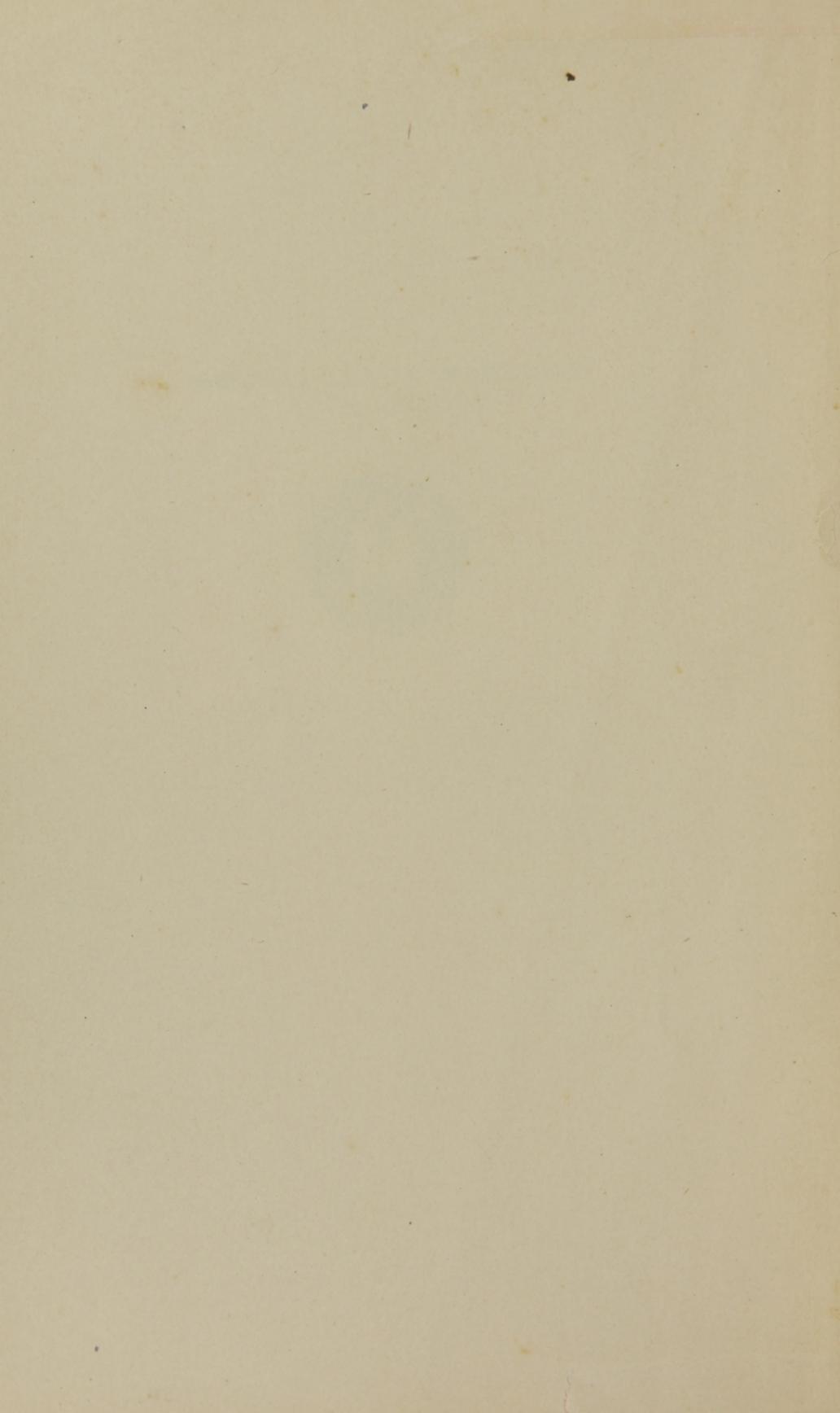


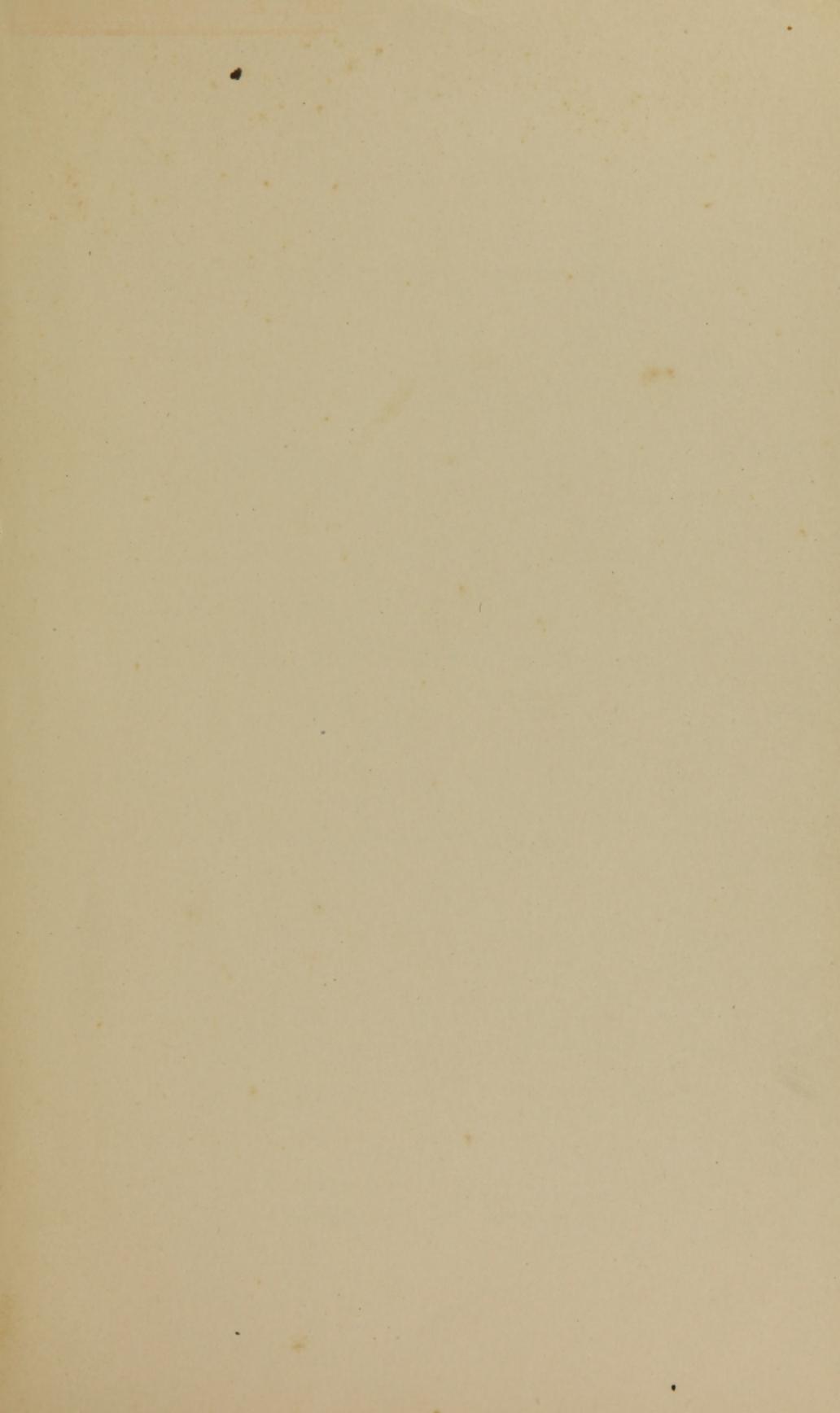


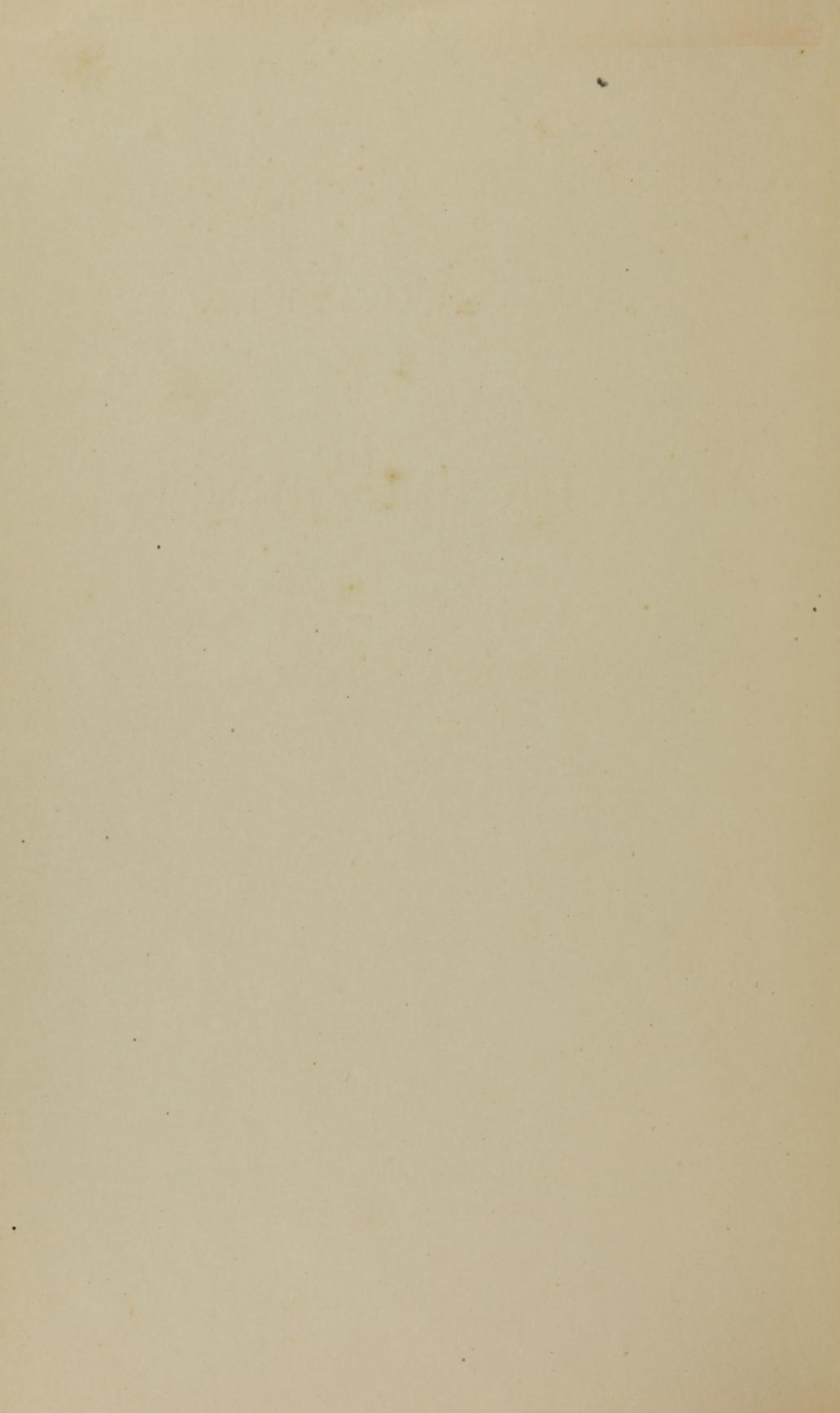
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THE PRACTICAL APPLICATION  
OF ELECTRICITY IN  
Medicine and Surgery.

The Beginner's Vade Mecum.

BY

R. W. ST. CLAIR, A. M., M. D.

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To my old comrade,

WILLIAM Q. HUGGINS, M. D.

A brave soldier, a true friend, and a good physician. An old veteran, and the commander of Alexander Mabon Post, No. 125, I respectfully dedicate this work, as a slight testimonial of regard for my oldest and best loved friend.

AUTHOR.



## PREFACE.

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I have received hundreds of letters from country practitioners, asking me "what battery shall I use in operating on this or that case?" Others want to know which pole to use, and how strong, or how long to use the battery. I could not well answer each and every letter, and as I know of no book that tells them all the little minutiae, I have written this book. I have told it the same as if lecturing to a class, and hope it may help those who do not already know the first principles of what every physician should know. To those who know it all, they have read far enough. To those who do not, I hope they may be paid for reading the rest.

R. WALLACE ST. CLAIR, A. M., M. D.

*Brooklyn, N. Y., June 20th, 1890.*



# The Practical Application of Electricity in Medicine and Surgery.

## A Few Reasons Why.

It has been said, and with much truth, "every question has two sides." You will meet with those who will sneer at electricity as a remedial agent; that, as it cannot be satisfactorily explained how it works on each disease for good, it is of no use whatever. This is no argument; it is simply talk, and only serves to show how ignorant the person is, who will take such a stand on any subject he knows nothing about.

Whenever you meet a person who takes that stand, you can rest assured he knows absolutely nothing about the subject whatever. He has never taken the pains to read the subject up, and as for his thinking it up, he is too thick-headed to do it. Those who condemn it the most, are the most ignorant as to its first principles.

When Thomas A. Edison proposed to sub-divide the electric current, to light our city by electric light, THE WHOLE WORLD (with few exceptions) was loud in its condemnation of the very proposal. It *knew*: "Years ago this one, and that one had tried it and failed. It cannot be made to light ANYTHING." What is the result? Twenty million people to-day will tell you they "knew it could be made to light the whole world."

You will meet those who will tell you "electricity will cure every known disease." You will find their electrical education to be nearly as superficial as the former. They seek to deceive you for another purpose. QUACKERY is at the bottom.

The Why, and How electricity cures disease, is very hard to explain in many cases, while in others, it is plain to those who know what they *should* know before attempting to treat the patient entrusted to their care. It may be left to you, some day, after long study and experiment, to give to the world the *modus operandi* of many cures that to-day is hard to explain. Electricity is but in its infancy yet, and 'tis by hard, patient study, and the burning of the "midnight lamp" (as it has been in all truly great blessings) for many a year yet, before it will be known just how it does its work.

Every man, woman, and child, is a galvanic battery—a storage battery if you like; and each will, and do, retain a certain amount of electricity. Some more, and some less. When well and vigorous, they retain a much larger charge than when the blood is impoverished, and the nerve cells are degenerated. Then the battery is out of order, and unless attended to, it will become short-circuited and stop.

This can be easily proved. The spark from your battery will not light gas, nor will it ignite gunpowder; but place a spark coil, (a coil of wire wound like a spool of thread, say ten inches long, and two inches thick,) and the same battery, or one half as strong, will instantly light gas and ignite gunpowder. Now instead of placing the spark or condensing coil in circuit, place the human body in the circuit, and you get the same result.

Many persons can light the gas with their fingers. The author can do it any dry or cold day. I believe any person in health can do the same thing, if they do it according to electric law.

