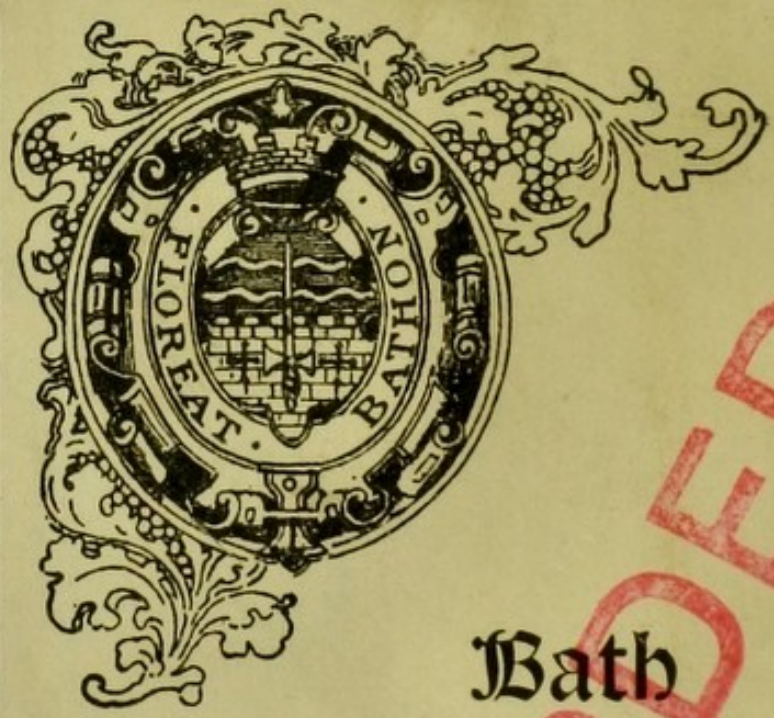
Practical notes on nitrous oxide (N2O) : a brochure / by J. Ottley Atkinson.

Notes on Nitrous Oxide.

N_2O

Ottley Atkinson.



PRACTICAL NOTES

ON

NITROUS OXIDE.

(N_2O)

A Brochure

BY

J. OTTLEY ATKINSON, L.D.S., Eng.

KENDAL:
Published by T. Wilson, 28, Highgate.

1892.

PREFACE.

Notes on Nitrous Oxide having, originally, been published in a somewhat concised form in the "British Journal of Dental Science," September 2nd, 1889, and subsequent numbers, some explanation may be deemed necessary for their re-appearance in this, a more extended form.

As a portion of our readers have mis-conceived our meaning on some important points, we regard it a duty, in the interests of the gas and in justice to ourselves, that those who have so misunderstood us should be further enlightened by a clearer expression of our views on the points in question.

In the first instance the notes were not written in any captious spirit of hostility to others, nor in the present are our remarks dictated by other than a spirit of fair-mindedness.

Some who have taken up a different position to ourselves on the question of gas operations, who, misapprehending, have misrepresented us, implying much that is entirely unwarranted and opposed by facts. This being the case, and possessing the courage of our convictions, it became incumbent upon us to express our opinions—opinions which are the fruits of a life of sound practical experience—in bolder and plainer language.

No attack is made upon any system or teaching of others, but at the same time the same consideration is claimed for the methods here advanced that has been extended to others.

No attempt is made to approach the scientific aspect of the subject, that being left to abler pens.

The intention of this brochure is to arrive at the truth in all that concerns the practical use of Nitrous Oxide, and to popularize its use more generally as an anæsthetic for dental operations.

PRACTICAL NOTES ON NITROUS OXIDE.

"*Practice is Science.*"

PRACTICAL notes on Nitrous Oxide is in no way intended as a competitor, but as a supplemental addition to that which has already been written by others, nor is any special merit claimed for this publication. All who are likely to read its pages are presumed to be, more or less, acquainted with the history and manufacture of Nitrous Oxide, and to possess more than a superficial experience in its administration, as well as in the daily routine of a Dentist's Surgery.

Technical phrases have been carefully avoided. A description of the apparatus and methods necessary for the manufacture of the gas has been thought surperflous. The small, but valuable, hand-books that have been published, from time to time, by Mr. Barth and others, are full of useful information, and can be readily procured by those who require their aid.

Without invidiousness we would direct the attention of our readers to the works of Dr. J. Fredric W. Silk, Dr. Hewitt, and especially to the work of Dr. Guilford of Philadelphia, whose small hand-book, published 1887,* may be fairly described as the most intelligent and practical work on the subject we have yet seen. The first named authorities have treated the subject thoroughly and exhaustively. With but few exceptions there is hardly a sentence expressed by either that cannot be conscientiously endorsed by every intelligent gas anæsthetist.

No claim is made to originality, we merely attempt to describe wherein the methods practised by ourselves differ from those of other authorities and if in so doing, one practitioner is aided in obtaining more satisfactory results than he has hitherto been able to attain, the object of this contribution will have been in some measure achieved.

The early history of Nitrous Oxide is tolerably well known, but remains of sufficient importance to jusify a concise repetition of what may be regarded, by some, as an "oft-told tale," nor would it be justice to the names of the noble

* Nitrous Oxide, by Dr. S. H. Guilford, D.D.S., Philadelphia, 1887.

band of men to whom the world is so deeply indebted that their achievements should ever be passed over in silence.

Priestly had the honour of its discovery in 1776. For the next twenty-four years it was chiefly heard of as a scientific plaything, and used for the purpose of creating amusement at chemical and other lectures. In 1800 Sir Humphrey Davy was so well acquainted with it as to be aware of its anæsthetic properties, suggesting that it might be employed with advantage in surgical operations "where there was no great effusion of blood." For the next forty-four years Nitrous Oxide for all practioal purposes remained dormant.

