(No Model.)

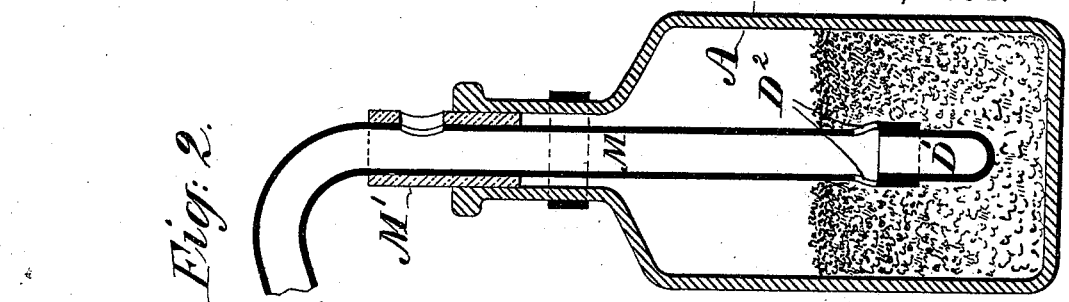
2 Sheets—Sheet 1.

A. L. LÖNNERBERG.

INHALING APPARATUS.

No. 526,906. Patented Oct. 2, 1894.

Fig: 2.



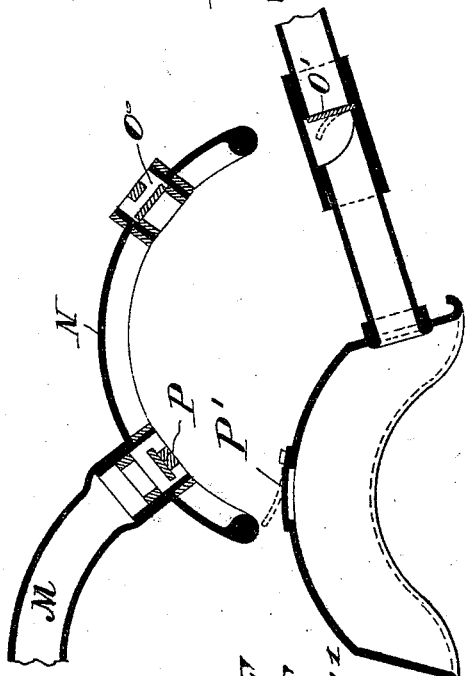
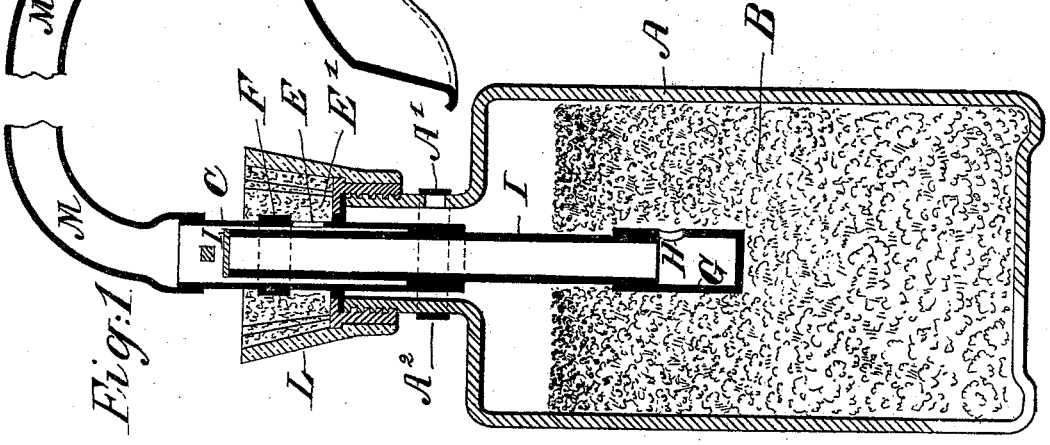


Fig: 1.



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WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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INHALING APPARATUS.

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Fig. 1.

