

On medicinal inhalations, with description of an improved apparatus for the production of medicated vapours / by James Adams, M.D.

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Fig A.

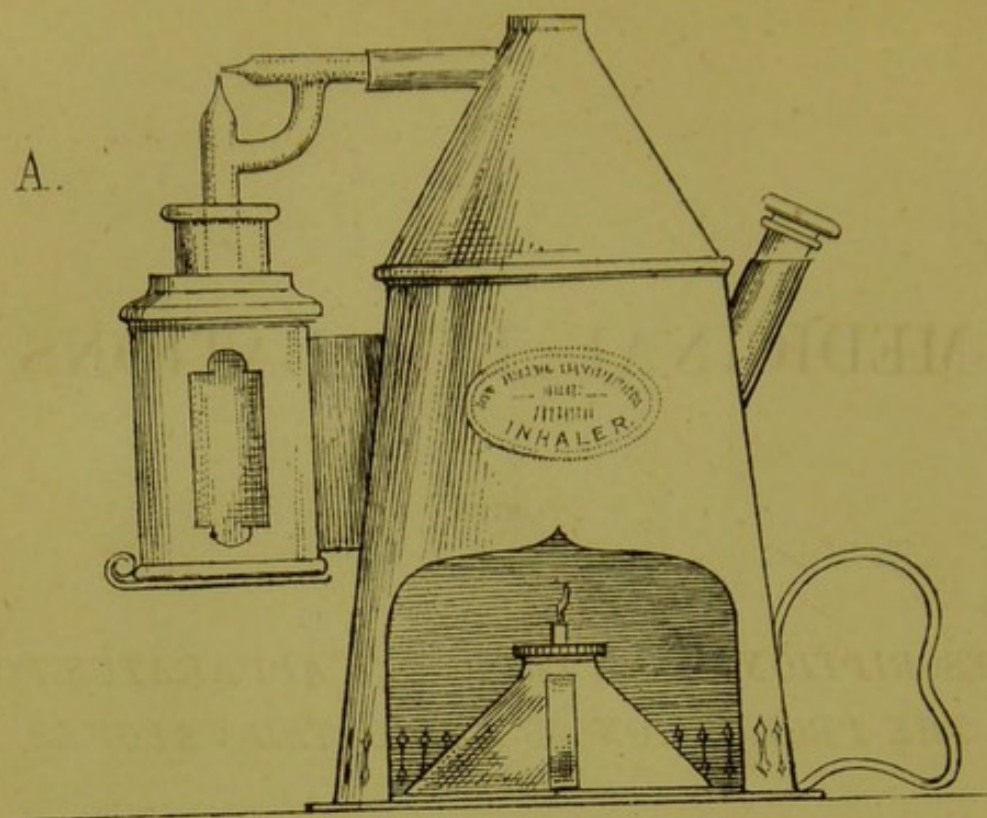
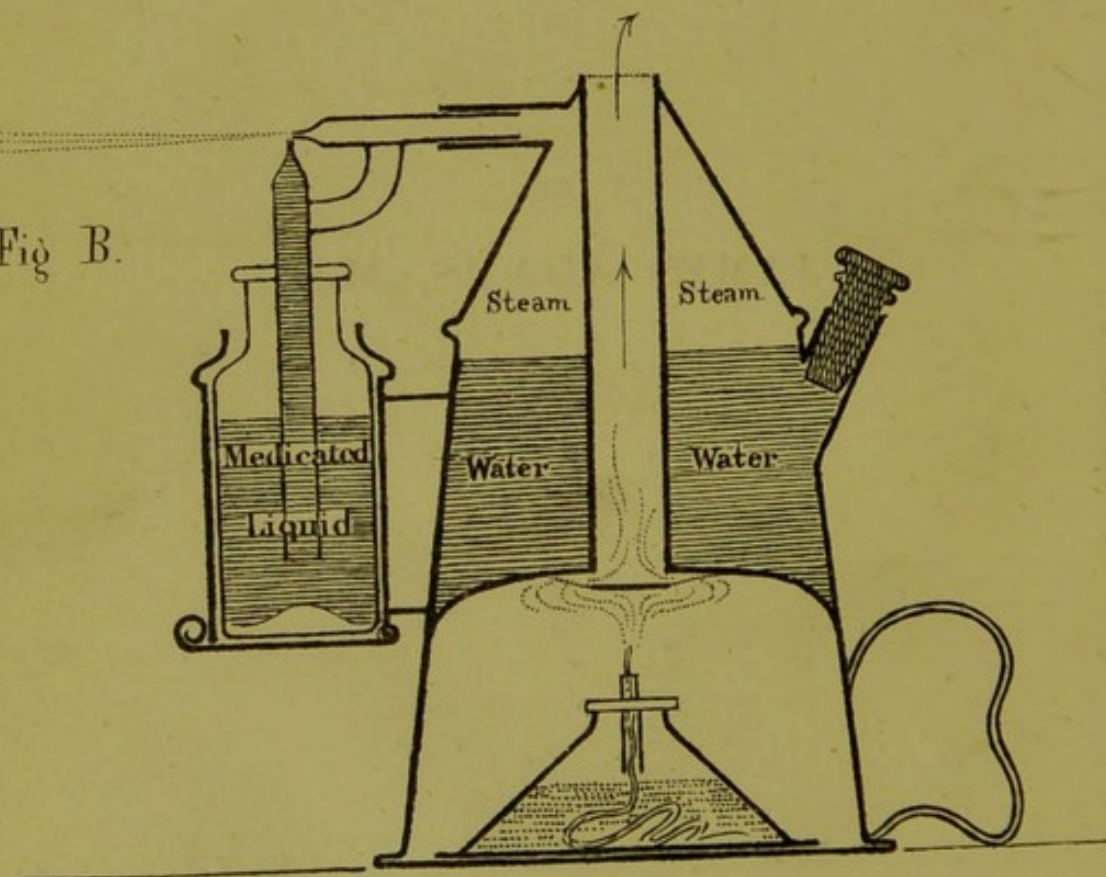


Fig B.