On the eleventh of December, 1844, Mr. Wells, a dentist of Hartford, Connecticut, U. S. A. inhaled the gas, to which his attention had been drawn by Dr. Colton, dentist, while another dentist, Dr. Riggs, extracted one of his teeth painlessly. From that date commenced a new era in tooth drawing. This, briefly, is the stereotyped history of Nitrous Oxide. Thence-forward its success as the leading anæsthetic for dental operations became assured. Twenty-three years later, 1867, Dr. Evans, the eminent dentist of Paris, introduced the gas to

London, since which time it has steadily gained in popularity, and become firmly established.

In its early years it was usual for each dentist to manufacture his own Nitrous Oxide, but this is no longer necessary, gas in its compressed state being supplied by the makers to the profession at a price which renders its private manufacture unremunerative to all whose time is money. The purity and efficiency of the gas at the present day leaves nothing to be desired.

With some the age of the gas has become a moot point, and many whose judgment commands respect contend that it ought to be freshly prepared: this is not our experience. Equally good results are obtained with gas that has been stored for a considerable length of time. We contributed a letter on this question to the "British Journal of Dental Science," which can be found in the June number of 1874. The following is an abstract:—

"On May 12th I administered the gas from a hundred gallon bottle of Coxeter's liquid Nitrous Oxide, which was last filled three years and seven days ago, viz. May 5th 1871, the patient being a young lady twenty-four years of age, from whom I extracted the two lower first permanent molars, and I never witnessed a more

satisfactory operation." This recorded case was followed by numerous others equally satisfactory, the gas in some cases being five or more years old. These demonstrated cases, followed by others, absolutely settled the question of age.

It is impossibie to conceive how the properties of the gas can become changed or materially deteriorated when secured in hermetically closed wrought-iron bottles. On the other hand, we have repeatedly administered the gas from the large holder during the process of manufacture, the gas being only a few minutes old, without experiencing any unpleasant result, although the extreme rawness of the gas, in a few cases, has produced a sufficient amount of irritation in the bronchial tubes to render it less desirable than gas that has been matured. These experiments conclusively proving the age of the gas to be of less importance than some have attached to it.

There can be no difference of opinion amongst experienced anæsthetists, of the suitability, or otherwise, of Nitrous Oxide for dental operations, if we allow for prejudice, ignorance, and possibly interest. The fact cannot be too strongly enforced that the gas, pure and simple, is, par excellence, the anæsthetic most suitable for the dental profession. During an extensive

practice of over thirty years we have not—since the advent of gas—met with a case where the use of any other anæsthetic was either necessary or justifiable. There is no operation, requiring the use of an anæsthetic, that a dental surgeon is likely to be called upon to perform that cannot be accomplished as well, if not better, under the influence of Nitrous Oxide than under any other known agent. This being the fact, to administer chloroform, with its attendant risks, for dental operations, except under very exceptional circumstances, must be regarded as highly reprehensible.

We may look in vain for the discovery of a safer anæsthetic; its great safety is its greatest danger, tempting the thoughtless to neglect precautions that ought never to be omitted, thereby inviting failures, and so bringing discredit upon the gas that ought, justly, to fall upon the themselves.

The assertion that Nitrous Oxide is perfectly safe may be thought "too strong," although we believe it to be so when in the hands of an intelligent and experienced anæsthetist, and no one else ought to exhibit it. Under these conditions there is no cause for serious apprehension. There are few patients in ordinary health free

from definite lesions, who may not place themselves under its influence with as much confidence and unconcern as is usually felt by an ordinary traveller when taking a journey by one of our best managed railways.

During a period extending from 1868 to 1884 we manufactured our own gas, supplying it to our patients from a large receiver conveniently placed behind the dental chair. This arrangement, on the whole, answered admirably. Since that date appliances of the most modern type have been exclusively adopted.

In order that the patient's fears may not be unnecessarily excited we would impress upon our readers the importance of having everything connected with the surgery, as far as possible, wearing an air of innocent simplicity, care being taken that the apparatus is of the simplest construction consistent with efficiency, and in the most perfect order the face piece; especially receiving the closest inspection that the absolute exclusion of atmospheric air may be fully assured. This is of supreme importance.

Of the various face-pieces in use we prefer Barth's improved with the two-wayed stop cock as the simplest and best. The face-piece (Barth's) fitted with the three wayed stop-cock

finds no place in our surgery; its presence being a standing temptation to use it for the purpose of making our patients re-inhale expired gas, a practice that cannot be too strongly deprecated.

With the face-piece fitted to the large india rubber tube, attached to the large gas bag, the smaller tube securely connected with the steel gas bottle the apparatus is complete. This is the direct method and best adapted for private practice,and in all institutions where the patient's welfare and successful operations are reckoned of primary importance. In hospital practice other methods of a more or less objectionable character are adopted with a view to economy.

The question of suitable mouth props, or gags, is also of some importance. Every known variety has been tried by the writer and found wanting; none are free from defects, and all have been consigned to the limbo of antique curios. The acmé in mouth props is attained from ordinary corks. An assortment ought always to be at hand. Inch-and-a-half beer bottle corks are found the most useful; but various sized corks are indispensible to meet the requirements of special cases. The most valuable are extra long wine-bottle corks, two-and-a-half inches, which can be fashioned with a sharp penknife

in a few seconds to suit any case. A notch at either or both ends can be readily cut to fit edentulous gums. Corks have much to recommend them; they are easily adjusted, do not slip or injure the mouth, are not likely to be drawn into the larynx, and require no fine gut or other attachment, which at all times supply a point for the possible ingress of air. Long wine-bottle corks being cut from the finest and toughest cork, there is no danger incurred from breakage, and we have never known them to crush up. Perfect cleanliness is secured by destroying the cork on the conclusion of each case. We are conscious that one fatality has been recorded in America from the slipping of a cork into the larynx, but having employed corks exclusively as mouth props in many thousand cases for a period of twenty-four years we have not witnessed during that time a case of serious import.