The gas tip or burner must be metal, and not lava. Some other person must turn on the gas, or it may be left turned on. With slippers, or thin soled shoes, perfectly dry, on the feet, go across the room with a sliding motion not unlike that made when skating. When you reach the gas-fixture, do not touch anything till the finger touches the metal tip, and the spark from the body will be discharged to the tip, and will light the gas every time.

Now if this is true, and it is, man was made to contain and retain electricity for some good purpose. If, when he becomes diseased, this supply is less, who can say it is not the loss of electric

power that causes the disease, and not the disease to blame for destroying potential?

If a patient has lost blood, what is the rational conclusion? It would be to give the patient iron, quinine, etc., to make blood again, and supply the demands of nature.

If electricity is life, (and nothing can live without electricity any more than it can without oxygen,) when the proper amount of electricity is wanting, should we not seek to supply the need as much as any other want? It certainly would appear so to me, and that is what I attempt to do.

If, because we cannot explain just how electricity works a cure, it is of no use, and one proof that it can not and does not help the patient back to health, how will they explain any one of the remedies used every day?

Take the cathartic. How does it do its work? "But," says one, "*that* we know—it increases the peristaltic action and promotes absorption." Indeed! But *how*? Does it do all this by irritation? If so, where? How does it act on the bile?

I can take my faradic battery and by proper application, can produce an operation of the bowels quicker than most cathartics, and show the bile has been acted on as well. Must I explain *how* electricity acts before it can be admitted by the unbeliever? Take any test you like.

Take two cases of Sciatica. What is the general treatment? If the patient is suffering terrible pain, a hypodermic injection of morphine is the first thing. I will take the other case. Place him on the insulated stool, and with an electrode applied near the painful nerve, draw sparks for fifteen minutes. My patient will be relieved as soon as the one given morphia. They will both return next day, one feeling ill from the morphine, and with as much pain as the day before.

My patient will have pain, but less than before, and otherwise feeling very well. In ten days my patient will be cured, while the other will be no better, and if he does not contract the morphine habit, he will be mighty lucky.

Now, *how* it cures. I answer, First, by aiding circulation, helping to carry oxygen to the tissues, and also throwing off the poison in the blood.

Secondly, it acts directly on the nervous system—not only direct but by reflex action. It also acts on the kidneys, and effete matters are thrown off, as nature intends it should be and is, till clogged up and acting as a blood-poison, it brings on disease. The electric current quickens the action of the kidneys, and again they do their duty.

Thirdly, it acts on the whole portal circulation, and the liver is stimulated to throw off the cause of disease deposited there.

Fourthly, it acts mechanically. There must be a great disturbance in the tissues where the spark is drawn from. It comes from deep down among the muscles; how deep is unknown, but when you remember a pack of playing cards will not stop the spark, but will be pierced by it, you must admit it is not superficial.

They try to get the same effect with blisters, by the moxa, and even by driving needles deep in the flesh. These leave a bad sore to be healed, even if they accomplish the same good result, which they do not.

You get a quick contraction of the muscles, very much as if they were hit by a piece of elastic rubber when drawn tight and allowed to recoil against the flesh. You get a good action of the terminal branches of the nerves, through reflex action.

Then it reduces the circulation in any part desired. It decomposes the tissues if so desired, and will destroy any part if desired. You can get almost any action you wish, if proper appliances be used, and you know how to use them.

For a full and comprehensive digest of the subject, you can not do better than read Drs. Ranney and Morton on electro-therapeutics Rockwell, and many others.