Apparatus for the production of Medicated Vapours.

Fig A, External appearance.

Fig B, Sectional view.

ON

MEDICINAL INHALATIONS,

WITH

*DESCRIPTION OF AN IMPROVED APPARATUS FOR
THE PRODUCTION OF MEDICATED VAPOURS.*

BY

JAMES ADAMS, M.D.

GLASGOW:

JAMES MACLEHOSE, 61 ST. VINCENT STREET,

Bookseller to the University, and to the Faculty of Physicians and Surgeons.

1868.

MEDICINAL INHALATIONS.

IN the treatment of affections of the lungs and air passages, the inhalation of medicated vapours has been practised from the earliest times. The chiefest medical authorities speak in terms of high commendation of such agency, whether as remedies bringing immediate relief to the patient, or as a branch of therapeutics, through which specific modes of treatment for some diseases may ultimately be reached.

But owing to several causes it happens that, unless by a limited number of medical men, the use of medicated inhalations is only occasionally practised. Among these causes, there is no doubt the great trouble and loss of valuable time that is involved in instructing a patient or his friends in the proper use of an apparatus, or in the most suitable arrangements for making the inhalations efficacious. But I am inclined to think that the inefficiency of most of the contrivances that have hitherto been easily accessible, and the cost of others, has had a greater deterring influence. And still greater influence must be accorded to the fact, that until a late period—until the present time I may say—there has not existed a means by which medicaments, however likely and however potent, could be applied to the mucous lining of the air passages, unless that these substances were either volatile in themselves, or were capable of being dissipated in the air by the action of heat artificially applied. It is to this difficulty, or rather to the methods that have been successfully contrived for overcoming it, that I now wish to direct the attention of the Society. And, under the pretext of submitting to your inspection a convenient modification of an apparatus, on which I have been expending my mechanical powers, and which I have very largely used, I

hope to elicit the experience of some who can speak from actual observation of the effects of medicinal inhalations, and to enlist the thoughtful consideration of others to whom this mode of treatment is comparatively new, or altogether untried.

It may be well that I should first refer to some of the contrivances which have been hitherto in use.

Hippocrates describes an apparatus consisting of a pot, the lid of which had an opening for the reception of a reed, through which the vapours escaped and were inhaled through the open mouth, while moistened sponges were employed to protect the mouth from being scalded.

In later times the methods employed have been various, but usually of a very simple kind, and—discarding all consideration of complicated costly arrangements, such as apartments specially constructed,—have been often extemporized with a reference to the agent made use of. Thus we have Tar heated with certain precautions in an iron ladle, or pot, as recommended by Sir Alexander Crichton, who saw it employed in Russia in the treatment of bronchitis and phthisis. I have often so used it myself, employing for the vaporization of it and other solid substances, as sulphur, &c., such a simple apparatus as I now place on the table. The fumes arising from undressed Wool, burned on an iron plate, were at one time much used on the recommendation of Dr. Physick of New York. He found these fumes extremely serviceable for stimulating and healing external sores, and he thought he had found them of utility in phthisis when inhaled by the lungs. I have not unfrequently made use of strips of bibulous paper soaked successively in solution of Nitre and tincture of Tolu or Benzoin. These, when dry, are ignited on a plate, and a vapour is given out from which patients affected with Asthma and chronic coughs say they often experience relief. Pastilles of varied composition are occasionally employed with similar results. But the most common method of employing inhalations consists in pouring boiling water upon Vinegar, Chlorine, Æther, Camphor, any of the Balsamic resins—or Narcotic extracts, or their Tinctures. These substances are placed in vessels variously constructed of block tin, pewter, glass, or earthenware, but all essentially consist of a vessel of large capacity, having a tubular orifice to which the patient applies his mouth and makes forcible inspiration. I place several of these instruments on the table; but I feel constrained to say that, notwithstanding their various names and modifications of form, material, and cost, a large-sized tea or coffee pot, or common tea-kettle, will at any time form an efficient substitute. To all these contrivances I have an objection, that their use is fatiguing to the patient, who, I rarely find

can avoid making use of distressing and exhausting efforts at inhalation, not that there exists such necessity, but that the form and mode of using the instrument seems to suggest instinctively the effort. There are various other objections which I need not take time to enumerate, such as the rapid cooling of the hot water, and the triflingly small amount of vapour that is produced, &c.

The steam of hot water, without any admixture, is often considered a desirable application to a dry and inflamed throat, trachea or bronchial lining; and in illustration of the rough and ready means that are usually extemporized, I mention that on two recent occasions I knew a medical man, than whom there are few so full of practical resource, directing a basin of warm water, with a piece of heated iron or common fire brick dropped into it, to keep up the steam; and another gentleman, one of our most accomplished physicians, instructing a roll of stiff paper to be tied to the spout of a kettle, so that the steam might be projected in a direction to reach the patient.

