

CATLIN (A.W.)

OXYGEN

**As a Distinct Remedy for Disease
and a Life-Saving Agent in
Extreme Cases.**

By A. W. CATLIN, A.M., M.D.

*Attending Physician, St. John's Hospital,
Brooklyn, N. Y.*

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OXYGEN AS A DISTINCT REMEDY FOR DISEASE, AND A LIFE-SAVING AGENT IN EXTREME CASES.

OXYGEN, although known to the profession for many years, as a remedial agent, has not, until the last decade, received in any sense its true recognition. Like many other agents, it has had its history of tentative experience, only to be relegated to the list of such remedies as are either too expensive, too cumbersome, or too uncertain in their effect, to retain their hold in the mind and heart of the earnest practitioner.

This also means that, in common with other agents having similar experience, it has been left in the hands of a quasi-professional class—non scientific—whose use of it resulted in no practical good. If, in this article, proof can be adduced to show that this agent is not only a potent remedy, but has a far wider field than is commonly supposed, the object of the writer will be attained.

Primarily, and for a long time exclusively, this agent has been recommended in lung difficulties—more especially to relieve the dyspnoea and cyanotic conditions following in the train of a pneumonia, where a large amount of lung-structure is involved. Another way of stating the fact that its use was deferred until the disease was far advanced, the strength exhausted, and the recuperative powers in abeyance; in other words, a *dernier ressort*, as a palliative and not as a curative.

Fortunately, however, for our patients, another view is now taken of this life-giving agent, and to-day we recognize the fact that if we can, with a limited lung-capacity (such acute but self-limiting disease being present), pass more or less continuously the same quantum of oxygen into the blood as is normally required, when no disease is present, we practically lift our patient to the plane of health so far as functional activity is concerned and give him a hundred-fold more strength to battle with than before. We emphasize this question of functional activity. Disease means limitation and ultimately, if not checked by natural or other means, suspension of such activity. Where, therefore, the natural forces, if sustained, are the curative agents, it is eminently proper to secure by every means in our power a continuance of this activity throughout the whole system until the dis-

ease has run its course, and thus conserve the reparative powers so necessary in convalescence.

How often we hear the sad expression, "The disease was virtually conquered, but our patient succumbed because the vital forces were too much exhausted to go on with the recuperative effort;" a statement which we believe is destined to become less and less frequent as the profession realizes the part that this potent factor is to play in the future of medicine. It is our desire to show: 1. That oxygen is the most sure and satisfactory stimulant we have. 2. That by being exhibited through the lungs, and not by the stomach, its entrance into the circulation is much more certain and immediate. 3. That its effect, felt primarily upon the heart, is almost as quickly seen at the nerve-centres and in the digestive organs. 4. That it is pre-eminently the remedy for profound shock, either from hemorrhage or nervous drain, where vitality is at too low an ebb to take up the intricate history of assimilation and repair.

CASE I.—Mrs. G.—, six months pregnant, after being subjected to a protracted and severe strain by the constant care of a child critically ill with diphtheria, was suddenly taken with flooding. The hemorrhage was so great and shock so profound by the time medical aid reached her, it was impossible to move her from the lounge to the bed. A tampon was applied and hypodermics of brandy and strychnia resorted to. All attempts to nourish her by the mouth failed. The stomach would not tolerate even water. Pulse scarcely perceptible at wrist. Respiration shallow, eyesight dim, voice but a whisper. Tampon controlled the hemorrhage, brought on some uterine contraction, and the hypodermics, which were continued, produced some reaction.

In the course of a few hours counsel was sought, to determine the best course to pursue to relieve the uterus of its contents. It was advised to remove tampon and put on forceps if dilatation would admit of it, but the better course was finally adopted of applying the faradic current to the fundus as the last part of the tampon was removed, which caused the uterine wall to contract firmly upon its contents, brought the head promptly down, and quickly completed the birth of child and placenta without any loss of blood, a vital consideration in view of the well-nigh moribund condition of the patient—a result which certainly could not have been obtained if the old method of entering the cavity of the uterus with the forceps had been resorted to, and would certainly have put the life of the prostrated mother in imminent peril. Continuance of the current held the womb tightly contracted, and to use the patient's own words subsequently, gave her power and conscious strength here which she was unable to supply herself. Prostration, however, continued absolute; the stomach still refused nourishment or liquid in any amount, and