That there may be as little appearance of preparation as possible everything ought to be in its proper place before introducing the patient to the surgery. Further than seeing that there is nothing tight about the neck and waist that is likely to interfere with the free action of the heart, and respiratory organs, no extra prepara-

tion of the patient is required. Examinations, such as passing the hand down, and under the dress, for the purpose of ascertaining that the chest and waist are free, are in the main to be avoided ; they tend to create alarm in the minds, and lead to trouble with patients of hysterical temperament, and do more harm than good. Our best authorities are opposed to them.

Mr. Braine and other authorities on the subject, advise "that a superficial examination should always be made, such as feeling the pulse, and ascertaining that the chest walls expand fairly well, by simply placing the hands on the chest, and directing the patient to take one or two deep inspirations ; but this is with a view to satisfy the patient, and put one's self on the right side in the event of an accident and consequent awkward questions that might be asked, rather than to obtain any very precise information for one's own guidance.

Sir Joseph Lister, alluding more particularly to chloroform, but the opinion is if anything more applicable to Nitrous Oxide, maintains that such examinations are quite unnecessary, and, in fact, tend to alarm the patient and raise suspicions in their minds which were previously non-existant. I think then it may be laid down as a pretty safe rule that if the patient or friends

suggest any doubt as to the former's fitness to be placed under the influence of the gas, or express even indirectly, by word or sign (such as holding out the hand for the pulse to be felt) a wish for an examination, it is well to adopt the superficial method suggested above rather than attempt to overcome their scruples by argument, while if definite lesions are known or suspected to exist, a more thorough and complete investigation should of course be made. Under other circumstances the less the equanimity of the patient is disturbed the better."

Whatever preliminary examination may be deemed necessary the primary object should be safety; the welfare of the patient never being disregarded in order that the dentist should be protected against very remote contingencies.

When once, from previous examination or otherwise, a patient has been pronounced a suitable subject for the gas, little further notice need be taken of the pulse and circulation; the heart, ordinarily, will be found quite able to take care of itself. Excessive anxiety about the heart tends to distract the attention of the dentist and his assistants from what is of more importance, namely, the *respiration*, which cannot be too closely watched. Carefully observing and

recognizing the difference between the mere holding of the breath by the patient, and true arrestation of regular respiration. Should the breathing cease from any cause other than mere holding of the breath, if only for a few seconds, the face-piece must be promptly removed, the position of the tongue ascertained, and drawn well out of the mouth until the breathing becomes re-established. In critical cases the continued action of the heart for some seconds, or even minutes, after respiration has stopped is our last and only safe-guard against a fatal disaster.

The experienced eye of a practical dental surgeon will take in and recognize at a glance what ought to be done in each case. His assistants, two males and one female (we never operate with a less number) thoroughly in harmony with each other and the operator, all efficiently trained, and equal to every emergency, are now supposed to be at their respective posts. The operator, who is also administrator, having selected the forceps most suitable for the work to be done, and placed them, unseen, in the order required in the left side pocket of his waistcoat. We find three pair sufficient to meet the requirements of all but the most

difficult cases. The use of elevators in all anæsthetic cases we strongly disapprove.

It must next be seen that the air pad encircling the face-piece is neither too hard blown or the reverse, that it may fit the patient's face accurately, and secure the absolute exclusion of atmospheric air during the administration. From the moment the gas is turned on—this is to be done by an assistant—till the conclusion of the operation the utmost care and skill on the part of the dentist and his assistants become a sine quâ non.

The gas in all cases should be fully given until stertor, jactitation, and other well known symptoms warn the administrator to desist. On the removal of the face-piece the extractions commence. It would here take pages to describe what in practice can be demonstrated in a few seconds.

The pernicious use of supplemental bags for the reinhalation of the gas cannot be too strongly or too frequently condemned. We disapprove their use on hygienic grounds, and to their use may be traced most of the troubles, difficulties, and failures met with by gas practitioners.

In our own surgery the gas is not administered a second time to a patient on the same

occasion, and under no circumstances to a female without another female being present.

We do not agree with those who assert, dogmatically, that the duties of administrator and operator ought never to be undertaken by the same person. Authorities who have had the largest experience meet with no difficulty in combining the duties—they do not run concurrently—the duties of the operator commencing on the termination of the administrators. Our most successful gas anæsthetists disregard this arbitrary teaching, although advanced with all the authority of official importance.

Dr. Guilford, who stands pre-eminently in the fore-front as an authority on Nitrous Oxide Anæsthæsia, says, page 53, "We see no necessity for this; indeed we prefer to be *both administrator and operator*, employing the assistant only to watch the pulse and respiration, to take charge of instruments or accessories as they are discarded, or to control the movement should this become necessary."* Dr. Guilford further adds, "for the past twenty-two years I have administered the gas many thousand times without a single unfavourable result." We, personally, are acquainted with other dentists

* The italics are our own.

who have administered it at least thirty thousand times without experiencing a single mishap; and this where the duties of administrator and operator are undertaken by the same person. This is our practice, and we have reason to think is the usual practice of many gas specialists in the United States. So far as we are aware no valid reason has ever been adduced why the two duties should not be combined. All teaching to the contrary savours strongly of a wish entertained by rather a numerous class who betray their anxiety to restrict gas operations within the limits of their own attainments by persistently enforcing their own untenable dogmas.

The dentist's own judgment must ever determine the mode of procedure in every case "Limit the freedom of the individual and you arrest human progress."

The dentist who is equal to both duties, fully realizing his responsibilities respecting himself, and the lives of his patients, does not willingly delegate to others the duties of either administrator or operator.

With the mere anæsthists, who are not skilful operators or vice versâ; there is no alternative, the duties must be divided or the gas left alone.

In simple cases it matters little by whom

either duty is performed, but in all first class operations it may be laid down as a pretty safe rule that unless a person has acquired a considerable amount of skill both as administrator and operator he ought not to undertake the duties of either with their attendant responsibilities.

In the best interests of the patients the duties are frequentiy combined with the most beneficial results. The operator being the best judge of his own wants will push the gas judiciously, with a near approach to precision to suit the requirements of the case in hand.