The necessity of having recourse to such crude expedients, in the course of practice among the more comfortable classes, where the mere question of cost for even a passing want is no real obstacle, shows that a convenient and portable contrivance has been a desideratum. Such instruments as were available applied only to substances in their nature volatile, but until the present time, so to speak, there has existed no means by which a non-volatile chemical body could come in contact with the organs of respiration.

And this brings me to mention, and with respect, the name of Sales-Giron of Pierrefond in France, who, after two years consideration of the subject, laid before the Academy of Medicine of Paris, in 1858, an apparatus by means of which fluids containing dissolved medicaments, whether volatile or non-volatile, could be converted into a fine spray or mist capable of reaching the extreme bronchial tubes when inhaled. This proposed addition to practical medicine met, of course, with that careful and searching consideration that has ever been accorded by medical men to all proposals having for their object the relief of suffering humanity—a consideration, the spirit of which is commonly misunderstood by the general public, and, partly from combined ignorance, interested motive, and malicious intent, is commonly misrepresented by the charlatan.

Sales-Giron, in the construction of his apparatus, carried out an idea which in some measure had been already practically applied, although in a coarse and little effective manner, in the vaporatory of certain sulphur baths. His instrument consisted of a vessel filled with fluid, in which was dissolved certain

medicaments; and an air-pump was attached over the vessel. By the pressure of the air-pump, the fluid was forcibly projected through a narrow aperture, and made to strike against a metal disc, when the stream was broken up and converted into a very minute vapour or spray. This he designated an *atomized* or *pulverized* fluid.

When this portable apparatus was placed before the Academy it became a question, how far, if at all, such fluids could affect the respiratory tubes. A committee of investigation was appointed; and in 1862 the committee reported as a result of their labours, that the various substances used by them in their experiments reached not only the trachea, but penetrated to the minute tubes and air cells. And it was during the discussion of this report that Trousseau said, "I have applied the inhalations in many instances, and derived great benefit from them. They form a medicament of great value in affections of the pharynx, larynx, trachea, and the large bronchi. . . . In short, Sales-Giron has rendered a great service to the world at large by his invention of the treatment by means of pulverization."

This statement of the veteran Trousseau has been emphatically endorsed by the experience and commentaries of the numerous eminent medical men on the Continent and in this country, who have in a special manner given their attention to the subject.

At the hands of several individuals who approved of the new invention, the apparatus of Sales-Giron underwent various modifications, the most important of which consisted in the contrivance of Dr. Bergson, who connected at right angles the capillary openings of two glass tubes, one of which dipped into a vessel containing the liquid to be "pulverised"—the other tube having attached to it an india-rubber pipe with two india-rubber balls, one of which acted as a bellows, the other a reservoir of air,—the identical instrument, in short, that is now advertised as "Dr. Dewar's Patent Spray Producer" the difference consisting in the tubes being made of Vulcanite, with metal points instead of glass.*

This very ingenious contrivance of Dr. Bergson has undergone various modifications. As a toy instrument, consisting of the tubes alone, it is used for sprinkling perfume, by simply blowing in one of the tubes while the other dips into the phial of perfume. When the horizontal tube is blown through with some force, the effect is to exhaust the air in the other which dips into fluid, the fluid rises to fill the vacuum, and,

* Several months before Dr. Dewar's patent, the instrument, but without metal points, was in regular course of sale by Thornton & Co., manufacturers of vulcanite.

reaching the capillary orifice at the top, is caught by the rushing blast, and blown into fine vapour.

It is sometimes used in the same arrangement for sprinkling the larynx and fauces. Sometimes it is attached to a regularly constructed bellows, but the common construction is the original one, that of an india-rubber ball that requires to be compressed by the hand. Its action is, however, intermittent, producing alternately a coarse or a fine spray just as the pressure of the hand upon the ball relaxes or contracts. Under this pumping action the patient is liable to receive alternately the full blast of an uncomfortable cold sprinkling shower on his face or to catch merely the extreme or furthest projected particles of the spray. To most individuals this cold blast is disagreeable—to many intolerable. To obviate this drawback a spirit lamp is sometimes applied to heat the medicated fluid; and I have found it occasionally necessary to recommend that the vessel of medicated fluid should be placed in hot water and gently warmed, where the patient has happened to possess himself of an india-rubber ball apparatus. But the use of this india-rubber ball is very difficult. Practice and dexterity is required before anything like a continuous spray can be produced. The limited and monotonous movements of the fingers soon become irksome, and can only be maintained under a sense of fatigue or of cramp even by persons possessing considerable muscular power. On this point I have made experiments assisted by various individuals, and the result satisfies me that, even where the patient can have an assistant willing to give the requisite time and effort, that effort can not be maintained in cases where the inhalations require to be frequent and of prolonged continuance. The efficient use of the apparatus by the invalid himself is, I think, quite out of question.

Unless, therefore, for the object of sprinkling the fauces or larynx, the use of any contrivance requiring manual exertion will not be continued by any practitioner or patient; and it was from a knowledge of these drawbacks that the latest improvement, that of producing a continuous and steady current of vapour by the action of a jet of steam, was applied by Dr. Siegle.