the character of the pulse indicated a cardiac failure which made the condition very alarming. A fresh cylinder of oxygen was then sent for and its administration watched with the deepest interest. Continuous inhalations were given, and almost immediately a restful, calm expression came into the face. The pulse steadied at the wrist, and soon little naps of refreshing sleep announced that our king of stimulants was doing its work at the nerve-centres. In an hour a teaspoonful of milk and lime-water was taken and retained, and very soon another, till complete tolerance was established; and this in turn was followed by a demand for food, showing that our life-giving agent had reached this vital centre and that powers of assimilation were eager to do their work. The inhalations were continued with longer and longer intervals as the strength returned, convalescence being established and recovery assured in much less time than the gravity of the case gave us reason to expect.

CASE II.—Seen in consultation. Mr. H—, a gentleman thirty-eight years of age, of good average health, taken during the grippe period with the prevailing influenza—exasperating bronchial cough and neuralgia; attack resisted treatment and patient gradually weakened, till a passive pneumonia announced itself and grave doubts were entertained of his recovery. At this point oxygen was advised, and almost immediately the patient announced himself as feeling better. The agent was continued and recovery followed in the line of restored functional activity. He breathed better, had refreshing sleep, began to demand and assimilate nourishment, and threw off the passive congestion because of renewed strength.

CASE III.—Miss S—, twelve years of age, a scholar at one of our large institutions, naturally of a very nervous temperament, had the duty of speaking in public before the school required of her—a task which so disturbed and excited her, that after the effort was over she was obliged to return home and go to her bed; extreme nausea was present and absolute nervous prostration. Respiration irregular and sighing, pulse feeble and intermitting; patient tossed restlessly from side to side, and stomach refused all food. All other means failing and the patient becoming more and more exhausted, oxygen was exhibited, with immediate benefit; a calm quiet sleep coming—first in brief naps, then more continuously—while the heart steadied and the sighing-breathing gradually ceased.

After the sleep of restoration the digestive centres balanced and food was given in small quantities. The gas was continued for a few days, with small but repeated doses of *nux vomica*, and a rapid recovery made.

CASE IV.—Seen in consultation, and best told in the words of the attending physician, Dr. Alexander Hutchins, of Brooklyn,

Mrs. W—, anticipating her confinement, December 20th, was attacked with double pneumonia, November 16th. She had endured great discomfort from uterine tumor, the breathing in the recumbent position being much impeded, and the dyspnoea from the pneumonia, added to the restraint by pressure on the diaphragm from below, enforced an erect sitting posture to breathe at all. Her condition was held to be very grave and the prospect of a premature delivery imminent. Labor came on suddenly on the 24th, eight days after the pneumonic seizure, and though the labor was rapid and energetic, the patient was almost moribund immediately after the expulsion of the child. Prompt obedience to the peremptory command of her physician in taking forcible inspirations, restored her breathing. The loss from hemorrhage, the heart strain, the dyspnoea from the pneumonia, all contributed to a profound shock and depression which the various forms of stimulants failed to overcome. Inhalations of oxygen were resorted to, with manifest immediate relief, about thirty hours after the completion of her labor. The inhalation was continued during sleep and while awake, with very rare intermissions, for forty-eight hours, and was kept up less continuously for ten days. It was a substitute for all other medication. The recovery was complete.

It can hardly be questioned that the oxygen saved her life. The insufficient aëration and the weakened circulation would have made absorption from the stomach impossible, stimulants alcoholic or diffusible would have been of no avail, no food could have been digested or assimilated. The ease of the administration of the oxygen was no unimportant matter in this case. It required no effort whatever on the patient's part. The persistence with which it was continued was in part due to the appreciation by the patient that the intermittent use of the inhalation diminished her comfort. The case was asthenic from profound shock. The inhalations of course were never deep. As the lung cleared the inspirations were deeper and the need of the oxygen became less imperative and less frequent. The support of the patient was maintained with uniformity by reason of the steadiness of the oxygen stimulation. The neatness and repose of the treatment are not trivial matters. The stimulation through the lungs, and not by the stomach, is in the course of natural action, and not indirect action.