One anonymous writer in contemptuous terms combats this view, denying the ability of any one to prolong unconsciousness one iota, unless he can alter the laws of physiology, disregarding the fact that the physiological action of Nitrous Oxide is not exactly known, and has never been clearly demonstrated. It may be here reasserted that quite an appreciable amount of time may be gained by judicious and intelligent pushing of the gas.

There are few dentists who would needlessly run any risk of endangering their own reputation, and bringing the gas into disrepute, by attempting more than they can perform.

Not long ago a leading anæsthetist was reported to have said that he did not think it possible to extract more than two teeth during the insensibility produced by one administration of the gas, although on one occasion he had seen as many as four taken out; whereas when chloroform was the agent employed he had repeatedly assisted in clearing an entire jaw at the same operation.

This does not coincide with the conclusions arrived at by others. No two cases presenting precisely the same features the number will vary with each; in no case ought rash promises to be made either to patients or friends. But at the same time, assuming the cases to be of the ordinary type, it is not a very rare or impossible thing for an expert operator to succeed in clearing an upper or lower jaw at one administration. A well-known gas specialist in Philadelphia accomplishes this feat almost daily. Quite recently a lady friend of our own had fourteen upper teeth and one lower successfully and painlessly removed by the same gentleman at one administration, he undertaking the duties of both administrator and operator. We have more

than once witnessed over twenty teeth and roots extracted at one operation.*

So long ago as 1871 we contributed a short article to the "British Journal of Dental Science" which may be found in the April number of that year, from which is quoted the following extract: "In my own practice I have repeatedly extracted a dozen teeth, and roots of teeth, and in one favourable case eighteen were successfully removed during the Anæsthesia produced by one administration."

We have now before us a tabulated record of one hundred and forty-eight gas cases, in which the average number of teeth extracted at one administration is eleven. This is a mere record of what takes place in an ordinary gas practice, and no criterion of what might be accomplished. It may be fairly conceded that what has been practically achieved daily for more than twenty years has passed beyond the realms of contraversy or further discussion.

Nitrous Oxide having barely reached the threshold of its capabilities as an anæsthetic, operations under its influence ought not to be

* These cases though undertaken as mere show cases sufficiently illustrate the possibilities of Nitrous Oxide when required for more extensive operations than simple extraction.

restricted to the possible mediocre abilities of an inexperienced operator, rather the operators abilities ought to be cultivated until they become equal to the possibilities of the gas.

The great majority of our gas cases consist of single and double extractions, but we are frequently confronted with the question whether or not it is desirable to extract any considerable number of teeth at one sitting, which question must be answered by the state of health, the constitution of the patient, and the general circumstances of each particular case, and best left to the discretion of the practitioner.

In the spring of 1881 a lady called upon us for the purpose of having several teeth extracted, preparatory to the insertion of an upper artificial denture. Suspecting heart troubles, we firmly refused to administer the gas, although she strongly wished it; the teeth were carefully and successfully removed without the aid of any anæsthetic. Five months subsequently, without a moment's warning, the lady died from heart disease. Possibly an anæsthetic might have been administered without any unfavourable result, but we cannot regard it otherwise than as a fortunate circumstance that the gas was refused in this case.

Nervous shock has always to be reckoned with and must never be lost sight of; on this point it is important the anæsthetist should exercise his judgment with the utmost discretion. At the same time it must be borne in mind that when gas is the agent there is a remarkable freedom from unpleasant after-effects compared with those usually experienced when other anæsthetics are employed, the recovery from Nitrous Oxide being rapid and complete.

The advocacy of wholesale extractions is once for all here repudiated. We are strongly opposed to them. Cogent reasons frequently exist why not more than one or two teeth should be removed at the same time. On the other hand equally cogent reasons may present themselves why the operation should not be performed piecemeal. We constantly meet with cases where it is most desirable, for obvious reasons, that a considerable number of teeth should be removed at the same operation. Many of our patients are anxious this should be done, and their wishes ought not to be disregarded in the absence of any special reason to the contrary. After effects from one extensive operation are less to be apprehended than from a succession of smaller ones.

There are dental practitioners who argue against the extraction of more than one or two teeth when Nitrous Oxide is employed, who in practice do not hesitate to clear an upper or lower jaw where chloroform or ether is the Anæsthetic, and nothing is heard of the dangerous consequences of nervous shock. When this is the case it is difficult to free the mind from suspicion that "shock" is made a convenient bug-bear and raised for the purpose of concealing personal short comings.

The most serious objection to prolonged operations is not so much the dread of "shock;" as the comparative shortness of the anæsthetic effects of Nitrous Oxide not allowing sufficient time for their accomplishment. We have proof of this, if further proof were needed, in the persistent efforts that have been, and are still being made, to overcome this objection, by combining the gas with ether, mixing it with oxygen and various other methods, each possessing its value, and each attended with disadvantages which preclude their general adoption in the dentist's surgery.

The time and energies of the dental surgeon are most profitably spent in overcoming the difficulties arising from the element of time, in

acquiring increased skill and dexterity as administrator and operator. That this end may be gained all efforts in this direction ought to meet with every encouragement. Those of our young men who display expertness and aptitude for this branch of professional work being induced to apply themselves heartily to the task of minimising their gas difficulties in the way suggested.

Theoretical teaching although invaluable is not sufficient in itself; and unaccompanied by daily practical work becomes worthless. Further, the gas specialist should possess the power of crystallizing all his theoretical knowledge into the practice of a few seconds. In Schools of Dentistry for the professional training of students it may be desirable to conduct the instruction given on well-defined conventional lines, but in ordinary practice the dentist must be able to vary his methods to meet the special requirements and exigencies of each particular case.

Amongst undesirable patients may be classed the strongly bearded, and those possessing a profusion of hair on the face The trouble we are apt to meet with from this cause may be much reduced by a liberal application of soap

and water to the beard and moustache, with the object of rendering them impervious to the air. Hysterical females are the most troublesome, and frequently cause much anxiety. If we should suspect, from a patient's general appearance and behaviour, that she is likely to give unusual trouble, it is better to refuse her the gas, rather than subject oneself to the consequent annoyance that might arise from its administration.