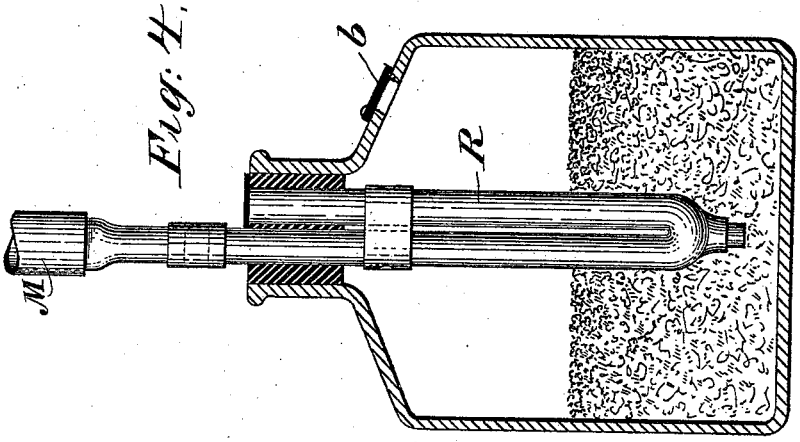
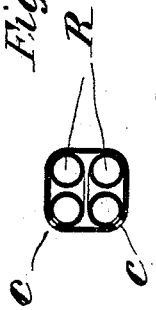


Fig. 4a.



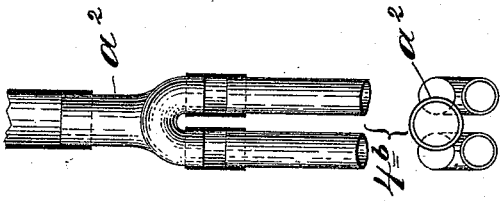


Fig. 4b.

Fig. 3.

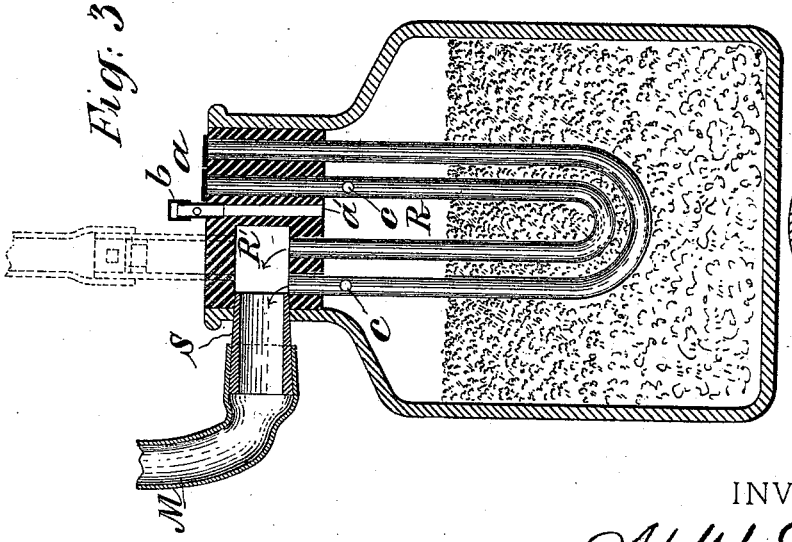
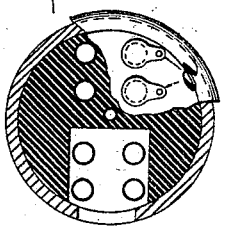


Fig. 3a.



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UNITED STATES PATENT OFFICE.

ADOLF LUDVIG LÖNNERBERG, OF STOCKHOLM, SWEDEN.

INHALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 526,906, dated October 2, 1894.

Application filed June 2, 1892. Serial No. 435,263. (No model.) Patented in Sweden December 12, 1891, No. 3,797, and March 18, 1892, No. 3,829; in Germany March 22, 1892, No. 67,717; in Norway March 23, 1892, No. 2,614; in England March 23, 1892, No. 5,751; in Belgium March 28, 1892, No. 98,992; in France April 1, 1892, No. 220,576; in Switzerland April 6, 1892, No. 4,999, and in Austria-Hungary March 12, 1893, No. 36,281 and No. 14,082.