CASE V.—Miss B—, aged nine years, shortly after her return to the city, in September, 1889, was taken with headache, chilliness, and general malaise, gradual rise of temperature, and an increasing prostration that compelled her to take to her bed. The case was diagnosed as one of mild typhoid, but soon developed, at the end of two weeks, so much cardiac weakness as to make prognosis grave. Patient, naturally frail and anæmic,

complained of oppression and cold extremities. Lips and nails were blue, and at times a dusky hue could be seen over the whole countenance—prostration increasing with growing inability to nourish. The unfailing friend—*Dr. Walton's blue cylinder of oxygen gas*—was promptly secured, and continuous inhalations given. Heart responded at once—cyanotic condition cleared up, and a gradual but steady improvement ensued. Fever ran its course, but with the oxygen, which was continued two weeks, there was a conscious strength to battle with the disease, which meant victory in the end.

In the above cases, selected from a large number, the principal points claimed for this agent are exemplified, but we desire to emphasize this fact—for it is a fact—that while oxygen is undoubtedly a great burden lifter from the heart in cases of dyspnoea and insufficient aëration, it is something far more to the nervous system if given with a free hand, as we have indicated. Nature's sweet restorer never has been so successfully wooed as by this suitor, and when the ravelled sleeve of disease has been gathered up by this most potent remedy we see following immediately in its train all the natural processes of repair, wherever such is possible. This then is the point we desire to lay stress upon: Oxygen is something far more than the mere palliative—a reliever of symptoms, or an urgency-resort to keep the heart going a little longer. It is a distinct remedial agent, and will save life over and over again in such cases where the natural forces only ask for time and functional liberty to do the work.

In the *Boston Medical and Surgical Journal* of November 20, 1890, will be found an article from the pen of Dr. A. N. Blodgett, wherein he sets forth in admirable detail the results of continuous inhalation of oxygen in a case of pneumonia, which would have unquestionably proved fatal but for this agent. From this history, which I would be glad to have every professional brother read carefully, we quote the following (p. 483):

“When I directed the continuous administration of the gas, I did so under the positive conviction that the patient was irrevocably doomed, and the best result that I looked for was simply relief to the sensation of suffocation, and not any curative action. The record then made in my note-book, February 18th, at 8 A.M., is ‘in articulo mortis.’ At this time I had only employed the gas in the manner ordinarily directed; that is, two or three gallons at a time, several times daily. I now directed its use without cessation, and, to my great surprise, the patient not only obtained the relief desired, but was enabled to carry on the function of respiration.

“The amount of gas employed was not far from two hundred gallons in twenty-four hours. The druggist who supplied the gas was astonished at the amount required, and, thinking to do me

a service, sent me a cautionary message, implying that no human being could possibly stand so great an amount of oxygen, on account of the dangerous degree of stimulation to the system and the increased combustion of tissue. I have no doubt that the warning might be appropriate in any ordinary or occasional use of the gas; but in this case the temporary absence of the oxygen was followed by the most alarming symptoms, and it was only with the greatest exertion that the patient was resuscitated. I should say in this connection that the oxygen used was the compound of oxygen and nitrous mon-oxide prepared by Dr. Alfred Walton of New York. The undiluted pure oxygen would undoubtedly have been too stimulating. I think that the recovery of the patient from the condition in which she then was is due entirely and unquestionably to the administration of the gas. Its effect was almost as pronounced and evident as is that of a ligature in hemorrhage.

“To my sorrow I have to confess that I am able to recall more than one case of pneumonia which has terminated in death in which I cannot but think that the timely use of oxygen compound might have been conducive toward a different ending of the disease. I am inclined to think that the judicious employment of this agent will be followed by distinct amelioration of the symptoms, and reduction of the distress in all cases of impending asphyxia. If in this way the strength of the patient may be husbanded, and the blood be maintained in a state of oxidation sufficient to allow the respiratory phenomena to go on, I think that many cases will be found in which the period of greatest danger may be safely tided over which would otherwise unquestionably be lost.”

Such is the testimony of Dr. Blodgett.