The experienced anæsthetist has little to fear from erotic or other untoward manifestations. We have not witnessed one such case during the last eighteen years, and never in our own surgery.

Professor Barker says—Instructions in Nitrous Oxide :—"He never met with a case in which the aphrodisiac effect was noticeable." In opposition to the generally received opinion that anæsthetics do stimulate the sexual functions, we unhesitatingly assert that in a record of many thousand cases we have not met with a single case where Nitrous Oxide has been the anæsthetic employed. In two cases only (both occurring more than twenty years ago) have we experienced inconvenience from involuntary voidance of the contents of the bladder; both

might easily have been prevented had ordinary precautions been taken.

As our experience increases our convictions deepen that these troubles are mainly to be accounted for by errors of a remedial nature in the administration of the gas; air leakage, and the pernicious use of supplemental bags being a fruitful source of annoyance in this respect. Cases are rare indeed where awkward manifestations can be justly attributed to the temperament of our patients.

The fables we are expected to listen to from patients of their individual idiocyncracies may be passed unnoticed. We have not met with a patient with any marked peculiarity in this respect. This is also the experience of others who possess the best means for observation.

In the summer of 1869, one patient, the son of a then famous Indian Rajah, informed us that the gas had no effect upon him, and that it was impossible to put him under its influence, he having on one occasion inhaled twenty-six gallons without any effect being produced. No difficulty was experienced with this patient on that, and subsequent occasions, in inducing complete anæsthetization with the ordinary quantity of gas. The above may be taken as a

typical case, and we fail to understand how any ordinary constitution can resist the influence of Nitrous Oxide. We never met with a patient who could not be thoroughly narcotised in less than ninety seconds.

Dr. Guilford wisely states, "of the casualities and emergencies that may arise in connection with administration of any anæsthetic, to properly and promptly meet them requires that the practitioner should understand their variety, their characteristics, and their means of remedy." Mr. Henry Sewell endorses this, and adds—"In the event of an accident the administrator ought to be able to recognise the symptoms, and to act instantly." Dr. J. W. White tersely remarks—"When trouble comes to a patient from any cause during the anæsthetic state, it is not a good time to hunt up information."

Of the numerous accidents that may, and do occur, such as a portion of a broken mouth gag, or a tooth, slipping back into the fauces and being drawn into the trachea, it is presumed all who act as anæsthetists are thoroughly acquainted with their best means of remedy; rendering their recapitulation and treatment unnecessary.

Through the looseness of the condyloid articulation in some patients, luxation of the lower jaw is not a very infrequent occurrence, but need cause little anxiety. By employing the proper methods (with which the anæsthetist is supposed to be familiar) the reduction of the dislocation may be readily and easily accomplished, in many cases before the patient has realized that anything unusual has happened.

All authorities are agreed that the most serious accident or emergency which may at any time confront us in connection with anæsthetisation is asphyxia. Asphyxiation "will be indicated by increased and alarming lividity of the countenance, and a struggle for breath" if continued, followed by complete arrestation of respiration. This may be caused by the lodgment of some foreign body in the larynx, but more frequently by the dropping backward of the tongue, effectually blocking the air passages and preventing the ingress of air. When this is the case it is of the utmost importance the administrator and his assistants should maintain their self-possession, and be able to act instantly, promptly seizing the tongue and drawing it well out of the mouth and keeping it out, at the same time ascertaining the presence or other-

wise of any foreign substance in the fauces; if the former, promptly removing the obstruction. In the majority of cases this treatment will be found sufficiently effectual, but when necessary, recourse must be had to artificial respiration. Although our record includes one or two alarming cases, we have never found it necessary to adopt this last-named treatment.

We differ entirely from those who hold that Nitrous Oxide is an asphyxiating gas. In 1873* we addressed more than one letter on this subject to the Dental Journals. The following are abstracts:—"I do not in any sense regard Nitrous Oxide as a 'suffocating' gas, but am convinced it is quite as much an anæsthetic as any other agent we, at present, possess." Again, "Now when a knowledge of the gas and its administration has reached a state of almost perfection, I think it to be regretted that any person should come forward and create a feeling of unnecessary alarm in the minds of the public by denouncing it without either rhyme or reason as asphyxiating, dangerous, and no anæsthetic." The experiences expressed eighteen years ago

* *Vide* February and March numbers, 1873, of "British Journal of Dental Science."

have not, by subsequent experience, been materially modified.

In our own practice, in all cases where the asphyxial symptoms have been pronounced the cause has been the falling back of the tongue, effectually preventing the ingress of air, and not from any intrinsic asphyxiating properties possessed by the gas.

Instances have been recorded in the Dental Journals where the patient has been subjected to dangerous asphyxia in consequence of failure on the part of the dentist to turn on the gas on the application of the face-piece, but this accident (?) is only possible in the absence of proper assistants, and in the surgeries of those practitioners where gross neglect of the most ordinary care prevails.

The following is the most serious and alarming case we have met with. On May 17th, 1890, an unmarried lady, twenty-eight years of age,—to whom we had previously administered the gas successfully without a single unfavourable symptom,—called upon us for the purpose of having four teeth extracted uuder the influence of Nitrous Oxide. The patient having full confidence took the gas well, although she appeared to be rather long in going off; she was

closely watched for the usual symptoms, but there was an entire absence of stertor, jactitation, and all other symptoms with which we are so familiar, when without any premonitory warning the countenance became alarmingly livid, followed by complete arrestation of respiration. The tongue was instantly drawn well forward, and kept in that position for several seconds, securing free access of the air until respiration became re-established. On liberating the tongue it at once slipped back, instant action being again taken, so preventing this anxious and painful scene being re-enacted.

Though never to be disregarded by the gas anæsthetist, stertor, jactitation, and the conjunctival reflex test are by no means to be implicitly relied upon; occasions may and do occur when one, or all, may be entirely absent. The foregoing dangers are real, and so far as human forethought extends, must be guarded against.