It is this combination of Bergson and Siegle's several apparatus, known by the name of Dr. Siegle, that is now in approved use; and it consists in a small boiler heated with a spirit lamp the capillary tubes being attached to the boiler. The steam produced in the boiler issues from one of the tubes with considerable force, and in a steady current, producing the same effect as a blast of compressed air, so that the medicated

fluid is projected in a gentle warm mist or vapour, very much finer than could possibly be previously obtained by any other arrangement. Contrasting the vapour produced by this apparatus with that of the air-pump or bellows arrangement, I should liken the first to a fine Scotch mist, and the second to a plump of rain.

Experiment has shown, what indeed was already very obvious, *i.e.*, that this very minute division, or pulverization, of the medicated fluids, is a matter of prime importance, as the finer the vapour the less the irritation to which it gives rise in passing the larynx, and the more effectually it penetrates to the minutest and furthest removed air-tubes. The patient requires no assistant in working the instrument; he inhales without fatigue or flurry, and at leisure; and the inhalations can be repeated and prolonged indefinitely and at pleasure.

I have during the last fifteen or eighteen months had very extensive trials of this apparatus; and I think that, with some modifications it has undergone at my hands, and to which I will immediately refer, it leaves little to be desired. I was led to a consideration of these modifications on account of the high cost of the instruments, ranging from 15s. to 50s., and the occasional delay of many days, and even weeks, before they could be obtained. These were serious obstacles to a fair trial, or to the general use of the instrument, and I was unable to stimulate either instrument-maker or druggist to find a remedy. I at length got a smart tinsmith to work several patterns under my directions, and to produce an instrument equally effective with the most costly, and a respectable druggist* to give him an order for a supply. These within the last few months, under the stimulus of the sulphur mania, have been sold in large numbers by several druggists at an average cost of 4s. One druggist tells me he alone has sold upwards of 200.

I felt interested in my attempts to improve the instrument, and you would be amused if I showed you all the patterns from first to last, and surprised if I were to go into a description of little details which required consideration or remedy before the instrument I now place on the table was produced. Suffice it that I feel warranted in saying that it is the most efficient, ready, and cheap instrument that can at the present moment be obtained. Let me state shortly some of the qualities wherein I think that it contrasts with, and is superior to, others.

It is compact and ready for use, and is so put together that there is no necessity for frequent and nice adjustments,—consequently the risk of troublesome disarrangements, or of accidental injury of the instrument, is exceedingly small.

* Mr. D. P. Walker, 125 New City Road.

The form of the boiler is distinctive and peculiar, and ensures several advantages. Thus, the position of the water inlet enables the boiler to be filled to the proper height and no more. Above the water line and inlet there is a reservoir for steam sufficiently large to maintain a continuous current of spray, and to project it to any distance that may reasonably be desired. This arrangement of the water inlet, steam chamber, and steam outlet, prevents a very annoying and even dangerous accident of frequent occurrence in instruments with the ordinary form of boiler, namely, the forcible projection of spirits of scalding water in the face of the patient, caused by the boiling liquid coming over with the steam. The heat from the spirit lamp is carried up through the centre of the boiler, thus reaching a larger heating surface of the boiler, generating steam more rapidly, keeping up a full supply of the steam, and at same time *super-heating* and *drying* the steam so generated. The steam escapes by a short horizontal nozzle at the top of the boiler, and necessarily is subjected at the instant of its escape to the action of the flue of the lamp, thus ensuring such a dry condition of the steam that it quickly becomes dissolved or dissipated in the air, so lessening the risk of annoyance to the patient, and at same time avoiding in a great measure the dilution of the medicated fluid with watery steam. By carrying the flue of the lamp through the centre of the boiler, the body of the instrument is not so hot but that a handle attached to the lower and cooler portion of the case can be grasped with comfort and safety even when in use. An alarming-looking and costly safety-valve, very liable to become stiff and unworkable, has been dispensed with, as I have found that a simple cork or india-rubber plug is equally efficient and more convenient. The box containing the phial of medicated fluid is soon warmed by the mode of its attachment to the case of the instrument, and there are other details of minor importance which, when combined, make the apparatus more convenient in use.

Before parting with my reference to this instrument I may mention that I have experienced annoyance from finding my patterns and directions departed from occasionally by workmen who did not understand what I was aiming at. An old friend of mine,* who had opportunities of knowing this fact, suggested a patent, which I of course rejected, my ideas on medical patents being at one with my friend Dr. Gairdner.† I did not object, however, that he should do so; and, associating

* Mr. J. C. Stuart, manufacturing chemist, Dundas Hill.

† See *Certain Moral Aspects of Money-Getting*, p. 23.

with himself a respectable druggist,* he has taken out a patent. I hope thus to ensure accuracy and good quality of workmanship with cheapness of manufacture. *This will certainly gratify me; but beyond this, I beg emphatically to say that I have no right of property in the instrument, and no interest whatever in its sale.*†

Having said so much regarding instruments, I have little time to refer to the medicaments, which may conveniently, and with probable advantage, be employed in the form of vapour. Those with the use of which I am most familiar are solutions of Morphia, Digitalis, Stramonium, Squill, Tannin, Alum, Nitrate of Silver, Sulphate of Zinc, Chloroform, Acetic Acid, and Sulphurous Acid. I extend and combine this list of agents as seems to me desirable. Each drug has of course its special properties, and it would open too large a discussion to enter, however shortly, upon their consideration. I might say much to show why I have reason to be satisfied with the results I obtain from time to time; but I think it sufficient to indicate the fact that I am so satisfied, and that I believe that the inhalation of medicated vapours is likely to be a more familiar and a more important therapeutic agent in the hands of the physician in time to come.