It is hard to understand the prejudice that has existed so long in the minds of the profession in regard to this agent, and even to-day has to be combated with not a few. Slowly but surely, however, it is being recognized in its mission of helpfulness, and we believe the day is not far off when it will take rank with electricity as one of the two great life-saving agents of our day and generation. Among the cases narrated it was manifestly shown in one that life was saved first by the localized power of electricity controlling hæmorrhage, and later on by the diffused and true stimulants of oxygen, whereby functional activity was continued.

It only remains to add the results of experience as to the best method of exhibiting the agent.

If you would get your best results, you must administer the gas at first freely and continuously, especially in those cases of profound shock where the depleted centres of life must have this true stimulation offered unremittingly, if they are to be encour-

aged to take up their duty again. Theoretically, only a certain quantum of gas can be absorbed—but facts are stubborn things, and the fact here is, that far more oxygen is absorbed by the blood than has been supposed possible, provided the oxygen is properly diluted. Pure oxygen is so dense in its specific gravity that it is not easily taken up by the blood vessels. Nitrous monoxide is of light specific gravity and is also a powerful nerve stimulant. The proportions which have given me the best results are two parts oxygen and one of nitrous monoxide. The only indications for a suspension of its use is a condition at once recognized by the patient, viz., super-exhilaration and dizziness—and this limitation is rarely reached in these extreme cases where the inhalations are not as deep or prolonged as they are when the strength returns and the demand for the stimulant naturally begins to limit itself. In other words, the patient once instructed in its use and conscious of its helpfulness, is the best guide in its administration and can be safely allowed to breathe it *ad libitum*. The fear is, they will not get enough, not that they will get too much. This, of course, implies that the pure gas mixed with nitrogen, two parts of the former to one of the latter, is being used.

Its power as an antiseptic and disinfectant we are all aware of, and is markedly seen in diphtheria where the breath is so foul, and it has been decidedly helpful in the severe types of this disease as a coadjutant to corrosive sublimate. If, after prolonged surgical operation where the patient has been thoroughly saturated with the anæsthetic and, as a consequence, convalescence is tardy and unsatisfactory, oxygen were to be promptly administered, we would find the reparative action wonderfully enhanced and local results far more gratifying.

The objection so often raised to it as a cumbersome remedy, not easily obtained at short notice, no longer holds, for depots are established all over our large cities, while the telephone, for New York and Brooklyn Physicians, makes it possible to reach the plant at No. 280 Fourth Avenue in New York City, and secure a cylinder of fresh gas within an hour—day or night, Sundays or holidays—a service which has been promptly furnished many times to the writer, and for which he desires to make grateful recognition.

There are many other conditions under which oxygen can be exhibited, always with relief, even if the nature of the case is necessarily fatal; and at the end of a hopeless struggle, when the grim visitor is at hand to claim his own—the poor weary body—it is no small thing to say, that it relieves needless suffering, smooths the dying pillow, and gently invites into that dreamless sleep, that knows no waking here.

A FEW CLINICAL CASES SHOWING THE VALUE OF
OXYGEN COMBINED WITH NITROGEN MONOXIDE
IN THE TREATMENT OF PULMONARY AND OTHER
TROUBLES.

By E. E. TITUS, M.D.,

Attending Physician to the Northern Dispensary, Instructor at the N. Y. Post-Graduate
School and Hospital, New York.

IN THE MEDICAL RECORD of July 6th there appeared a very able article by Professor W. Gilman Thompson, showing a series of experiments with oxygen upon animals, and the conclusions arrived at as a result of those experiments. The conclusions were in the main such as I have demonstrated repeatedly by clinical experience. In the treatment of pulmonary complaints the tendency at the present time is toward local medication. This arises principally from the general acceptance of the germ theory, which teaches in the main that diseases originate from micro-organisms, and the belief that from this it must follow, as a necessity, that these micro-organisms must be destroyed or rendered harmless to organized tissues, either as a means of cure, or as a prophylaxis to such a disease. For these reasons attention has been directed more particularly to the study of means whereby antiseptics or germicides may be made to reach disease-germs in the lungs more directly and safely than has hitherto been known.