It has been said with much truth that serious casualities rarely or never occur in the surgeries of our most experienced gas anæsthetists; for the best of all reasons, excessive precautions are adopted for their prevention.

In one dental office in Philadelphia (Colton Dental Association, succeeded by Drs. F. R. and J. D. Thomas) the gas has been administered for the extraction of teeth and minor surgical operations one hundred and forty-seven thousand times without a single death or serious consequence. We have instanced the performances of the above-named gentlemen, estimating the value of their authority by the number of their successful operations.

Illustrations might be indefinitely amplified proving the all-sufficiency of the gas as an anæsthetic for dental purposes.

We have no sympathy with those who say the gas is a simple thing, and that tooth extraction under its influence is a mere formality. All remarks of this nature are begotten of ignorance, and calculated to do much harm. No royal road exists to excellence as a gas specialist. The gas specialist is a specialist of specialists, and requires special training and special qualifications for the proper performance of the difficult duties of his speciality.

Dr. Guilford may be profitably quoted on this question. Speaking of the operator under gas anæsthesia, he says :—"He should be skilful, in order that he may perform the operation

in the best manner, with the least injury to the surrounding parts and the least liability to accident. It has been well said that no one should undertake under an anæsthetic until he has acquired considerable skill in extraction without it. He should be possessed of strong and steady nerves, so that he may not lose control of himself through excitement. He should be quick in his movements, to enable him to perform the task he has set himself during the continuance of full anæsthesia. A clear head, steady nerves, and dexterity are all pre-requisites to success in this branch of practice."

Whilst being protected against all that is calculated to irritate or distract him, the operator should be proof against all outside influences, and have acquired the power of focussing his physical and mental faculties for the time being on the work in hand. Intense concentration in this respect is of the utmost importance. The calling of a gas specialist is exacting in its demands for much personal devotion; necessitating a careful and regular mode of life, observing early hours, and avoiding late suppers in order to maintain all his energies at the highest pitch and in the most perfect tone.

As a test of nerve power we know of nothing equal in severity to a first class dental operation conducted under Nitrous Oxide anæsthesia.

It is admitted that no other anæsthetic requires the same amount of care and skill in its exhibition as Nitrous Oxide, and it ought at all times to be under the supervision of a highly-trained and experienced practitioner,—this fact is not sufficiently recognised. We cannot admit that the gas has ever obtained its proper position in the dentist's surgery until it has banished all other known anæsthetics.

When the public has become fully educated to appreciate the merits of the gas, and when the dentists themselves have succeeded in doing it full justice, it will be a rare thing to hear of an extraction without its aid.

"It is well known that all general anæsthetics which produce unconsciousness have been used first by dentists, or else for the purpose of extracting teeth. This has been the case with the oldest anæsthetic—Nitrous Oxide gas—as well as with the more recent ones—ether, chloroform, methylene, chloride of ethyl, and hydrobromic ether."*

* A lecture delivered in Halle-on-the-Salle, at the 64th meeting of the Society of German Naturalists and Physicians, September, 1891, by Professor Ludwig Hollaender, Halle-on-the-Salle.

The valuable properties possessed by Nitrous Oxide as an efficient and safe anæsthetic for dental purposes can hardly be over-rated. On the other hand it possesses its disadvantages and difficulties. None are insurmountable, and the dentist who strives most successfully to overcome them will be the wisest and best rewarded practitioner.

PLATE I.

Represents a male patient seated in the dental chair (Owen's) with the dentist and his assistants in their respective positions. The administrator, who is also operator, having the requisite forceps carefully concealed from view—is seen on the patient's right in the act of applying the face-piece—this duty alone will be found to fully occupy both hands—the tips of the fingers of the left hand being placed under the chin of the patient, firmly supporting the lower jaw, thereby preventing the slipping of the cork ; the right hand securing the exclusion of air by gentle pressure on the face-piece to the upper part of the face. To ensure success, it would be well for the administrator to increase the pressure as the state of anæsthesia advances. The assistants on the left, one taking the pulse, watching the respiration, and controlling the movements, when necessary ; the other turning on the gas, and assisting generally.

No string connected with the cork in the patient's mouth is seen hanging down outside, the advice that this precaution ought always to be taken we disregard ; the disadvantages from such attachment out-weigh the benefits, and we