Those who are inclined to pursue this subject will find ample details of the history and full directions for, and illustrations of, treatment by medicinal inhalations in the work of Dr. Beigel of London—an admirable work in my opinion, and showing in its author the possession of sound common sense and professional ability.

At the last moment, it has occurred to me that it might give point to the object of my communication, and open an easy inlet to the observations of the members, if, before concluding, I should make special reference to one agent, with the name and alleged miraculous virtues of which the public of Glasgow has been made very familiar during the last few months. I need scarce say that I allude to sulphurous acid gas, or, as it has been termed in the popular epistles through which it has gained notoriety, “the Great Sulphur Cure.”

The statements in Dr. Dewar’s original pamphlet regarding the value of sulphur as a great remedial agent, seemed to me at the time sufficiently moderate and circumstantial to warrant a candid examination; and during the last twelve months, and of course long before the recent excitement, I have given to it a fair trial in a spirit of patient observation. I may at once say

* Mr. P. Harrower, 136 Cowcaddens.

† The instrument, price 5s., is now sold by the three parties I have named, and by other chemists and druggists.

that I have satisfied myself that it has its uses—that it is not an innocuous agent—one to be pooh-poohed and laid aside without trial, or to be contemptuously stifled in a cloud of “chaff,” scattered over the columns of a newspaper. But, to qualify this allusion, I admit that it is very difficult to be amazed and yet temperate when reading the loose statements, crude deductions, and far from satisfactory cases recently published by Dr. Dewar; or, to refrain from disparaging the rhapsodical style of his enthusiastic follower, Dr Pairman.* Yet a medical man, having in recollection the history of medicine and of popular credulity, as the latter is manifested upon the occasion of every new appeal that is made to its faith in nostrums and universal cures, should ever bear in mind that a question of Science, or of facts in Medicine, is not to be discussed in an arena and before a jury that in all time has pronounced, as if by intuition and in popular acclaim, a favourable deliverance upon every kind of wonderful ‘cure’ that successively crops up—ranging from Sulphur, through Cold Water, Hot Water, Turkish Baths, Mineral Baths, Homœopathy, Mesmerism, St. John Long’s Liniment, or Perkin’s Metallic Tractors. Neither truth nor professional credit is advanced by such discussion, and we would do well to imitate the example of lawyers, who are never drawn into newspaper columns to wrangle over questions of law.

Passing from this digressive comment, and returning to Drs. Dewar and Pairman, I am well satisfied that they are both sincere men; and, believing as I do, that they have made their statements in perfectly good faith, and alleged, as matters of fact, occurrences that are open to daily and familiar experiment and observation, I think it preferable to sift these statements before troubling myself about misty theories, or rather hypothetical conjectures—or in denouncing pretensions however apparently absurd. If these gentlemen are competent observers, and of sound judgment, then the occurrences they have recorded must have been repeated under like circumstances; and this recurrence of powerful and novel effects has no doubt been observed, and will be corroborated by the testimony of medical men whose position as competent observers is established. We have such observers among us this evening, and I hope they will express such a judgment as their experience warrants them in giving. As regards myself, I repeat that I have observed with patience and without prejudice, and as a result of my observations I felt warranted, at the commencement of

* Dr. Pairman has, however, admittedly “a method in his madness,” and his statements of positive facts are, when closely examined, found to be more moderate and reasonable than is at first sight apparent,—certainly much more so than those of Dr. Dewar.

the late sulphur mania—for it deserves no other name—in expressing my opinion that the agent was useful; and that Dr. Dewar deserved great credit for his earnest and persevering efforts in directing the attention of the profession to several novel and useful applications of the remedy; but that it was most preposterously over-lauded—that its excessive popularity would have a short day—and that some injury and many grievous disappointments would remain *en souvenir*.

My experience of the remedy, in some of its principal applications to medicine in the way of inhalation, and without any reference to surgical ailments, may be shortly stated.

Individuals whose general health was good, and who have resorted to the sulphur inhalations on account of such slight forms of Catarrh as usually receive little or no medical treatment, except it may be a sweating powder, or a warm bath, have been the most liberal in their acknowledgments of benefit. It did really seem to me that some cases were relieved or shortened in their progress by the treatment.

In Acute Bronchitis I have seen a copious secretion of serous or watery fluid cast off from the air passages at an unusually early stage of the disease, and this effect was evidently induced by the inhalations, and was followed by marked relief.

In Chronic Coughs it has frequently acted powerfully in exciting forcibly expiration, and in inducing a more copious expectoration.

From these results I am of opinion that in Catarrh, acute Bronchitis, and Chronic Coughs, the remedy stimulates the minute exhaling vessels, the bronchial surface seems to be both sweated and purged, and the tough, viscid phlegm which collects in the bronchi is dislodged more freely and effectively than occurs under the use of ordinary expectorants, administered in the usual way. But I have found no notable difference nor any advantage in use in the Sulphurous Acid over common Vinegar or solution of Chlorine administered by inhalation in like cases.

In a few opportunities I have tried it in Asthma, but have not found that the inhalations were tolerated or continued, partly on account of marked distress which they occasioned, and partly because no evident relief was obtained during the paroxysms.

In Phthisis its effect seems to be altogether that of a topical expectorant, but I have not seen any decided lessening of the amount of expectoration.

Cases of inflammatory sore throat have not been benefitted, but in the hoarseness following the acute stage of a cold I have seen improvement and relief.