If tuberculosis depend upon the presence of infectious organisms in the tissues, then certainly the most rational mode of treatment in phthisis must include the administration of antiseptic agents. The most powerful antiseptic known to science is oxygen, for in an atmosphere of oxygen it is impossible for disease-germs to exist.

It has been found by clinical experience that oxygen is less irritating and more readily absorbed when combined with a certain equivalent of nitrogen monoxide. The proportions that I have found most valuable are two parts pure oxygen and one part nitrogen monoxide. In order to obtain good results, it is of the utmost importance that these gases should be absolutely pure and properly combined. Pure oxygen I believe to be too powerful an oxidizing agent when used alone; especially when there exists inflammation in the air-passages. Nitrogen monoxide is valu-

able as a modifier of pure oxygen, and has a soothing effect upon the nervous system. It renders the oxygen with which it mingles more assimilable, and hence more promptly available in the general system. The discussion at the New York Academy of Medicine, following the reading of Professor Thompson's paper, was interesting in showing how generally this agent is now being used by the most advanced men in the profession. Its usefulness as a therapeutical agent may be shown by quoting the remarks of those gentlemen who engaged in the discussion. Dr. J. West Roosevelt said that in the simple anæmia of girls he found patients do better under the use of oxygen in connection with administration of iron than under iron alone. That opinion was shared by Dr. Francis Delafield, expressed some months ago at the Academy. Like Dr. Thompson, he had seen marked beneficial results where the amount of breathing service was diminished. Dr. George L. Peabody was of the opinion that oxygen inhalations were most useful in certain maladies attended by extreme dyspnœa, such as catarrhal bronchitis, asthma, pleuritic effusions, etc. Dr. Beverly Robinson stated he had seen absolute proof of the direct, immediate therapeutic action of inhalation of oxygen in anæmia, in conjunction with iron, and in a very large number of cases digestion and assimilation were improved, and in so far as it did that, it seemed to have a wide field of utility. In phthisis he believed it had no direct curative effect, but he thought it proper to use it, because, first, it forced patients to expand their lungs; second, because there was reason to believe it might act in some degree as an antiseptic; third, that it was useful in improving the nutrition. In cases of phthisis, with partial consolidation, fever, night-sweats, and cough, the administration of oxygen will be followed by a decline of the daily temperature, subsidence of the night-sweats, improvement of appetite, and more perfect digestion and assimilation; patients are taught to breathe more perfectly, which is invariably followed by increased lung expansion. The method of administration is important. The patient should be instructed to expel as completely as possible the air from the lungs, and then inhale deeply, and after fully inflating the lungs it should be held as long as is comfortable before being expired through the nose; there should be an interval of two minutes between each inhalation; this method is applicable to the treatment of phthisis and anæmia. In pneumonia it should be administered continuously from three to five minutes, and as frequently as the urgency of the case demands.

I quote a few cases taken at random from my note-book, which will suffice to show the general action of this agent.

CASE I.—A gentleman, aged thirty, an actor by profession, slight in stature, family history negative, was obliged to remain

most of the time in the Northwest, because of pulmonary trouble. Whenever he returned to his home in the East his trouble was invariably aggravated. A physical examination revealed the following condition: Consolidation of the left apex anteriorly as far down as the nipple line; also evidence of small cavity in the upper part, and moist râles throughout the lung; incessant cough, profuse expectoration of muco-purulent character, daily abnormal temperature, with profuse night-sweats and rapid emaciation. Began inhalations of oxygen for from fifteen to twenty minutes twice daily. At the end of one week the night-sweats had materially diminished, cough less severe, and general condition much improved. At the end of six weeks' treatment he had improved considerably in general condition and weight. An examination of the lungs showed that the induration had very much decreased, no evidence of cavity, and almost an entire absence of râles. Physical examination at the end of ten weeks showed that the consolidation had entirely disappeared, no vestige of the former trouble remaining, and he was apparently a well man. No return of his former symptoms have developed up to date, which is now more than a year; the only treatment he received, other than the inhalations, was the iodide of iron.