To all whom it may concern:

Be it known that I, ADOLF LUDVIG LÖNNERBERG, a subject of the King of Sweden and Norway, residing at 8 Kungsholmsgatan, in the city of Stockholm, Sweden, have invented certain new and useful Improvements in Inhaling Apparatus, (for which patents have been granted in Sweden, No. 3,797, dated December 12, 1891, and No. 3,829, dated March 18, 1892; in Belgium, No. 98,992, dated March 28, 1892; in Norway, No. 2,614, dated March 23, 1892; in England, No. 5751, dated March 23, 1892; in France, No. 220,576, dated April 1, 1892; in Switzerland, No. 4,999, dated April 6, 1892; in Germany, No. 67,717, dated March 22, 1892, and in Austria-Hungary, No. 36,281 and No. 14,082, dated March 12, 1893,) of which the following is a specification.

This inhaling apparatus is principally intended to be used for the curing of any affection of the chest when a certain gas or gases or mixture of gas and air is to be inhaled, the apparatus being therefore so arranged that the relation between the air and the gas may be easily regulated. It may, however, also be used for inhaling air alone, for instance, when it is desired to have the air to be inhaled heated or purified.

The apparatus is of such dimensions that the person using same can carry it about while at the same time the gas is being developed with which the air to be inhaled is mixed. Consequently the user need not devote any attention to the apparatus nor is he inconvenienced thereby.

The apparatus consists essentially of a bottle or vessel containing the material or liquid from which the gas is to be generated, absorbed in a sponge, or in some solid, porous material, for instance charcoal, or it may be in liquid state. Into the bottle there descends a tube, provided within the bottle with an adjustable valve, through which the gas can ascend the tube, and at the outer end of which there is fixed a shield provided with valves and intended to be placed in front of the mouth. Through other valves the atmospheric air is drawn into the tube or the bottle, these valves being likewise adjustable so that the air arrives in the tube and the bottle at the same time in the same or in different proportions, or only in one of them at the same time. As to the passage of the air, this may be arranged in various ways. In the annexed drawings several constructions therefor are represented, which however do not differ from each other materially.

In the said drawings—Figure 1, is a sectional elevation of an inhaling apparatus embodying my improvements. Fig. 2, is a similar view illustrating another form of the apparatus. Fig. 3 is a similar view of another form. Fig. 3^a is a sectional plan of the upper part of the apparatus seen in Fig. 4. Fig. 4 is a sectional elevation of another form of the apparatus. Fig. 4^a is a detail sectional plan the plan of the section being through the neck of the generator vessel seen in Fig. 4. Fig. 4^b illustrates details which will be described.

Referring to Fig. 1 A designates a bottle inclosing a sponge, B, containing the material from which the gas is to be generated. Into the bottle there descends, through the neck thereof, a pipe C, containing a pipe D, which extends farther down into the bottle and is closely embraced by the lower end of the pipe C. On the lower end of the pipe D is fitted a cap, G, provided with a lateral opening H. The latter, through which the gas generated in the bottle enters the pipe D, can be made greater or smaller by pushing the cap up or down on the pipe D. A tube M connects the pipe C with a mouth-piece or shield N. This latter is provided with two valves, O and P, of which the former opens outwardly and the latter inwardly. The atmospheric air can enter the tube M through a hole E in the pipe C, which hole is covered by an air-filter E′ which may be cotton or wool, placed in an elastic collar L, fitted over the neck of the bottle, and the size of the opening E can be regulated by means of an adjustable collar F on the pipe C. The atmospheric air may likewise be let into the bottle. For this purpose there is a hole A′ in the neck of the latter, which hole can be closed or left more or less open by moving a rubber ring A^2 up-

ward or downward on the neck of the bottle. Finally the top of the pipe D is provided with a valve I opening toward the tube. If required to have the air to be inhaled only slightly mixed with the gas from the bottle, the hole A′ is closed and the cap G is adjusted so that the hole H is sufficiently open. When inhaling, the atmospheric air flows into the tube through the hole E and there suction takes place just as with an ordinary ejector in the pipe D. The gas and air are mixed in the tube and are inhaled through the valve P. The exhalation takes place through the valve O. If the hole H be further opened, more gas will enter the pipe D, and if the hole A′ be also opened and the hole E closed, the air inhaled will be still more mixed with gas, inasmuch as the atmospheric air, during the inhalation will then rush into the bottle and cause some pressure, wherefore gas and air will flow up into the tube in an active manner. It is thus possible to regulate the mixing of the air inhaled with gas with great exactitude.