Electricity is not a patent medicine; it is nothing any one need fear will interfere with medical ethics, yet the time has been, and not long since, when if a doctor mentioned electrical treatment at a society meeting, he would be sneered at, and I know of one instance where a doctor in good standing was turned out of the society for nothing else, only that he insisted "electrolysis would cure stricture quicker, and better, than any other mode of treatment."

Electricity is a part of our school of treatment, and the only thing I regret is, that some of the others are finding out its worth, and

employing it, while my own school stand aside and growl about it. One has no "luck with it." There is no such thing as luck about it. If you understand the principles of it, and use the skill you should use, there will be no such thing as fail.

It will not heal up a natural hole and hair it over; no one claims it will. But that it will cure stricture, remove hair from the face, and cure sciatica, to say nothing about the great field in the diseases of women, there can be no doubt.

Another wants to know just HOW a cure is effected, or he will not try it. Still another thinks it will interfere with his present practice of cutting for stricture, and that he will make less money at it than now.

Electricity acts on the skin. It opens the pores, and I can put a patient in a state of perspiration, with a static machine, quicker than it can be done by hot water, steam, hot bricks, etc., and he will enjoy it, while the heating apparatus causes much discomfort.

If I could have but one battery, I should prefer the galvanic by all means; even the static machine will never take its place. With a galvanic battery one can do nearly everything he wants to, but as a pain reducer, NOTHING will equal the static machine.

I know many do not like it, and say they would not have one if given to them, but I sometimes think they never used one, or, if they have, did not know how to use it, or, what is more probable, had an old-fashioned machine, that would not work only on certain days, and that when not wanted.

All this trouble is overcome now. Any one who buys a Waite & Bartlett machine (see Fig. 1) will find it ever ready, always charged, or easily charged, with a current strong enough for all purposes. They make the best machine ever placed on the market. Dr. L. C. Gray, (in the *N. Y. Medical Journal*), says: "Static electricity is of no value, and the HOLTZ machine is only an imposing toy."

Just as I thought. The doctor, while he no doubt thinks he is telling it just as it is, has been fooling away his time with an inferior instrument. If he will buy a Waite & Bartlett machine, and give it a fair trial for one year, and does not sing another tune with variations, I will pay for the machine. It does not interfere with the galvanic battery, as each instrument has its own particular field,

and neither can do the work of the other, though the galvanic battery will do many things the static machine will do. You want both, if circumstances will admit of it; if not, take the galvanic battery till you can afford the static. Then buy the best.

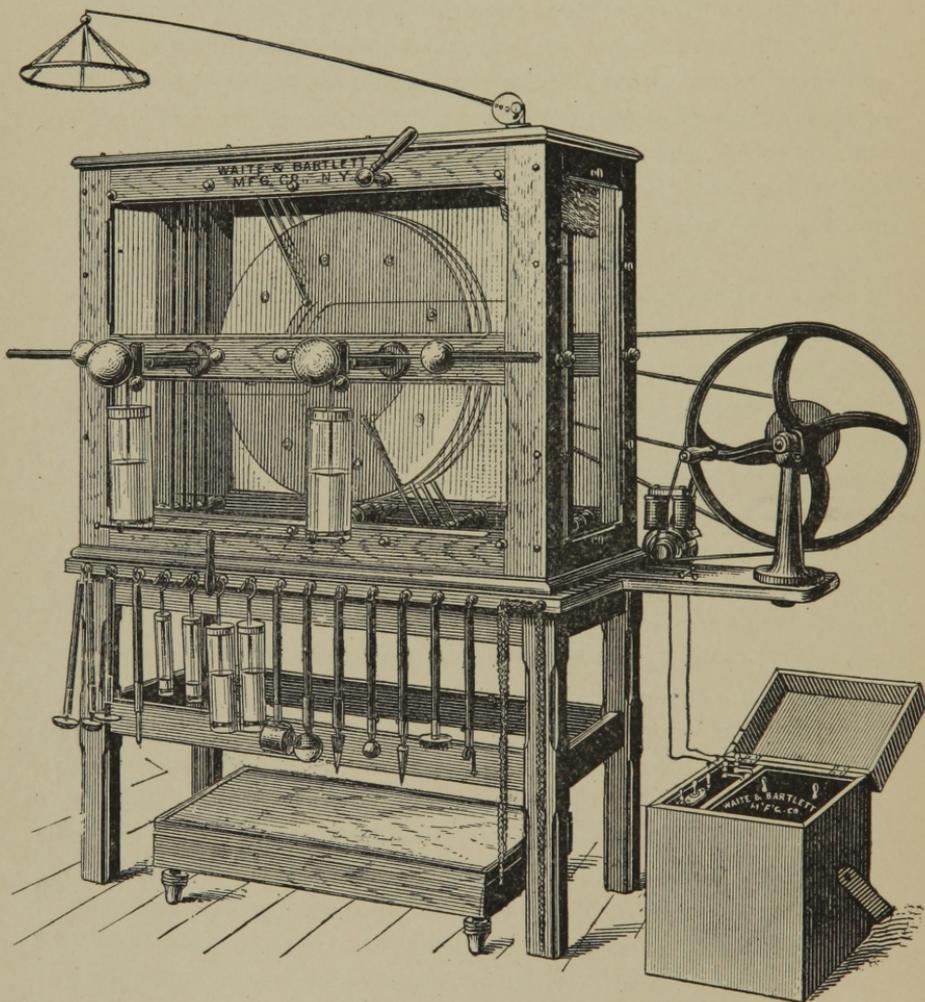


Fig. 1. Waite & Bartlett Machine.

I do not wonder that, at times, those who are seeking for truth in regard to electric treatment, find themselves floundering in the depths of uncertainty. I declare it is enough at times to cause one to throw down his books and exclaim, "Alia tentanda via est." I

cannot understand it; one says one thing, another asserts with equal positiveness that No. 1 is all wrong, and he alone has the whole principle.

Apostoli tells them he employs 500 milliamperes in gynæcology, and that it is the proper thing to do.

I, for my part, cannot see how he can employ so strong a current, and often wonder what battery he has to give it. I have owned and used every instrument illustrated in this work, (except Queen's static machine and Waite & Bartlett storage battery,) and many others, yet never have owned a battery that would give even 400 milliamperes, or 300.

Dr. W. F. Hutchinson, of Providence; Dr. A. L. Smith, of Montreal; G. B. Massey, of Philadelphia, all at the head of electrical experts, who have done some of the finest work ever known of, and who have written some of the best works on medical electricity ever produced, do not claim to have employed anything like such currents even in the same operations. What they write is what they do, and are doing every day. It is due to such men as these, and Goelet, of New York, and a few others, Ranney, Morton, Newmann, etc., that electricity holds the deservedly high position it does to-day.

But here comes a man, Dr. McMordie, through the *Medical Press* of January 1890, hailing from the Samaritan Hospital, Belfast, with A. M. M. D., (and A. S. S., should be added,) with the most wonderful story I ever saw over any sane man's signature.

He claims that "while treating fibroids and uterine hemorrhage with a ONE-CELL BATTERY, the os externum became dilated, and in those who were young and healthy, the SEXUAL ORGASM was distinctly produced, and the current had no effect on the hemorrhage," no matter what pole he employed as active pole. He also says, "ORGASM WAS PRODUCED so often that I gave it up in disgust."

In the first place, the very story proves that the doctor knows absolutely nothing about the first principles of what he is writing about. Who ever heard of a battery with one cell (unless it is a small faradic battery, which no one in his right mind would think of employing in such operations)? One cell would not give current enough to charge the electrodes through the resistance of the body,

and make any movement of the amperemeter, unless it registered down to fifths, and there is no such battery made as a one-cell galvanic.

But allowing all that to be true, how in the name of all that is electric, could he bring on orgasm with an electrode, while operating for fibroids through a speculum? It could not be accomplished, unless he was a brute, and brought it on himself, with his hands, to satisfy a beastly desire on his part. How did he know it came on? Did he know it would, and asked? Did she tell him without asking? The man is a vile crank, and I hope he may never be counted in with the experts mentioned above, for they are gentlemen, experts, and those whom I respect with all my heart.

He says, "I gave up in disgust." Which would be the most disgusted—he, with that hellish record, or the poor defiled patient? Can it be possible such monsters of ignorance and brute-like instincts can be allowed to live amongst Christians? Then to write it himself, and use it as an argument that all the great lights in electricity are entirely wrong, while he alone is right, and how he found it out—by doing what no respectable physician would THINK of doing, even to save his life!

What hurts me the most is that thousands will read his story, and knowing nothing about it, will shrink from the very name of electricity. They will say, "Why, he belongs to a hospital; he MUST know all about it, and as he has tried Apostoli's method, and failed to not only do its work, but actually debauched the patient with the develish machine, I don't think I care to learn anything about it."

In all the years I have given electric treatment, I have treated very many female patients, and never in one instance have I observed the slightest sexual excitement. What is more, I have read the writings of all our best electricians, and have yet to see one instance of anything that even hints at such a thing. I always operate with my patient in Sims' position, thus avoiding the contact of the hand as much as possible.

As I have said before, those who oppose electricity in diseases of females, are those who know nothing about it. The above is a good illustration.