CASE II.—A gentleman, aged thirty two, by occupation a civil engineer, of phthisical family; five years ago had an attack of pleurisy with effusion, which left a carnified condition of the upper part of the right lung. Three years later began to lose flesh; a cough from which he had never entirely recovered became worse, accompanied by profuse expectoration, rapid loss of flesh; daily temperature reaching as high in the afternoon as 103° F., followed at night by profuse sweating. Patient was advised to go to Colorado; after remaining there some months, without improving, he returned to New York thoroughly disheartened, having given up all hope of ever getting well. Placed him upon inhalations of oxygen and nitrogen monoxide, as in the former case. Its use was marked by an increase of expectoration for the first week, after which time it gradually decreased; the appetite, which was entirely gone, improved rapidly; the afternoon fever and night-sweats disappeared at the end of the fifth week, with gradual improvement in the general health, and slight gain in weight. The breathing at the commencement of treatment, which under forced inspiration was very limited, painful, and accompanied by a disposition to cough, gave place to easier and painless respiration. Patient has been under constant treatment since November, 1888. The last two months he has been able to attend to his business daily, and has exposed himself repeatedly to inclement weather without any return of his former symptoms. A slight cough remains, which, I believe, is due to the presence of pleuritic adhesions. One thing further I would

mention, the chest expansion under forced inspiration was increased from one and a half to three and a half inches.

CASE III.—Young lady, aged twenty-three, suffering from an extreme form of simple anæmia, which had resisted a thorough employment of the usual remedies, combined with good food and plenty of fresh air; was consulted because of amenorrhœa, loss of appetite, feeble digestion, and irregular action of the bowels; could not take proper exercise without marked dyspnœa. A thorough examination excluded all organic causes. Having tried iron, arsenic, and strychnine with but slight and only temporary improvement, I concluded to employ inhalations of oxygen in conjunction with the above-mentioned remedies. To my satisfaction, and to the patient's great delight, improvement began almost immediately in the appetite, digestion, and assimilation; the pallor of the face gradually gave place to a healthful rosy complexion, with disappearance of the dyspnœa, and at the end of three months' treatment the menses were perfectly re-established.

In the treatment of pneumonia I have used the combination of oxygen and nitrogen monoxide with marked benefit.* It quiets the action of the heart, greatly relieves the dyspnœa, enabling the patient to breathe more freely and deeply, and promotes free expectoration. The following case, taken from a number so treated, and cited because of its extreme form, will suffice to demonstrate the beneficial effects of this mode of treatment.

A gentleman, aged sixty-three, of robust habit, was taken ill with double pneumonia. Recognizing the case to be of extreme gravity, because of the rapid respiration and the early development of delirium, with a rapid, feeble, and irregular pulse, I immediately began the use of oxygen and nitrogen monoxide, with stimulants, and other remedies. At first the inhalations were given very frequently, as often as every fifteen or twenty minutes, and for a period of from three to five minutes at a time. After using a few times, the patient became more quiet, the breathing easier and less rapid, with clearing up of the cyanosis, abatement of the delirium, and free expectoration. The remedies were continued through the night. The following forenoon patient expressed himself better, and very much relieved by the inhalations. The inhalations were continued through the course of the disease, at either longer or shorter intervals, as the exigencies of the case demanded, and was always followed by an amelioration of the urgent symptoms. During the period of convales-

*The agent that I have found to be the purest and the one that has given me the greatest satisfaction is that manufactured by the WALTON OXYGEN WORKS, 280 Fourth Avenue, New York.

cence the patient seemed to gain strength more rapidly by a continuance of the inhalations, and made a perfect recovery. This case was seen with me in consultation by Drs. Thomas E. Satterthwaite and W. A. Shufelt, who heartily endorse the line of treatment.

Sufficient has been said to show the efficacy of this agent in the class of cases above mentioned. Dr. Thompson cited in his paper the great benefit that was derived from the use of oxygen in the treatment of cholera, during the epidemic at Marseilles and Toulon in 1886. If such was the case, why should it not be a most excellent agent to be used in the treatment of cholera infantum, especially during the period of collapse? I am convinced that oxygen as a therapeutic agent has not received the attention that it merits, and I agree with Professor Thompson, that no consideration of expense should weigh against it.

Those *chronic cases* show most marked and striking results which are selected from the great army of house-prisoners, "delicate" people who, from necessity or habit have been long deprived of wholesome air and everything like active out-door life; or who have suffered from sedentary occupations; patients with sluggish circulation, small respiratory apparatus, with retarded excretory functions.