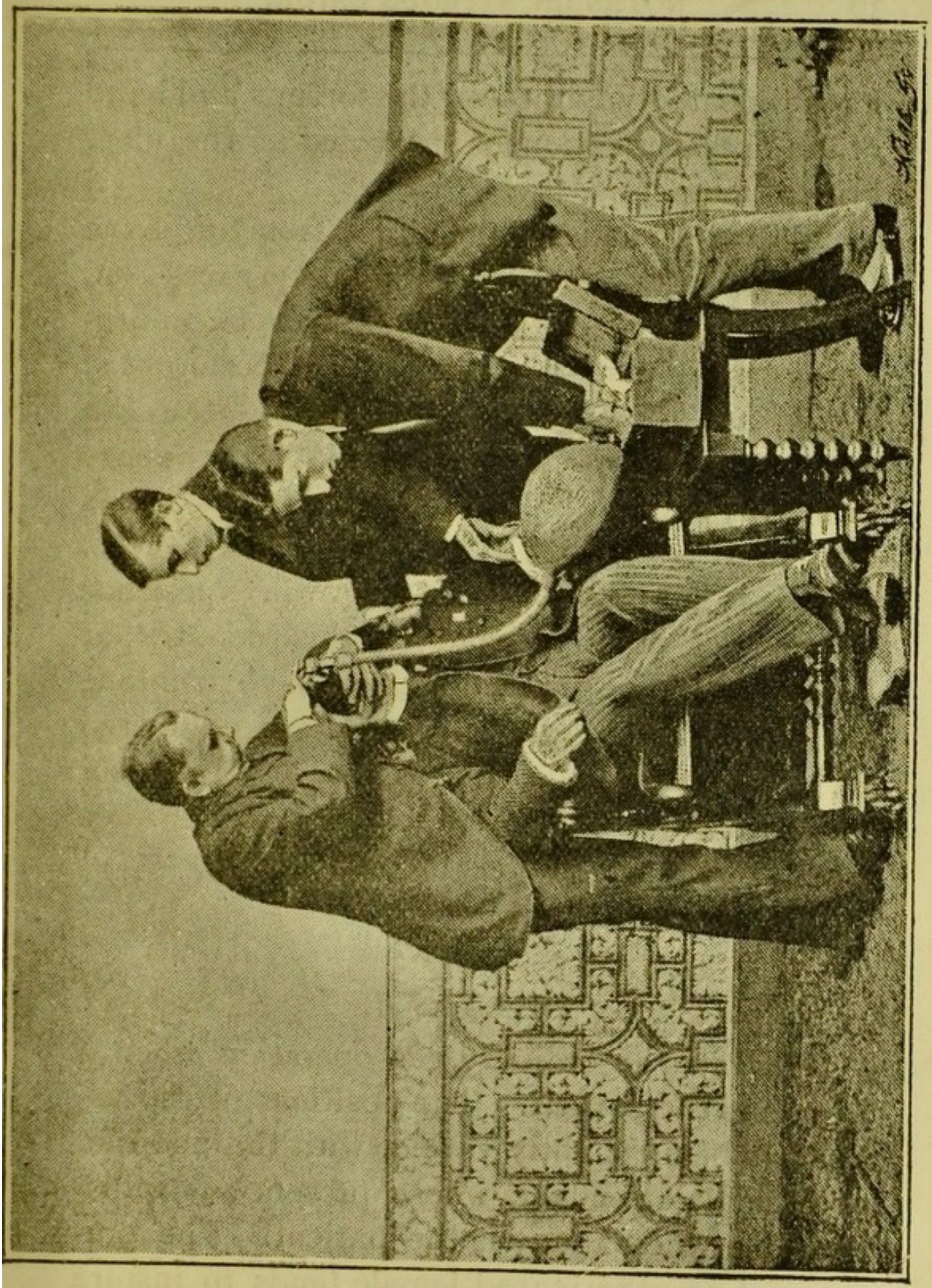


PLATE I.

have repeatedly witnessed the forceps and hand of the operator seriously entangled at the most critical moment.

Other authorities, who differ from us, have laid it down as a rule, admitting of no exception, that the administration must never be undertaken by the person who is about to perform the operation; it being urged when such is the case one of two things almost invariably happens; either the patient receives a little more gas than is absolutely necessary, or the reverse takes place.

This is not identical with our own experience or that of others, either in this country or America, whose usual practice is to combine the duties, and whose gas cases are numbered by tens of thousands, and yet who have never met with either of the difficulties named, to the extent of causing serious inconvenience.

PLATE II.

Illustrates an ordinary gas operation when a female is the patient. The positions of the assistants being slightly varied, with the addition of a female attendant, whose presence is indispensable when a lady is the patient. The presence of an experienced female tends to inspire