Were anything like the above to happen in my practice, I could not blame the method of treatment, but should think I had been wanting in delicacy in handling the instruments.

Since writing the above, I have seen a symposium collected by Dr. W. H. Walling, of the *Medical World*, from the best authority in America, or any other country, confirming my ideas to a letter. The doctor has given it a pretty good airing in the March number of the *World*.

I have always been in favor of as mild currents as would do the work in hand properly. I have never used 200 milliamperes in any operation in my life. Yet I will show my work with any one who employs stronger. It appears to me that there is a big screw loose somewhere, but *where?* I never use over 75 milliamperes, and seldom over 45.

Recently one of the best makers in New York called at my office. After awhile he confessed to me that he "*never made a battery that would give 250 milliamperes,*" and he said more. He said: "I don't believe there is any made. Why," said he, "it would take FOUR OR FIVE of our batteries to do it." Now if a fifty-cell, red-fluid battery will not give over 200 milliamperes, how can we get twice that amount from a Law, or that class of battery? I have tried to do it with 100 cells, and found less than half, and I used large clay electrodes. I would not dare to apply so strong a current to a patient of mine, for I should expect to burn her whole pelvic cavity out.

However, it makes no difference to the beginner, as nearly all his work comes under mild currents—stricture, electrolysis, galvanization, and the faradic battery. It is a safe way to begin with mild currents, and when you can master fibroids, then it can safely be left to your own judgement, as you will learn by actual manipulation.

Professor Massey, of Philadelphia, approves of a strong current in gynæcological work, but never, so far as I can learn from his most excellent work on the subject, goes over 250. He is good authority, and recommends a battery of seventy-five Law cells. THAT is proof he does not use over 250 milliamperes, as he could not get more with even 100 cells. Dr. Blackwood, of the same city, was one of the first to use, and to teach, electricity in the treatment of female diseases, but I have yet to learn he employs anything like so strong a current.

Dr. W. F. Hutchinson, of Providence, R. I., the electrician and well-known author, one of the best authorities on electric surgery, writes me: "I have always been a bitter opponent against strong currents. I never use in the treatment of fibroids more than 50 milliamperes, and rarely that, getting excellent results."

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## The Best Office Battery.

The best office battery for all kinds of work is one known as an open-circuit battery; one that will not deteriorate when not in use one that can always be relied upon when wanted. True, after their full power has been taxed, they require time for recuperation, but as this is very seldom, if ever, required, I cannot see as it is any objection.

This battery is composed of several cells, like the Leclanche. This makes a good battery, but the BEST, and I think I may say the ONLY perfect battery, is the DOUBLE-CYLINDER LAW BATTERY. After a trial of two years, I find this to be the most perfect battery in use.

This battery is perfectly uniform and reliable in its action; well constructed, and beautiful in appearance. Its electro-motive force is 1.5 volts, and its internal resistance .5 of an ohm at the start, and it continues the same until the zinc is consumed, or solution exhausted.

The first cost is the only one, while batteries with porous cups require renewing of the negative element. This keeps up a continual expense, and a large amount of dirty work. The negative elements of the Law battery are claimed to be everlasting. The company will at any time, without charge, furnish a new one for each old one returned.

The cell is made of flint glass, with its cover so made that by a slight turn it locks down tightly against a soft rubber ring, thus sealing the cell against evaporating of the fluid, and, best of all, prevents the climbing of salts, keeping the battery always clean. Others try to overcome this with grease, but it makes a dirty battery, and does not stop the salt from crawling up.

Figure 2, shows one cell of the Law battery. The number of cells required for a good battery may range from twenty-five to

sixty. Twenty-five will give a reasonably strong current, and will do for many kinds of work, but for electro-cauterization, electro-puncture, etc., the larger number will be required. It is well to have more battery than you want; you can use a few cells, but, if too small, the operation may be a failure.

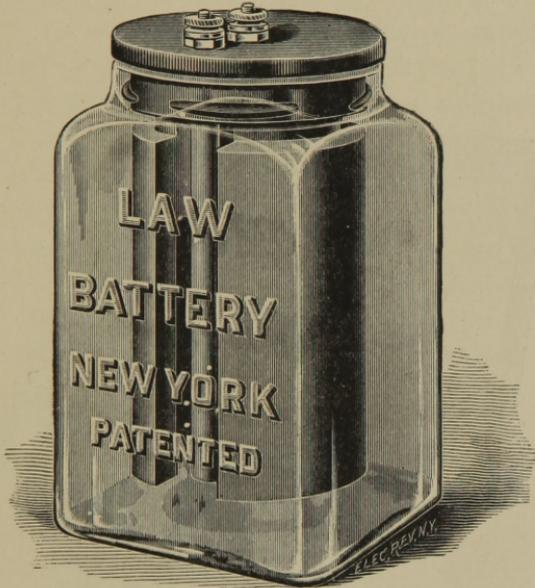


Fig. 2. One Cell of the Law Battery.

The old way of connecting a battery required a wire from each cell to a switch-button on the switch-board, to increase or decrease the current by means of the switch. This makes more expense, and the cells below thirty are used more than those above. The better way is to buy a current regulator, and thereby distribute the wear over the entire series of cells. Bailey's current controller is one of the best. [See Figure 4.]

This is of great importance. Another great advantage is, you use the whole of your battery each time it is used, and each cell does the same amount of work as its neighbor.

With this battery once put up in your cellar, it is good for from three to five years without repairs. Then, for very little, it is good again for years. All the expense is the renewal of solution, and, once in a few years, a new zinc rod. It can be used for the burglar-

alarm, for the door-bell, and, if gas is used in the house, it can be made to light the gas as well. This is the galvanic, or constant-current battery, and can be used in all cases of electrolysis, the cure of stricture, tumors, removal of hair from the face, birth-marks, etc.

For the bedside, one needs a portable battery, one that will do the same class of work as the one above. There are several good ones, all having many points to recommend them.

One of the best is the "Barrett chloride of silver" battery. With this battery a solution of sulphate of zinc is used. They

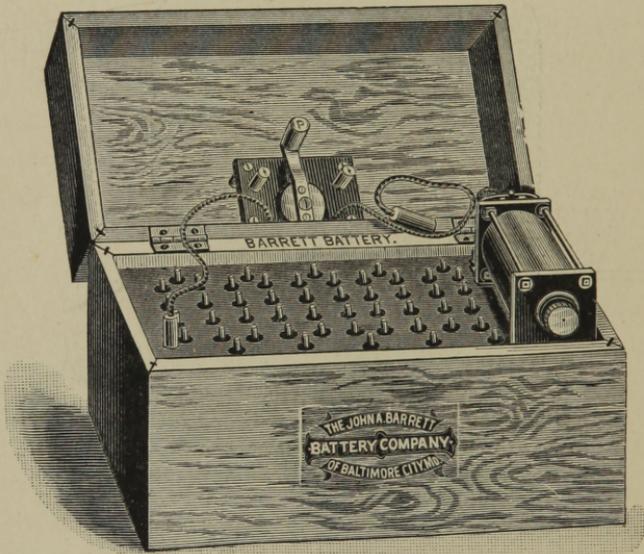


Fig. 3. Barrett Chloride of Silver Battery.

are very strong, and it is better to use the whole battery with a current controller. A battery with from thirty-two to fifty cells should be the one purchased.

All batteries should be cleaned and the zincs re-amalgamated at least once a month. Any physician can do this, or teach the boy to do it.

## How to Set Up and Maintain the Law Battery.

First, clean the jar. Then empty the package of sal-ammoniac into it. Be careful and get none of the salt on the outside of the jar. Pour in soft water (rain water will do) until it fills to the

bottom of the word LAW. Stir the sal-ammoniac with a stick until it is all dissolved. Be sure it is ALL dissolved. Do not spatter or slop the solution, for if it touches the cover or outside of the jar, the salt will dry on the glass, and by capillary attraction draw more salt out of the jar.

Clean the cover, and screw it to the jar by turning to the right. Place the cell in its permanent position (where it will not freeze), without shaking or slopping it.

Use short pieces of wire to connect the cells one with another. Start one wire at the binding post of base-board in the office, and the other end to the zinc of first cell. Connect the cylinder of same cell with the zinc of No. 2 cell. Continue through the whole number of cells, to the last one, and the last cylinder-wire goes to the other binding-post of the apparatus to be operated.

When not in operation be careful not to leave the circuit closed, or the battery will soon exhaust itself.

Should it become polarized, immediately open the circuit and remove the fault. If but slightly polarized, the battery will recover with a few hours of rest. Otherwise remove the cylinder and expose it to the weather—sun, rain and air—until it is depolarized. Then clean and renew the same as at first.

When the zinc is worn out, replace with a new one, and new fluid at the same time. Once in one or two years will be often enough.

NEVER UNDER ANY CIRCUMSTANCES put fresh sal-ammoniac in an old solution.

Your LAW battery will need, once in a year or so, new zinc. The better and cheaper way for those living away from supplies will be to purchase several pounds of zinc rod of the required size, and when needed cut it up, and with a drill, tap and die you can, in a few minutes, renew your zincs as well as the man who made the battery.

I give the formula for the fluid you will need for galvanic and faradic battery, also your cautery, but it is not a pleasant job to make it, and you can buy it cheap enough to pay you, if you buy a five-gallon demijohn. This will last a long time, and save you a dirty and troublesome job.