I have not seen, in any of its applications, the alleged "sedative" or "calmative" action of the remedy.

Troublesome and even alarming consequences are of occasional occurrence after prolonged inhalations of the dry sulphur fumes, or of the aqueous solution of sulphurous acid gas in its full strength,—such as great tumefaction of the tonsils and pendulous palate, husky voice,—difficulty in swallowing,—pain in larynx spitting of blood, &c.; and I have seen all these effects occur under circumstances where no blame could be justly imputed on the score of carelessness.

It is not, therefore, a remedy to be administered indiscriminately or without precaution, and I deprecate the practice of fumigating a patient's room by throwing a quantity (no limit as to quantity) over a heated shovel or live coal, and filling an apartment (which may be large or small, well ventilated or otherwise) with the dry fumes of an indefinite quantity of sulphurous acid gas,—an agent of known powerful chemical properties, and alleged to possess very potent influence upon the living organism. As well tell a patient to take "a large dash of laudanum" in his gruel when going to bed, or "a good pinch of calomel" occasionally.

My remarks on the sulphur cure have gone to a greater length than I anticipated, and I will now only add that I have not seen any effects from its use that have led me to think that it has any *specific action, when inhaled in any disease*, or that it has any other effect than that of a local stimulant, tonic, and astringent. As such I believe it is likely to prove a useful adjuvant in the treatment of various maladies.

MEDICO-CHIRURGICAL SOCIETY.

MEETING VI.—SESSION 1867-68. 7TH FEBRUARY, 1868.

DR. GAIRDNER, Vice-President, in the Chair.

DR. ADAMS read a paper on Medicinal Inhalations, with description of an improved apparatus for the production of Medicated Vapours. Dr. Adams placed before the Society a large number and variety of apparatus, used for medicinal inhalations,—including specimens of Siegels, Bergsons, Dewars, and the instrument constructed under his own directions. Dr. Adams also exhibited several of the apparatus in action, using perfumed instead of medicated liquids.

DR. ANDREW BUCHANAN thanked Dr. Adams for bringing forward these interesting mechanical contrivances, and giving a brief history of this increasingly important mode of medication, which he had no doubt would yet be applied with very beneficial effects in diseases of the lungs and air passages. Of course the modes of application would require to be thoroughly tested, and that in the same spirit in which this had been done by Dr. Adams. He (Dr B.) had first made acquaintance with these new mechanical appliances through the instrument of Dr. Dewar, which had been introduced to his notice by a very intelligent man, who stated to him that Dr. D. had taken a patent for it. He was surprised, however, on investigating the matter, that there was really nothing original in this patent of Dr. Dewar's except the gold points. Dr. Adams had told them that Dr. Dewar had been anticipated in the introduction of vulcanite in the instrument, by the manufacturers of that substance. This appeared to point decidedly to the fact that the present law of patent was essentially defective, when an instrument could be patented which in principle and detail had nothing original in it. Dr. Buchanan believed that the importance of this mode of treatment consisted in its bringing medicines directly to act upon the mucous membrane of the lungs. Formerly the only means they had of acting on this membrane was by expectorants, which were very uncertain in their operation, and could not therefore be depended on. The first step to the application of medicaments by inhalation was in the introduction of such substances as ether, chloroform &c., into the body through the lungs. By means of medicinal inhalation it was now possible to influence directly the pathological condition of the membrane of the lungs, through a mode never before thought of. The medicines were by this means introduced in a form so bland—the vapour or the nearest approximation to vapour was so finely divided, that the risk of injury was indefinitely lessened. Such a mode of application was precisely what was desiderated in an organ of such delicacy. He had tried sulphurous acid spray in a few cases of chronic bronchitis, and he had found it serviceable in some of these cases.

DR. RITCHIE, after remarking on the great expenditure of time, thought, artistic talent, and money which it must have cost Dr. Adams to have brought his Spray Inhaler to its present perfection, said that it was to be regretted, however, that there did not exist more materials of a strictly professional kind on which to found an intelligent judgment of the utility of medicinal inhalation. This mode of curative treatment being indicated

on several principles, and capable of application in a variety of forms, it would be well to have them clearly known. He (Dr. R.) must confess that he knew little of pulmonary inhalation of medicinal substances, in the treatment of disease. He had for many years, in common with others, been in the habit, as suggested by the late Dr. Robert Watt, of Glasgow, of using tar in the second stage of whooping-cough, and bronchitis, either by burning it or evaporating it by the heat of boiling water, or of a spirit lamp. Another application of the principle, though with a different object, was the mercurial vapour bath, in the use of which in secondary syphilis he had had great satisfaction. He had also, like Dr. Adams, used nitre papers, but without benefit, and he had frequently tried the inhalation of naphtha and petroleum in phthisis, but always with unfavourable results.