In Fig. 2 the apparatus is represented somewhat simplified. The tube M here descends directly into the bottle through a sleeve-like stopper M′, inserted in the neck of the bottle, this stopper being provided with a lateral opening as is also the tube, and both of these lateral openings may be regulated by turning or displacing the tube and the sleeve in relation to one another. This regulation can, however, be effected in many other ways, for instance by causing the lateral opening of the tube to project more or less above the top of the sleeve, and the sleeve may consist of a pierced cork, or the tube itself may be closely fitted into the neck of the bottle. Into the lower end of the tube M there is inserted a small, closed glass tube or cap D′, and by pushing this tube more or less into the tube M, the lateral openings D^2 D^2 of the latter may be left more or less open. If the tube M consists of such a material as may be affected by the contents of the bottle, the end of the same entering into the bottle may be made of glass. The mouth shield is likewise simplified, as instead of the above described valve P, a small rubber plate, P′, is fixed outside of the shield and covers an opening in the latter and instead of the valve O the small flap O′ is used inserted in the tube. The shield may be maintained in place in front of the mouth of the patient by elastic string or straps round the head. These are not shown.

Figs. 3 and 3^a show the apparatus so arranged that it may be used either in the way described, or for heating the air to be inhaled, with or without simultaneous mixture with gas. Into the bottle there descends the curved end of one or more U-shaped pipes, R, one end of each of which rises through the stopper and the other ends enter into a chamber R′ in the stopper. A tubular nipple, S, is inserted into the chamber R′, and to this nipple is connected the inhaling tube. The nipple S may be inserted as shown by the full lines, or as shown by the dotted lines; that is, either horizontally or vertically. Adjustable valves *a* cover the outer ends of the pipes R, and the atmospheric air can also enter the bottle through another channel *a′* traversing the stopper, and which can likewise be closed more or less by means of a valve *b*. Within the bottle and in the pipes there are holes *c* so that the gas generated in the bottle may enter the pipes and pass into the tube. For persons suffering from phthisis the inhalation of hot air has proved useful. This ought then to be so much the more the case, if the air were mixed with some gas known to act benefically upon the lungs. The apparatus Fig. 3 is very well adapted for introduction of this kind. The bottle is placed in a vessel containing hot water or steam so as to be heated. The air passing into the apparatus through the valves *a* will thus be heated when passing through the pipes and in order that the air may be speedily heated and as little resistance as possible occur in inhaling, several pipes are inserted among which the passage of the air is distributed. Through valves *b* the atmospheric air may be let into the bottle with the view already stated.

The form of apparatus illustrated in Figs. 4 to 4^b differs from that last described substantially only in that both ends of the U-shaped pipe or pipes R pass through the stopper and that the tube M is connected directly to one end of the pipe. If several pipes be used (the figure shows two) the ends of the pipes may be coupled together by means of a branch pipe a^2, Fig. 4^b, with which the tube M is connected. The opposite ends of the pipes R are covered by adjustable valves *a* as in Fig. 3 and within the bottle there are holes in the pipes so that the gas may enter the same. The tube Figs. 3 and 4, is provided with lateral openings as at E Fig. 1, in order that the air may pass directly into the same, when it is not required to let the air pass through the pipes R the opening in the tube being, on the contrary closed, if the air is to go through the pipes. The apparatus Fig. 4, may also be used for the inhalation of heated air and with or without the addition of gas generated in the bottle. If heated air only is to be inhaled one has only to close the holes *c* and the valve *b* so that no gas may enter the pipes and air only enters the latter. In lieu of the hole A′ in the neck of the bottle Fig. 1, or the channel *a′*, Fig. 3, there can evidently be a hole in the body of the bottle covered by an adjustable valve plate. Such a valve A^3 is shown on the apparatus in Fig. 4. In lieu of the bottle A it is evident any other suitable vessel may be used.