When a carbon in your galvanic battery gets broken, see to it, and have it repaired at once. The battery will not work until it is.

I once saw a doctor applying the battery to a patient, with one of the centre cells without a carbon. I spoke of it, and he said "it only made it one cell the less, as the current passed over to the next." This was not so. The carbons are not connected with the zinc, and the circuit goes from the carbon to the fluid, and thus to the zinc. Now, if the carbon does not touch the fluid, the circuit is broken.

I sent my boy down to fill my galvanic battery with fresh fluid. He had filled it many times before, and I did not look at it. I began to give it, and found the milliamperemeter did not register any current whatever. I looked it over, looked inside, but could not at once find the cause. Soon I saw one cell had been left empty. He had made a blunder. After filling the cell everything went all right.

I mention this among many other reasons why you may find something is wrong without knowing where to look for the trouble. I have known a doctor to look and work at his battery for half a day, trying to find out why he could not get the slightest current. It had worked well up to ten minutes before, when all at once it was dead. The whole trouble was the wires in the cords had broken off from much bending, and the last one had but just given away. The covering held, and it looked all right, but was all wrong. A new cord was inserted, and presto! Watch your battery. Know what is wanted, and you will have no trouble.

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## The Bailey Current Controller.

This instrument perfectly supplants the old switch-board, or cell selector, as a means of modifying the electric current.

It is far superior; also much cheaper. It imposes equal work upon all the cells of the battery, and when one is exhausted, the whole number of cells need replenishing.

The current regulation is perfect—from full strength of battery, down to a current so feeble as to be imperceptible to the most sensitive organ, and this without any possibility of breaks in the circuit, or sudden shocks to the patient. This is a most important feature, as all physicians know, who use electricity in their practice.

Again, with the regulator, there is a saving of wires leading from each cell of the battery, as two are all that is necessary. I quote from Dr. Skene's work :

“For the purpose of regulating the current strength, a current selector or switch-board, by means of which a large or small number

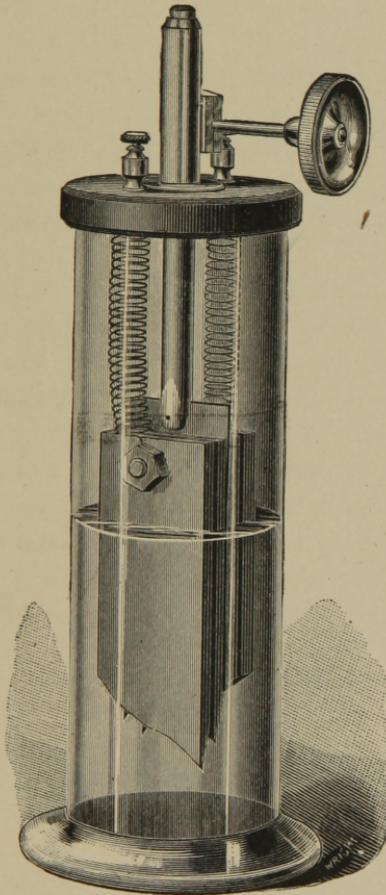


Fig. 4. Bailey's Current Controller.

of cells can be switched into circuit, has been commonly employed. This device is open to the objection that it uses different portions of the battery unequally ; that it does not permit a sufficiently gradual increase or decrease of the current ; and that, as the switch jumps from one stud to the next, at the instant when it touches both, one cell is short-circuited and its force thus wasted.

Instead of the switch-board, I have used for some time a Rheostat or Current Regulator, invented by Mr. H. L. Bailey, Electrician of the Law Telephone Company, of New York. This instrument consists of a bundle of carbon plates insulated from one another, placed in a vertical position, and attached to a vertical metallic rod, by means of which it can be racked up and down in a column of water.

When connected in circuit, the strength of current is regulated by the depth of immersion as in the common water rheostat, but with the advantage over that instrument of much greater precision and greater facility of manipulation. By means of this rheostat a resistance of from zero to two million ohms can be thrown into circuit.

The current can thus be gauged at will from an imperceptible strength of one or two milliamperes to the full force of the battery. The current may be increased, diminished, or turned off altogether, without the slightest shock to the patient, an important advantage over the switch-board. This method of regulating the current has the advantage, too, of using the entire battery at once, whether the current applied be one or a thousand milliamperes.

Since each cell does the same amount of work as its neighbor, all parts of the battery constantly maintain an equable strength. Moreover, the comparatively trifling cost of the Regulator is a by no means unimportant item. The introduction of the Bailey Regulator and the milliamperemeter marks an important advance in electrotherapy.

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## A Few Facts.

It is truly surprising what erroneous terms are continually being used by writers on electricity and electric treatment.

The question naturally arises, why is it? Is it done to confuse the student, or is it to show their erudition? Or is it the fact they are ignorant on the subject they try to make plain to others?

I have before me now a paper from one who makes his argument as clear as mud.

I find the term (three times in one short article) "a mild, descending, galvanic, static current."

This cannot be true, for the reason we have no such current. We have THREE forms of electric force, and only three, viz., galvanic, faradic and static. What he means by "a mild, descending, galvanic, static current" is beyond my ken.

The decomposition of zinc, in juxtaposition with another element, coke or carbon, in a cell influenced by an exciting fluid, either an acid, or a corrosive alkali, produces the galvanic current.

The zinc element is known as the anode, or positive electrode, while the carbon is known as the cathode, or negative electrode.

Here is a point it is well to remember. It often proves a stumbling-block to the beginner. The POSITIVE pole outside the cell is attached to the NEGATIVE plate or electrode inside the cell, while the NEGATIVE pole outside the cell is attached to the POSITIVE plate or electrode inside the cell.

Let me explain this once for all, and I think you will never confound them again. The current direction is *always* from the POSITIVE toward the NEGATIVE.

I fully agree with Doctor W. R. D. Blackwood, of Philadelphia. He says, speaking on this subject: "A vast amount of learned twaddle has been expended on the matter of such applications, and you will see much as to A. O. C., C. C. C. or K. C. C. with K. O. C. and A. C. C., with other formulæ which are practically useless except to distinguished lecturers and professors, who must put in time or fill pages to earn their salary and mystify the students. (When you become familiar with ordinary electro-therapeutics you can get Hughes Bennett's 'Electro-Diagnosis,' or Watson & Burbury's 'Mathematical Theory of Electricity,' which will make your head swim like as to 150 milliamperes through your bi-temporal diameter.")

Take the following, for instance. How many physicians out of a hundred would know what it means, and what good will it do them if they do know?

$$\begin{aligned} E - e &= R C_1, \\ 100 - e &= 60; \text{ ergo, } e = 40; \\ E C_1 &= 600, e C_1 = 240. \end{aligned}$$

And if he understands obtuse mathematics, and can work out an equation, what does he care about proving Ohm's law? Will it help him to cure one patient? I think not. There is too much of that kind of writing, and it is one reason so few care to read up and digest the literature on the subject.

I have a letter before me from a doctor living out West. He wants to know what is meant by the terms "LABILE" and "STABILE."

The terms are seldom used, though perfectly proper. The application of electricity may be either general, central or local. Each of these forms may combine labile or stabile methods, or both together.

In general electrization the current is applied to every part of the body. The positive pole is ordinarily placed on the nape of the neck, and held there. This is termed stabile. If it is moved up and down the spinal column it is termed labile.

The negative pole should be moved slowly over the entire body. I generally use my hand, as it conforms itself to the body better than the electrode, and one can knead the muscles at the same time.

Of course the battery power must be increased, as your body acts as a resistance coil, and unless the current be increased the patient will not feel it, and, in fact, will get only half the amount you intend giving him.

The terms "anode" and "cathode" are perfectly correct, but why not say "positive pole" and "negative pole"? We should remember that all those who read our writings are not electricians, and oftentimes the terms are confusing.

When I see a paper with so many terms that none but an accomplished electrician can understand, and when they can be expressed just as forcibly in terms that any physician can understand without going to his electric dictionary, and perhaps not find them there, I always think of a remark made by my old comrade and life-long friend, Dr. W. Q. Huggins, of Sanborn, New York. Said he to me one day, while trying to find how to apply electricity in a certain case from a work he had purchased for the purpose: "This may tell me what I want to know, but if it does, I can't understand it. I wish some one would write a work for beginners; those who know nothing about it, and give us a little HORSE sense."

Well I remember fifteen years ago, when electricity was not so well understood as at the present day, when books were few and not voluminous, how I tried to find data from which I could learn what I had to buy expensive machinery to experiment with to find out. How pleased I was to get a paper written by Dr. Blackwood, of Philadelphia. He always said what he had to say in such a manner I could understand it.