The application of atomized fluids to the treatment of disease, and especially the introduction of these by the air passages, had given a new aspect to the therapeutics of various affections; and, looking at the extreme facility with which aqueous or medicated spray could now be introduced into the most remote portions of the lungs; the amazing extent of absorbing surface presented by that organ, and the immediate admixture of whatever is introduced with the whole mass of the blood, there surely was a call for caution in the exhibition of such an agent as Sulphurous Acid spray. It would be valuable could any competent observer devote himself to the investigation of all the circumstances connected with the inhalation and injection of gaseous and atomized fluids. The induction of certain effects on the cerebro-spinal system as by chloroform; the modifying the action of the respiratory organic nerves as by stramonium, lobelia, and opium; the dilution of the blood with simple or with slightly saline water, as might perhaps be practised in cholera and collapse of fever, and other cases; the stimulation of the mucous membrane of the bronchi by nitrate of silver in chronic bronchitis, and the destruction of parasitic growths in the larynx, as in diphtheritis, by sulphurous or carbolic acid, were all so many different principles on which the vapour inhalations might be employed. In closing, he would express the hope that the Chairman, and other gentlemen favourably situated for such investigations, would direct their attention to this interesting subject, more especially as related to the introduction into the blood by the spray, of water, or of weak solutions of muriate of soda, in the state of vital collapse, which occurred in fever, cholera, and other states.

MR. POLLOCK, of Mearns, stated that he could corroborate Dr. Adams' observation about the impossibility of working Dr. Dewar's instrument any length of time, owing to the hand becoming powerless. He thought Dr. Adams' instrument a great improvement on all its predecessors.

DR. MORTON said that as regarded the general question of inhalation, there could be no doubt that for some years it had been gaining ground in the estimation of the profession, as a means of introducing medicinal agents into the system, and very probably they would have greater recourse to it as they became more familiar with the use of it. Dr. Ritchie had alluded incidentally to the caution alleged to be necessary in introducing agents into the lungs, owing to the rapidity with which they sometimes acted upon the system. They had no doubt been taught that this was the case, but it was open to doubt whether experience completely bore out the statement. The mucous membrane of the lungs seemed able to bear a much greater amount of irritation than was commonly believed. Every one who had experience in the frequent use of chloroform must have noticed that, in rare cases, its administration gave rise to an inflamed condition of the conjunctivæ. Now, he was not aware that any one observed any similar

effect on the lining membrane of the lungs, or of the air tubes. He also remarked that ethereal substances introduced into the cavity of the peritoneum very soon manifested themselves in the blood, and, *a priori*, it might be expected that the absorption of such substances would take place even more rapidly by the lungs. He thought it a circumstance to be wondered at that the list of substances which had been tried to be introduced into the system by means of inhalation was as yet so small. A tanner in town had informed him of the alleged curative effects of Valonia Galls on certain forms of bronchial affections. This man employed in his work girls from fourteen to twenty years of age: and he had observed those suffering from chronic bronchitis—popularly believed to be labouring under severe chest disease—on entering, suffer keenly for the first few days, and in some cases obliged to discontinue working for some time, from a feeling of suffocation; but when they got over this period, they were greatly benefitted, so much so that this employment was regarded as a kind of cure. Doubtless the astringent effect of the tannic acid was the cause of the curative action. This was perfectly in consonance with the old practice of giving cinchona, the efficacy of which was ascribed to its astringent effects. All the substances which had been used in the way of inhalation—chlorine, stramonium, sulphurous acid, &c., could only act by stimulating the bronchial mucous membrane—increasing the secretion, and getting it drawn off. That they could cure disease in this way he did not believe; but it was quite possible, in the way indicated, to influence the membrane very materially.

MR. JOHN REID said that he agreed with many of the conclusions to which Dr. Adams had come in respect of the inhalation of different substances, and particularly of the value of what had been called the great Sulphur Cure. Very early in his practice he had been in the habit of prescribing different agents for inhalation in bronchial affections, such as iodine, stramonium, &c., but he must say he never saw any marked benefit from such treatment. He had used for eight or nine years one of the old inhalers, of which a specimen was exhibited, with iodine, but he had now discontinued its use from never observing any benefit from it. In regard to the effect of sulphur they were well aware that it could only act as a stimulant upon the bronchial mucous surface, and that in a very disagreeable way. He had no faith whatever in its acting as a cure in bronchial affections. It was a fact well known to medical men attending on chemical works, that the men exposed to sulphur fumes were particularly prone to bronchial affections, and indeed were all more or less affected with bronchitis; showing that Sulphur produced the very reverse of a sedative effect on the mucous membrane. He did not think it creditable to any member of the profession to have made such a noise about this matter as Dr. Dewar had done. He first introduced it as a remedy in rinderpest, then in diphtheria, and now it was trumpeted as a remedy for almost every disease. He looked on the way that he had puffed himself into notice as nothing less than quackish and quite unwarrantable. The inhalation of sulphurous acid could have no other effect than to bring up a quantity of phlegm, which was not curing disease at all. It would not be found a specific in complaints of the lungs any more than in skin diseases. He had no faith in its curing bronchitis, catarrh, or any of that class of complaints.

DR. LYON, after complimenting Dr. Adams for the ingenuity displayed in his instrument, said that he had been carried along by the entreaties of some of his patients to try the Sulphur Cure, and had allowed some of them to use it, but in no case had he found it to come up to their expectation, and indeed in nearly all the cases no benefit had resulted. One patient, a severe sufferer from very frequent paroxysms of asthma, followed by bron-

chitis, had tried it but with no advantage. He thought that its day was nearly out. He had no doubt, however that medication of the mucous membrane by inhalation could be employed with advantage. He had been in the habit of doing the same thing in another way, viz., through the stomach. He had often given Copaiba in this manner; and it gave decided proofs of its presence in the lungs by the exhalations which resulted. He believed that it was possible to act with decided efficacy on the respiratory organs in the manner indicated by Dr. Ritchie, with mercury; and he doubted not that medicated vapours might thus be carried into the system and exhaled from the lungs with advantage, in bronchitis, &c.