The apparatus described may also be used for purifying the air to be inhaled. The bottle is therefore fitted with a filter, for instance made of cotton, with or without addition of other material depending upon the

nature of the air, and the air is caused to enter the bottle through the valves A′ *a*′ and the pipe or pipes through the valves *c*. The air will then be purified during its passage through the filter. In lieu of a mouth shield the tube M may be provided with a mouth piece of any other description found to be convenient.

Having thus described my invention, I claim—

1. In an inhaling apparatus, the combination with the generator vessel, and the mouth-piece and its passage communicating therewith, of means, substantially as described, for regulating the admission of vapor from said generator to said passage, and the supplemental valve controlled inlet for the air to said passage, as and for the purposes set forth.

2. In an inhaling apparatus, the combination with the generator vessel, and the mouth-piece and its passage communicating therewith, of means, substantially as described, for regulating the admission of vapor from said generator to said passage, the supplemental inlet for the air to said passage, and a filter arranged in said inlet, substantially as and for the purposes set forth.

3. In an inhaling apparatus, the combination with the generator vessel and the mouth-piece, of the tube M, connecting the mouth-piece with the tube C, the said tube C, having in it a valve-controlled air-inlet E, the tube D, within the generator vessel and connected with the tube C, and the cap G, on the inner end of the tube D, said cap having in it an aperture adapted to be closed or partially closed by sliding said cap onto the tube D, as set forth.

4. In an inhaling apparatus, the combination with the generator vessel A, provided with an air-inlet in its neck and a slide ring to cover the same, the tube C, extending into the vessel A and provided exteriorly to the vessel with an air-inlet E and a slide ring to cover the same, the tube D, within the vessel A and projecting outwardly into the tube C, the valve I, at the outer end of the tube D, means within the vessel A for regulating the admission of gas or vapor to the tube D, a mouth-piece N, and a tube connecting said mouth-piece with the tube C, as set forth.

5. In an inhaling apparatus, the combination with the generator vessel provided with a valved inlet for the air thereto, and the mouth-piece and its passage communicating therewith, of means, substantially as described arranged within the generating vessel for regulating the admission of vapor or gas from said generator to said passage, and the valve in said passage controlling the supply of air and vapor to said mouth-piece for inhalation, substantially as and for the purposes set forth.

6. In an inhaling apparatus, the combination with the generator vessel and the mouth-piece and its passage communicating therewith, means, substantially as described, for regulating the admission of vapor from said generator to said passage, the supplemental inlet for the air to said passage, and the valve in said passage controlling the supply of air and vapor to said mouth-piece for inhalation, substantially as and for the purposes set forth.

7. In an inhaling apparatus, the combination with the generator vessel, having an aperture A′ in its neck and a band A^2 about the neck adapted to cover or partly cover said aperture, the tube C extending into said vessel through its neck and having in it an aperture, E, and a band F, about the tube adapted to cover or partly cover said aperture, the tube D, within the vessel and extending into the inclosed end of the tube C, the valve I on the outer end of the tube D and within the larger tube C, the sliding cap G, on the inner end of the tube D, provided with a lateral aperture H, the mouth-piece and the tube connecting the same with the tube C, as set forth.

8. In an inhaling apparatus, the combination with the generator vessel and the mouth-piece and its passage communicating therewith of the supplemental inlet for the air to said passage, the filter arranged across said inlet and the valve in said passage controlling the supply of air and vapor to said mouth-piece, substantially as and for the purposes set forth.

9. In an inhaling apparatus, the combination with the vessel A, of a tube D extending into the same, a cap G, which fits snugly on the inner end of said tube and is adapted to slide on same, said cap having in its side an aperture H adapted to be closed or partially closed by sliding the cap upward on the tube, and a mouth-piece and tube communicating with the outer end of the pipe D, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ADOLF LUDVIG LÖNNERBERG.

Witnesses:
LOREN LUNDBORG,
C. W. ERDMAN,
U. S. Consul.