He advised electrization in uterine maladies, and in gynæcology he advocated high currents. Many took exception to the treatment, but I always found the theory good, and the practice better. If the

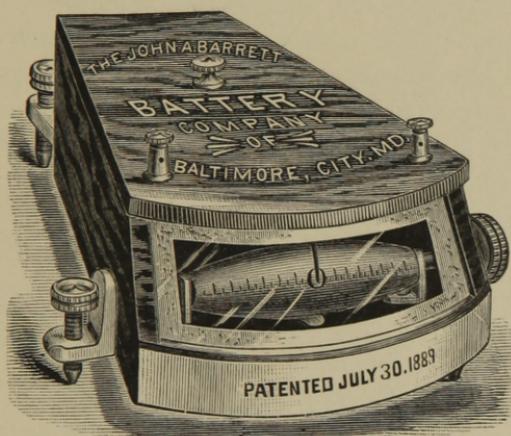


Fig. 5. The Barrett Milliamperer Meter.

able doctor ever sees this work he may know he was one of my first teachers.

Central electrization should be used in all cases of nervous debility, in chorea, stammering, [see stammering for special treatment] twitching of eyelids, paralysis agitans, gastralgia, and in short all spasmodic affections.

In dyspepsia, remittent and intermittent fevers, I have had so little good from it I cannot speak in its favor. However, some use it, and claim good results. I have used it in the severe coughs of phthisis, with night-sweats, with happy results.

I have this day in a case of phthisis, with profuse sweating and a terrible cough, given 100 milliamperes with the positive pole over the solar plexus, and keeping it stable throughout; with the negative

pole I used my hand, and passed it over the chest, throat and stomach, for twenty minutes. I have but just left him. He is sleeping quietly, cough almost nil, and warm and dry for the first time in ten days. It has always been of service to me in like cases.

---

## The Milliampere Meter.

The milliampere meter is to the electrician, when giving strong currents, what a scale is to a druggist. It is as essential almost as the battery itself. True, while employing a mild current to a sensitive skin, and where the operator knows the battery as well as he should, with everything in prime working order, he can tell very near what he is giving. But, if from any unknown reason the battery is not working, if it is short-circuited, he could not tell for some time, and might go through the whole seance and not a current pass through his patient. But when it comes to a sensitive mucous membrane, such as the urethra, or vagina, situated where it is impossible to overlook his work, the surgeon who would dare to use a strong current certainly is unsafe to trust a delicate lady with.

There is no good reason why every electrician should not have a milliampere meter. It comes within the reach of every physician, is easily understood, and gives a correct testimony in each case as to the amount of electricity used.

There are several good ones in the market; each one, no doubt, has enough to recommend itself to buyers.

The Barrett Company makes a superior article (Fig. 5).

Waite & Bartlett has one that I use in every operation, and it has never failed me yet (Fig. 6). McIntosh has a fine one (Fig. 7); also Flemming, of Philadelphia. There are several imported ones, but I prefer those made here, so far as I have seen.

The modus operandi is very simple, and no special instruction in its use should be required.

However, as I do not wish anything in this small work to be left to the rule of thumb, and as it is to answer thousands of questions that at first appear simple, and, in short, for the beginner who has

no one to go to for help, for this reason I will give the directions the same as if I were before the class.

When the meter is not in use the needle should be kept the same as the needle of the compass—stationary at zero.

I will give the rule or directions for the McIntosh meter (Fig. 7), and it will give any one the idea so well he can use any of the

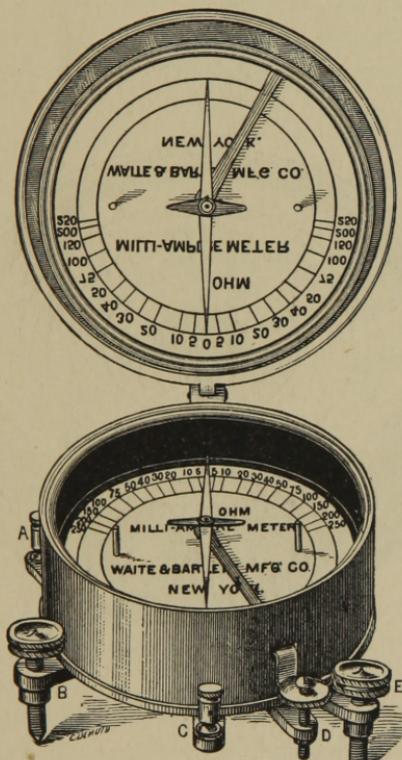


Fig. 6. Waite & Bartlett Meter.

others. They do not all work alike, but the general principles are the same.

## Directions for Using the McIntosh Meter.

First.—When ready, release the needle or indicator. This is accomplished by sliding the knob D to the right, as far as it will go

Second.—Set the instrument so the needle points due east and west. Then adjust it so it stands perfectly level. This can be easily done by means of the screws at the side.

Third.—There are two scales, one known as the long, and the other as the short scale. To use the long scale, connect the POSITIVE pole of the battery with the binding post C, and the patient with the pole A (this by means of conducting cords), then connect the patient to the battery's negative pole direct.

To read the LONG scale.—It is graduated from 0 to 1000 milliam-

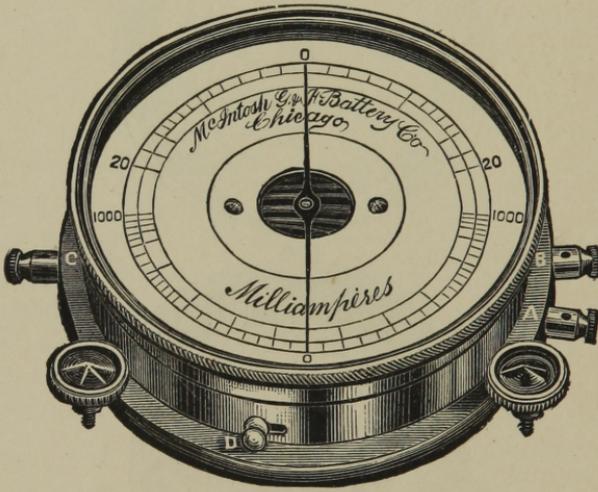


Fig. 7. McIntosh Meter.

peres: each division to 30, making 5 milliamperes each, and increasing in number indicated according to space, up to the full 1000.

To use the SHORT scale.—Connect the POSITIVE pole of the battery with the binding post marked C, and connect patient with the post B. The other pole of battery direct to patient.

To read the SHORT scale.—The short scale marks from 0 to 20 milliamperes, the spaces from 0 to 5 being divided to indicate half milliamperes.

One thing to be remembered is, never set the meter near any magnetic machine, or inductive influence whatever. Should you do

so, the meter would not work correctly, and would be like an escape valve tied down.

Never allow the electrodes to come in contact with each other while the meter is in circuit, as to do so would injure the bearings. If the needle does not work as free as it should, a slight jar of the table will start it, and make it read correctly, if properly leveled. Never turn on the full battery, unless there is a controller, or resistance coil in circuit, as the resistance of the meter is slight, and even a few cells would injure its mechanism. They require great care in handling, but will more than repay for the extra work, as it is all guess work without one.

For indicating current by the Waite & Bartlett :

The scale is graduated in thousandths of an ampere, called milliamperes, and has a range from zero to 250. Extremes of current employed are never less than 3-4 nor more than 250 milliamperes.

The meter should be as free as possible from changes due to changes of time and surroundings. This double object we accomplish by employing a horizontal movement and an astatic system of magnetic needles, controlled by a fixed magnet which is permanently under the influence of an armature or keeper, for preserving a uniform degree of magnetism. Such a system of needles is free from the influence of the earth's magnetism and is the most constant in its action.

Friction must be entirely absent. This we accomplish by the use of a perfectly-pointed steel pivot, working in a concave jewel, as in the best absolute galvanometers known to electricity.

The free parts of the instruments must be provided against accidental displacement. This is attained by a simple detail of mechanism, so that the magnetic needles cannot get off the pivot, even if shaken wrong-side up or otherwise roughly used. A simple-locking device also provides for lifting the needles from the pivot and holding them transfixed for transportation.

A physician's milliampere-meter should be readable from either a sitting or standing position. In the Barrett meter the face is fixed at the front at an angle which satisfactorily meets these points.

When the roller is turned so as to bring any one of the three scales to view under the pointer, the connections within the case are

automatically adjusted so as to cause the meter to read directly and accurately, according to the scale so exposed to view. By this means the physician is saved the trouble of using multipliers with his scale readings, and has at command three separate scales meeting every desirable case, and each scale reading his measurements directly.

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## The Massey Current Controller.

While the Bailey current controller is a good one (see Fig. 4), the one advocated by Dr. G. Betton Massey, of Philadelphia, is perhaps as good. I think it is made, by Otto Flemming, of the same city. It is absolutely necessary to have a current controller of some kind, particularly in use of heavy currents where heavy shocks are to be avoided. Rheostats were employed years ago to accomplish the same results. They are made of coils of wire of known and variable resistance.

They are used no more. Others were made of glass tubes containing water and a sliding rod. They never worked perfectly, and were unfit for heavy currents, and many a shock has been given when it did not add to the pleasure of the patient or the credit of the operator. Yet it was no fault of the physician, but the incomplete machinery.

The Massey controller as now used meets every demand on its work, controlling from the fraction of a milliamperé to the full strength of the strongest battery.

It consists of a ground plate (glass) provided with a tapering area of soft pencil marks, broadening into thick, heavy graphite, embedded in the glass, which is joined to metal.