Dr. EBEN. WATSON said that having had some experience of the use of one of the instruments exhibited, he had listened with much interest to the paper, and especially to the excellent short history of the instruments which Dr. Adams had given, and he was pleased with Dr. Adams' modification of a rather expensive instrument. The principle of it was nearly the same as that of Siegle's instrument, though the tubular boiler was certainly a great improvement. The piece of mechanism, however, showing greatest ingenuity was Bergson's tubes. With regard to the use of these instruments his own experience was that they had two effects to expect from inhalations, the local effect and the general effect; and the medicines which Dr. Adams had named could only benefit from their general effect. There was no doubt that the mucous membrane of the bronchial tubes had a large surface, was very vascular, and afforded a ready means of absorption into the system generally. Great caution ought, therefore, to be exercised in regard to such medicines as digitalis or morphia, owing to their rapid and powerful action. The medicines which he had chiefly applied in solution through Siegle's instruments were such as produced a local effect, such as carbolic acid, a weak solution of which had been long known to have a beneficial effect in ulceration of the larynx.

He had also used borax and sulphate of zinc in ulcerations of the windpipe with some advantage. But the agent he had most frequently tried was warm water, which had a good calmative effect on the mucous membrane of the throat in ulceration of the larynx, and was extensively useful as a preparative to other treatment. He had not used nitrate of silver in this way, but it had been done in Paris, and he believed that it had had an excellent effect when applied with a sponge or brush to the windpipe. With regard to the Sulphur Cure he might state his experience. He had heard of a great many miraculous cures as having been effected, but on coming into contact with the subjects of the alleged cases, he found there had been a great deal of exaggeration. He had used it in several cases of different kinds—ordinary sore throats, inflamed tonsils, and inflammations of different kinds, and in all these certainly with great disadvantage, for sulphur was a local irritant. In its calmative action he did not believe at all. There was every reason to think that the Sulphur mania would be shortlived. But he believed that the use of medicinal inhalations would go on increasing, and that in many cases it would be of advantage, both when applied for a local and a general effect.

Dr. PERRY said he believed that the discussion had proved that as a profession they were ignorant of the atomisation of fluids, though they had been long familiar with the use of medicated substances, more especially Iodine. In affections of the respiratory organs they were only beginning to understand that this might become an important mode of treatment. He had had a little experience, and, without entering into details, he might state that the cases in which he had tried inhalation of atomised fluids embraced croup, hæmoptysis, scarlatina, chronic laryngitis, phthisical

laryngitis, and a variety of other diseases principally in connection with the throat and lungs. He was in a position to bear witness to the great trouble which Dr. Adams had given to bring this instrument to a state which he (Dr P.) considered one of perfection. He had been going along with Dr. A. in his experiments, and he would say, that no one could have any idea of the immense amount of labour involved. To point out the advantages of the improved instrument were needless ; for both as regards cheapness, portability, and every useful quality, it had the advantage of the other form of inhalers. Siegle's last instrument, he might mention, from want of a handle, could not be held in the hand at the bedside, as it soon became too warm for the hand, and there were various other disadvantages in its construction which made it comparatively an inefficient instrument.

DR. GAIRDNER said that he regretted that he could not respond to the request of Dr. Ritchie with regard to the use of inhalation in cholera, as he had never tried it in that disease, but he was disposed to think favourably of the principle of applying it in that way. In regard to the general question of inhalation, he had long been an employer of inhalation of hot water, charged with all sorts of medicated substances which could be received in vapour. He had, however, been extremely *fidgetted* in the want of a good instrument to furnish the spray in sufficient quantity, with a well regulated temperature, and for a proper length of time. The instrument which, on the whole, he had found the most useful was one invented by his father, Dr. John Gairdner of Edinburgh, and consisted of a spirit lamp, and a long tube through which the vapour was diffused. He had, however, long expected satisfactory results from the new method. He believed that this instrument of Dr. Adams' would be of great advantage to persons in general practice and to hospital physicians, &c., from being so cheap, portable, and not liable to be easily put out of gear, and he had no hesitation in saying that no other would now be in use in his own hands. Two weeks ago a friend of his came from Edinburgh for the express purpose of showing him a recently devised form of an instrument sold for a guinea, and which he had picked up in a visit to Vienna. The only advantage which he could see the Vienna instrument had was from the use of a long vulcanic tube to disperse or collect the spray as required. In fine, he had no hesitation in saying the thanks of the Society were due to Dr. Adams for the great personal trouble he had taken to improve the inhaler, for the impartial view he had given of the history of the instrument, for the admirable spirit and careful wording of his remarks on the therapeutics of inhalation, and for the delightful perfumes by which he had brought a rather questionable subject into good odour in the Society.

DR. ADAMS said that in reference to the remarks of Dr. Ritchie it was obvious to every one that time would have failed him to enter at any length on the subject of treatment. His reason for bringing forward the subject was that in his intercourse with brother practitioners he had found that as a profession they were imperfectly acquainted with the new treatment of the inhalation of 'atomised fluids,' and he thought the subject at once important and interesting. He had found initial difficulty in all experiments on the subject—the instruments were always breaking, or going out of gear, or proving somehow unmanageable, and he had conceived it the first step in making any further advance, to endeavour to improve the apparatus so as to make it at once cheap, simple in construction, and thoroughly serviceable. The Society was now in a position to judge how far he had removed this difficulty out of the way of further progress.