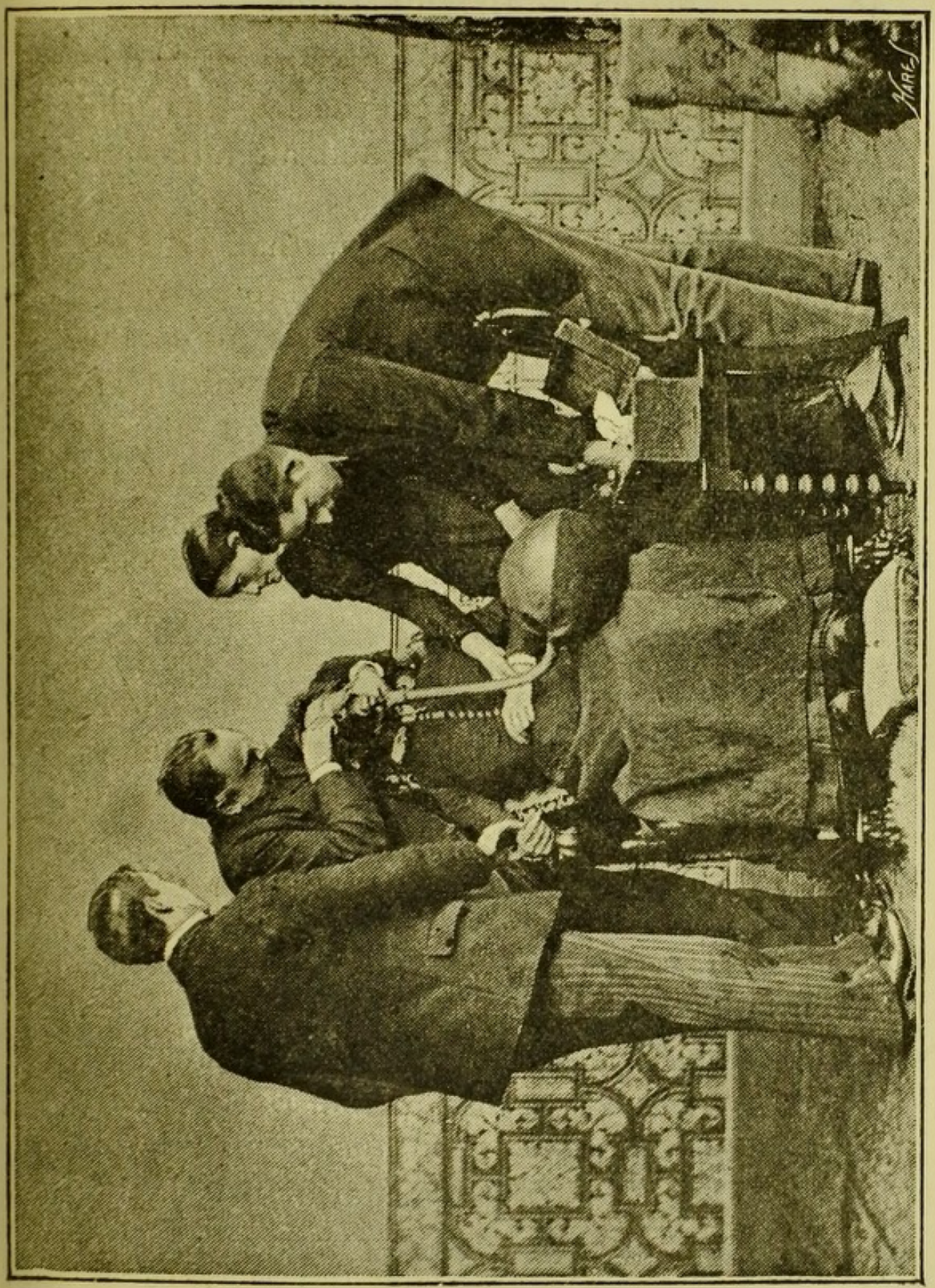


PLATE II.

confidence in the patient, and the attention she is able to bestow both before and after the operation is much appreciated.

We repeat again, and again, that the experienced gas anæsthetist has little to fear from erotic manifestations. With due regard to the purity of the gas, the absolute exclusion of air during administration, and the use of supplemental bags prohibited, erotic or unseemly behaviour from any patient (male or female) becomes all but inconceivable.

We do not envy the gas anæsthetist whose experience is spiced with a record of prurient manifestations.

In cases of emergency it is imperative the assistants--male and female—should be in readiness, not in an adjoining room, but on the spot.

PLATE III.*

Shows an ordinary leather covered case, holding a hundred gallon bottle of liquid gas, with the tube, indianette bag, and Barth's face-piece attached. This apparatus is simple, all-sufficient, and least likely to alarm our patient.

---

* We are indebted to Mr. Rigg, of Kendal; our illustrations are from photographs kindly taken by him.

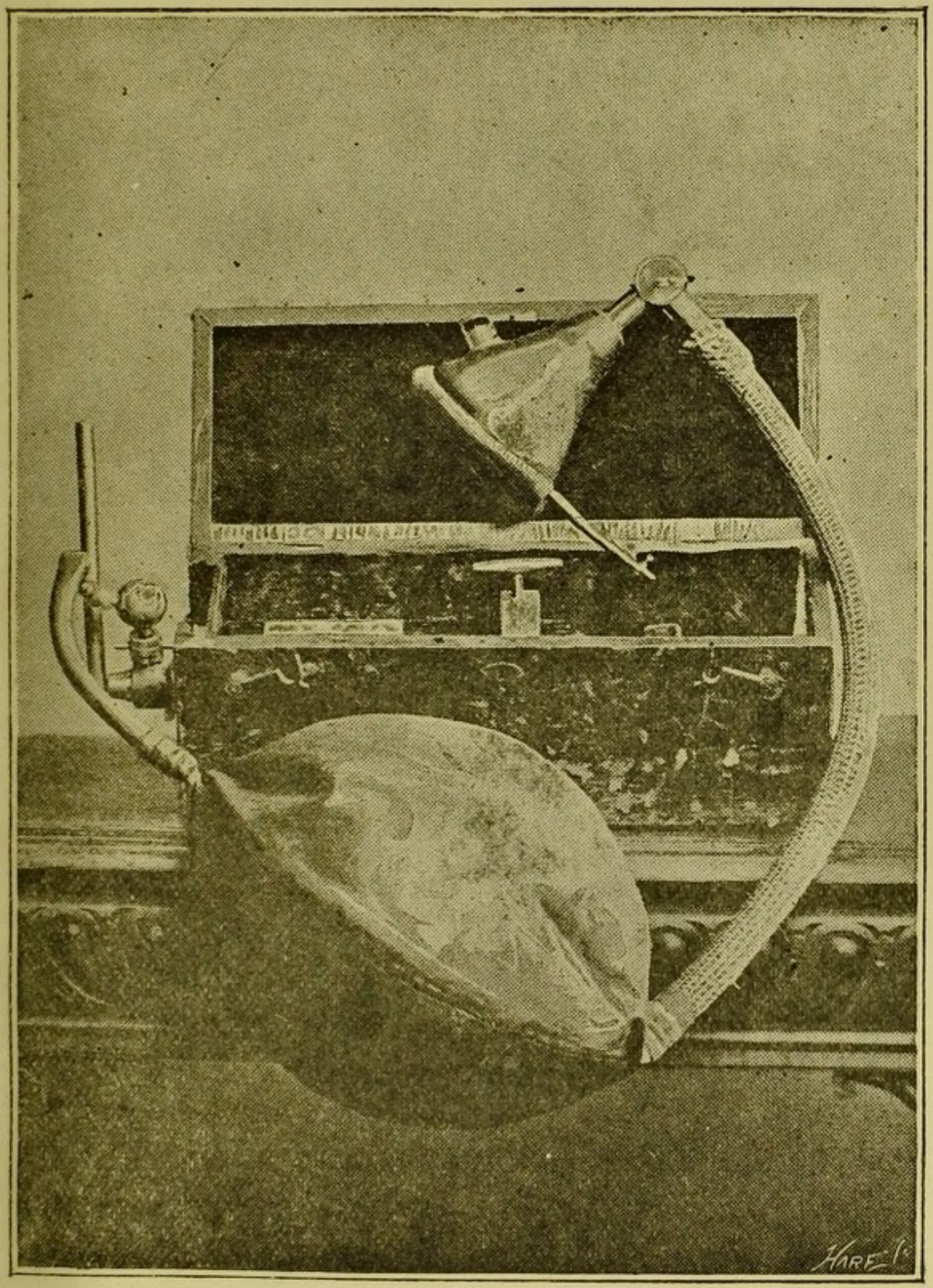


PLATE III.

KENDAL:
PRINTED AND PUBLISHED BY T. WILSON.

1892.