These act the same as any conductor, and when the pencil mark is very small and thin, of course the current cannot flow over it fast enough to give a heavy shock. As the crank is moved toward, and in contact with, other and heavier marks it adds conducting power and increase of current. When the crank is close to the post on one side it rests entirely on the glass bed, and there cannot be any current, as it is cut off. Graphite is a poor conducting medium, and as

the current must pass through the whole surface of graphite, it acts as a resistance coil.

As the crank is turned toward the solid black mark the current is increased. If it becomes too strong a reversing of the crank will again reduce the strength. So you have perfect control of the current, hence the name, which is better than rheostat and more easily understood.

Several things I will mention that you will do well to remember. I knew a doctor who did not think it worth while to remember so small a thing as "black lead marks," and came near ruining his patient for life, and did lose the customer, as he came to me, and I have him as a paying patient yet.

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## What Constitutes a Perfect Outfit.

The question "What do I want to have a perfect outfit"? comes to me by mail at least once a month. Not once in ten times do they think it worth while to enclose a stamp, and as it would take many hours to direct to each one, I will give here what I would call a perfect electrical outfit, one that will meet all emergencies.

In the first place, a good office battery, composed of at least 75 cells, and the best cell, and the cheapest one, is the new *Double Cylinder Law Cell*, with a full set of electrodes. This would include a full set of Newman's bougies (both curved and straight), a supply of well insulated electrolysis needles, &c.

Single and combination handles, with large and small discs, and points are needed. These may be covered with fine sponge, but it makes them very much more expensive, and I do not like them as well as the felt or even absorbent cotton. The felt or cotton may be fastened on with a fine copper wire, and after using it can be thrown away and new covers put on. Always give each patient a new covering for your electrode. You would not like your barber to use the same towel on your face he had used on another!

Keep your electrodes clean. You can buy hundreds, and the dealers will try to make you think you cannot do without them all,

but ten, or at the most fifteen, will do for all cases, till you think of some peculiar form you want, then buy it, or make it yourself.

Then you want a 50 cell Waite & Bartlett battery, or a 50 cell Barrett, to take outside with you in the carriage. The electrodes for the office battery will do for your portable battery.

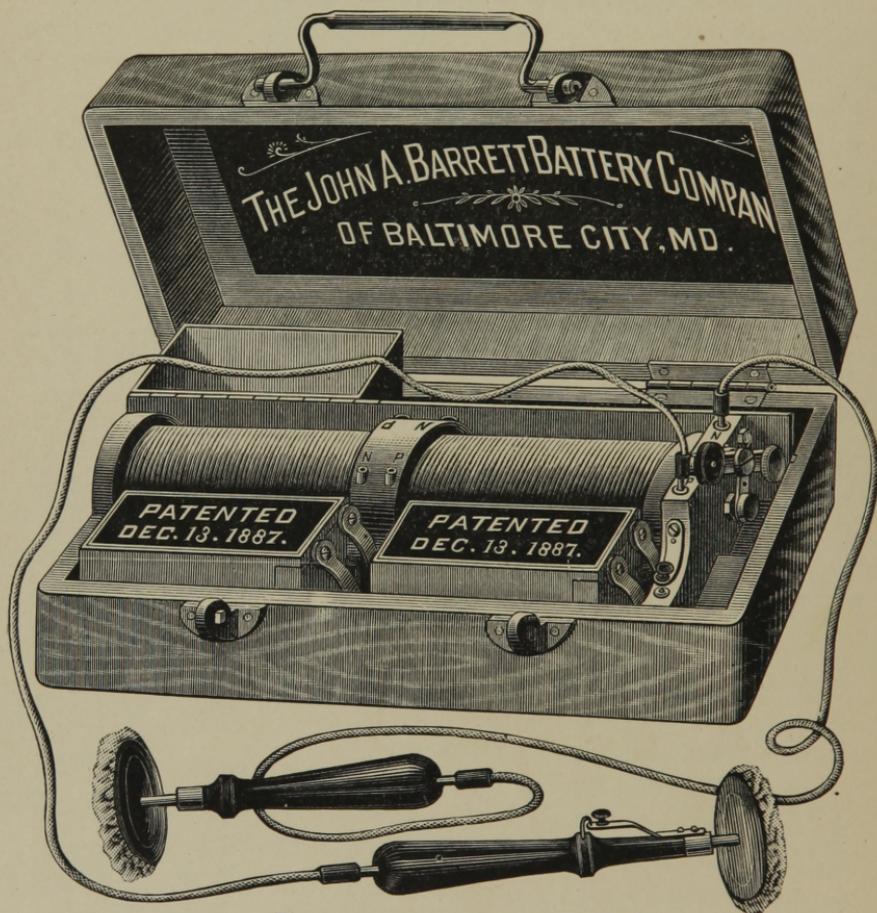


Fig. 8. Barrett Faradic Battery.

Now you want a good Faradic battery, and you can take your choice. Waite & Bartlett make a good one, the Galvano Faradic Co. makes a good one, also Flemming, of Philadelphia. But I prefer the Barrett Faradic (see Fig. 8.) to anything I have seen. The battery is as good as any other; it is small, very neat, and no fluid to

spill or eat out the zincs. It is a chloride of silver battery, and in my opinion, the best so far.

You can let it lie on the seat beside you, in your lap, or in your pocket—if the pocket is large enough. The cells (two of them) are

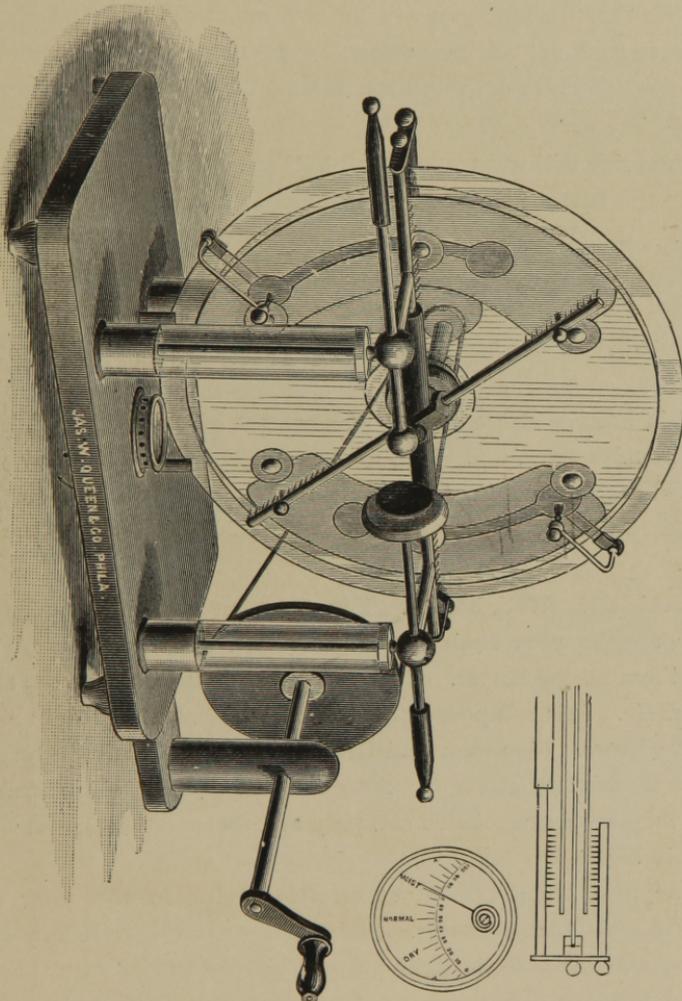


Fig. 9. Queen's Static Battery.

perfectly dry, can be used singly or together, and when used up can be replaced for a small amount, and you have a new battery.

Now you have three batteries. Very good; but you are not

half through. Now you want a Static machine. This will be more expensive than all the rest, so far. A modification of the old Holtz machine is what will be required. Queen, of Philadelphia, makes a good single-plate machine, (Fig. 9,) but I like the Waite & Bartlett.

With this machine you will require an insulated stool or table, also a special set of electrodes. (See cuts and description in this work). The whole, complete, will cost anywhere from \$200.00 to \$500.00.

Then you will want a cautery battery. This you want to see you get the best, or it will make trouble, even more than a "mother-in-law." The Piffard is a good one. (See description and cuts.) It is composed of zinc and carbon, or platinum plates, and will heat 24 inches of No. 30 platinum wire, and with an assistant, to rock it in its cradle, will keep up its heat long enough for almost any operation.

This battery also calls for another set of electrodes, and they are expensive ones, too. But, with care, they will last many years. You will require another set of pole-cords also. The pole-cords for the Piffard battery are simply thick wire cables as large as the little finger.

Is this all? Well, hardly. You must have an electric light, so you can make your examinations at night, and, if in the daytime, make them all the better. This requires a battery about the size of the faradic. It is composed of zinc and carbon, and will light a lamp for two hours. (See cuts and description of St. Clair battery and Waite & Bartlett storage.) Also another set of electrodes, and while they are an expensive set, they are the most beautiful of the whole lot.

The next thing will be an electric motor to run your static machine and your aspirator. (See cuts, etc.) For a battery to run this motor, your electric light battery will do that better than any other I know of. With the motor and battery to run it, you can wind your bandages. The aspirator is expensive, but it saves a deal of hard work, and once used would become a part of every outfit.

