prevented and whereby the ether vapors are formed in the volatilizer and discharged therefrom at a substantially uniform temperature and at a controlled pressure just slightly above atmospheric pressure generated and controlled by the pump P.

I claim:

1. In a volatilizer, a housing having a side wall surrounding a volatilizing chamber and having a lower end wall and being open at its upper end, a demountable cover closing said upper end, valved means for conducting liquid into said chamber through said cover, a distributor disk in the upper portion of said chamber suspended from said cover and having a margin spaced from but proximate to the housing walls, an open ended tube carried by and leading downwardly through said disk into said chamber, means for conducting air under pressure into the lower portion of said tube to cause the flow of liquid from said chamber upwardly through said tube into the space between said disk and cover, a series of successively inwardly offset troughs progressing downwardly along the housing wall, and means for conducting vapors from the upper end portion of said volatilizing chamber from immediately beneath and through said distributor disk and through said cover.

2. The structure called for in claim 1 in which the housing is formed with a series of vertically extending outwardly projecting heat conductive fins having lower ends extending below said lower end wall to form a support for said housing.

3. An ether volatilizer comprising a housing embodying a downwardly tapered lower portion including a side wall having an upper end and having a lower end, a cover portion having its margin connected to the upper end of said lower portion, said connected portions enclosing a volatilizing chamber, a series of inwardly offset downwardly progressing troughs within said chamber formed on the side wall of said lower portion, a horizontal distributor disk in said chamber carried by and suspended from said cover portion in spaced relation thereto, air conductive means for conveying ether from said reservoir to the space between said disk and cover, means for supplying air under pressure to said conductive means, said disk having a margin arranged to direct ether therefrom into the uppermost of said troughs, and means for conducting ether vapors from said chamber from immediately beneath and through said distributor and through said cover portion.

4. An ether volatilizer comprising a housing embodying a lower body portion and an upper cover portion detachably connected together and enclosing a volatilizing chamber; said lower body portion having a downwardly and inwardly converging side wall having a series of inwardly offset downwardly progressing spaced apart annular troughs therein and having a series of radially and vertically arranged heat conducting fins thereon extending throughout the length of said side wall and conforming at their inner margins to the transverse contours of said troughs, a horizontal disk in said cover portion spaced therefrom and carried thereby having a margin extending over the uppermost of said troughs, an open ended tube and carried thereby extending through said disk and projecting downwardly into said chamber, a venturi like throat in the lower portion of said tube, an air supply tube leading from above said disk into said

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chamber, a nozzle on said last named tube opening into the lower end of said first named tube below said throat, means for delivering air under pressure to said air supply tube, means for conducting liquid ether to said chamber above said disk, and means for conducting ether vapors from said vaporizing chamber from immediately beneath said disk.

5. An ether volatilizer comprising a basin having a horizontal bottom wall and an upwardly extending side wall formed of thin sheet metal, said side wall being of general inverted frustro-conical form and having a series of vertically spaced annular troughs on its inner periphery with the outer margin of the troughs connected to the inner margins of the adjacent troughs therebeneath by a portion of said side wall; a cover closing the upper end of said basin having a top wall; said cover and basin enclosing a volatilizing chamber; a horizontally extending distributor seated on said cover top wall having an intake passage in one end thereof and a separate discharge passage in its other end; means for delivering a stream of air under pressure to said intake passage; an air delivering tube connecting with said intake passage leading downwardly in said chamber to adjacent said bottom wall and having an upturned nozzle on its lower end; a horizontally extending distributor disk spaced downwardly from the cover top wall through which said tube extends; a discharge tube leading downwardly from said discharge passage through said cover top wall and through said

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disk and opening to said chamber beneath said disk; said disk being carried on said tube; an open ended ether delivery tube carried by said disk and extending axially therethrough with its upper end opening adjacent said cover top wall and with its lower end presented to said nozzle and formed with a venturi like throat above said nozzle and adjacent thereto; and a deflector on the underside of said cover top wall overlying the open upper end of said ether delivery tube.

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