The diseases mentioned as cured or greatly improved by such eminent observers as Trosseau, Demarquay, Kollman, Mackey, Birch and others, are: *Anæmia, Chronic Bronchitis, Cardiac Diseases, Diphtheria, Neurasthenia, Fibrous Phthisis and Pneumonia.*

"A few weeks' treatment," will be followed by "increased activity of the digestive, assimilative and excretory functions; hence follows relief of CHRONIC CONSTIPATION and return of normal appetite; dyspnœa from any cause may be relieved; softening and reabsorption of morbid deposits of every character, marked INCREASE in the BREATHING capacity; progressive 'toning up' of the muscular and nervous systems; removal of NEURASTHENIC conditions; and, in a word, *increased mental and physical vigor.*"

TREATMENT.

Discourage at the outset all tendency to hurry the treatment.

When possible, the gas should be administered to patients while standing erect, but when their strength will not admit of this, it can be given in a sitting or recumbent posture.

There is but one rule to be observed in regard to the inhalation of the gas in either acute or chronic disease, namely: Whenever the *difficulty in breathing is not marked*, the patient should hold the nose to prevent the inhalation of atmospheric air, but, if holding the nose produces discomfort, the inhalations should be deep and

full as possible and perfectly natural, but without holding the nose. For example, in the treatment of Anæmia, Neurasthenia, Chronic Bronchitis, or Incipient Phthisis, the patient should be instructed to first hold the nose with the left hand and to expel forcibly the air from the lungs, then turning on the cock, the gas should be inhaled or drawn down into the air passages and held long enough to count eight, then expire slowly through the nose. Three such inhalations are sufficient for one treatment, allowing two minutes to elapse between each inhalation. When the gas has been prescribed for the patient's use at home, three treatments a day should be employed. The cylinder will last one patient thirty days, taking three inhalations at a treatment, three times daily, if used carefully as suggested above. In *Advanced Phthisis*, where the breathing is difficult, also in *Pneumonia*, Heart Failure, Croup and Diphtheria the *nose cannot be held* as it becomes painful. The gas is then inhaled through the mouth or nose in a perfectly natural manner, taking long and deep breaths for a period of thirty seconds, then wait one minute and apply for another thirty seconds until this has been done three times, taking it all told about two minutes. Do this in Phthisis three or four times a day. If this plan of administration is found necessary the gas will *not* last thirty days. In the advanced stage of Pneumonia, Heart Failure, Diphtheria, etc., administer every half-hour, hour, two or three hours, according to the urgency of the case. The length of time a cylinder will last, depends entirely upon the frequency and amount used each time. Great care must be observed not to waste the gas, especially when first turning on the cock, let it flow *slowly* at first and gradually administer more rapidly. Always keep the inhaler connected with the cylinder in order to detect any escape of gas through the water.

No guarantee is given of the time cylinders will last, as the gas is frequently used by careless and inexperienced people, and as we are not present to see what care is used to prevent waste, we cannot justly be held responsible for a cylinder after it once leaves our laboratory. A test gauge will enable the consumer to determine accurately the amount of gas in each cylinder.

During the course of treatment many gallons of gas will be lost, if the cock is turned on too suddenly.

TO TEST CYLINDERS.

Each cylinder is tested by means of a test gauge before it leaves our works. It is desirable for every consumer to have a small test gauge that will enable them to test a cylinder upon the receipt of the same, also to ascertain the number of gallons present at any time during its use. In order to avoid any question as to the cylinder being full at time of shipment, we sell a test gauge for \$3.00, being the *actual cost* of the same. We desire to encourage the use of them, as it saves us much trouble arising

from the careless use of the gas, and therefore prefer to sell them without profit in order that the consumer may know positively as to the contents of a cylinder upon delivery. It is very important to exercise great care in its administration, otherwise many gallons may be needlessly lost. When physicians have a cylinder in the office, a four or five gallon *Rubber bag* is a very convenient thing, as it can be sent to a patient's house when the weather is such that they cannot come to the office. Full directions for administration accompany each apparatus.