Then you may get a gastroscope, a cystoscope, an electro-

otoscope and endoscope. A laryngoscope if you need it. To this add Robert's Electric Osteotome, and the St. Clair motor for testing the lungs. This is but two inches square, but runs a thousand revolutions per minute, and like the osteotome, is expensive. (See Figure 10.)

To this add the electrode for the eye. This is an electro-magnet of considerable power, with several different shaped points, easily changed to suit the operation. It is small and easily handled,

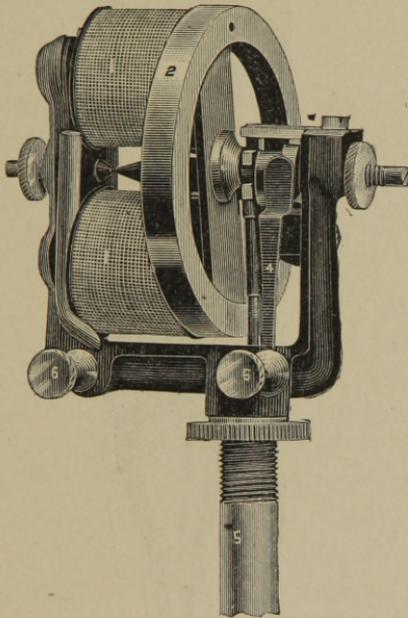


Fig. 10. St. Clair Motor.

and with the proper battery (a chloride of silver cell,) it can be carried in the pocket.

For removing small particles of steel or iron from the eye, that are on the conjunctiva or embedded in it, this instrument is worth its price many times over. (See Fig. 11.)

The cases where this little instrument comes in so well are those that fall to the general practitioner more than to the eye surgeon, because the accident happens at the foundries and work-shops where it is easy to send for, or run to, the nearest good physician they can find.

The proper way is to seat the patient facing the light, and to rest the head about the same as in the barber's chair.

When you have located the offending piece of iron or steel, pick up your instrument (which is not a magnet until the circuit is closed), close the circuit by pressing the small spring on the side, and

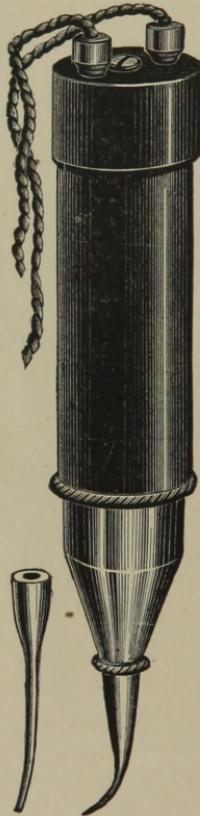


Fig. 11. Electrode for the Eye.

gently touch the point to the piece. It will adhere to the point, and become a part of it almost, so firm does it take hold of it. Withdraw the magnet, and the operation is finished.

For small particles upon the cornea, unless deeply embedded, a blunt point, having a flattened, bulbous termination, will be found the most suitable.

Mr. M., a blacksmith, living on Staten Island, aged 34, while working at his forge, in cutting a cold piece of steel, broke his hardie, a piece flying into his left eye.

He sent for a doctor living near the shop, and he worked for three hours, but could not get it out.

I was sent for. I took my little battery and magnet, and after turning the upper lid I found it sticking fast in the cornea. I touched it with the point of the magnet, and, as I lifted it, found it fast. I found it L shaped, and by moving it first one way and then the other it became unhooked and came out without tearing or wounding the cornea any more.

I have had many cases where, but for the magnet, I would have had trouble to get the offender out. With care any one can work it.

---

## What is Absolutely Necessary to Have.

To do anything well it is highly necessary to have good instruments, and while I have given what goes to make a perfect outfit, many of them can be dispensed with. I will give now what every electrician must have if he would succeed.

First, he must have some good make of galvanic battery. (I prefer Waite & Bartlett's.) This should be from 36 to 40 cells. With it he would expect to get a full line of electrodes. Not everything made, but at least fifteen of those most called for.

Then he must have a good faradic battery. Any one found illustrated in this work will give satisfaction. (I prefer the Barrett chloride of silver battery, as it is easily carried, and is a good one.)

Next, he must have a good cautery battery. Piffard's is a good one, (see Fig. 12.) but a good storage battery will give better satisfaction. (Fig. 12A.) It is always clean, does not need some one to rock it while in operation, and can be recharged at night while the owner sleeps. It has power for all kinds of surgical work, (one of three cells,) will light an incandescent lamp, run an electric motor and will cost no more than a fluid battery. Of course one must have a primary battery of sufficient strength for charging it when ex-

hausted or access to a dynamo. The whole thing complete can be had for about \$60.00, I think.

To this add a carboy of electropoion fluid, and what extra electrodes may be thought necessary, and the outfit is a good one. Of course the static machine is left out, and it is one often wanted, but can be dispensed with for a time, till the practitioner has built up a practice to warrant his buying one.

I should mention the fact that he must have a milliampere-meter and a current controller. These he must have, or guess at what he is doing, and that will not do.

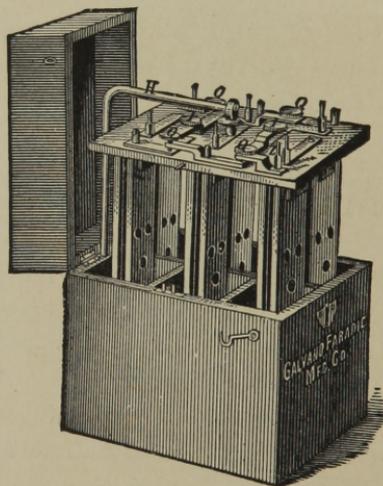


Fig. 12. Piffard's Cautery Battery.

## A Partial List of Electrodes Necessary to Have.

There are many other electrodes that come in with surgery, and even the neophyte will want others. But one with good ideas can make, or have them made, to suit the case in hand. Every electrician has some pet electrode that he wonders how others can do without, while the others do not think so well of it.

Time and practice will show you what you should have, and it is better to wait until you find out what best suits your practice.

After a few years you will have hundreds of them, many that you will seldom, if ever, use.

The following list is a good one, and you can buy, or have them made, at any of the makers, as nearly all use a standard thread which will fit together. I will not buy of a maker who uses another thread and size. He wants to drive you to his shop every time you want an electrode.

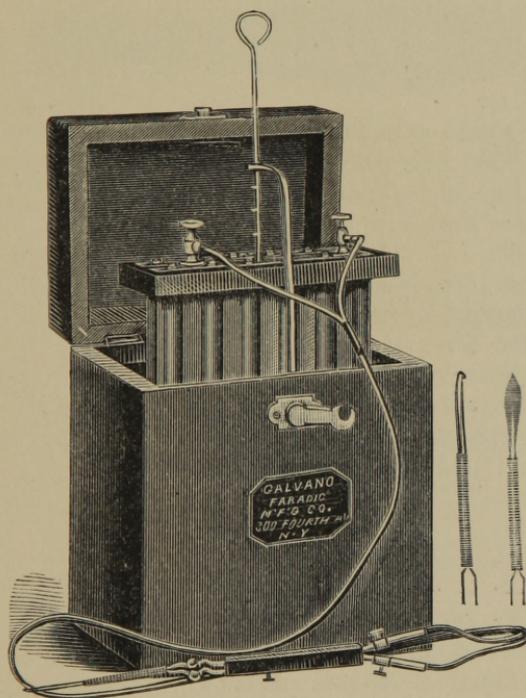


Fig. 12A.

### ELECTRODES.

Handle, Hard Rubber, Universal, with Current Breaker, Fig. 13.

“ Ebonized, plain, Fig. 14.

Eye Cup (Electrode) new style, Fig. 15.

Ear and Nose Electrode, straight.

Ear Electrode and Speculum, combined, Fig. 16.

“ “ double with sponge tips.

Nose “ insulated stem.

- Tonsil " with stem and ball.  
 Tongue Plate, with insulated stem, Fig. 17.  
 Laryngeal Electrode with insulated stem.  
 Disk Rheopore, with insulated metal points.  
 Rolling Rheopore, or Wheel Electrode, with insulated metal points and Universal Interrupting Handle.  
 Rolling Rheopore, alone.  
 Foot-Plate, zinc, Fig. 18.  
 " folding, flannel lining and rubber insulation.  
 Neckband Electrode, self-retaining, with sponge.  
 Arm Electrode, self-retaining, with sponge.  
 Oval Sponge, soft rubber back for direct application with hand, Fig. 19.  
 Round Sponge, with long handle for use under clothing.  
 Sponge Electrode, with door-knob handle.  
 Sponge Cup, nickel-plated.  
 Duchennes Metallic Points, gold-plated.  
 Metal Balls.  
 " Disk, three sizes, all small.  
 Comb Electrode, small, seven points.  
 Hair Brush Electrode.  
 Metallic Scourge, nickel-plated, Fig. 20.  
 Tooth Electrode, insulated stem.  
 Vaginal Electrode.  
 " " all metal.  
 " " cylindrical tip and insulated stem.  
 " " insulated in middle.  
 Uterine Cup, with insulated stem, three sizes.  
 " " " intrauterine stem.  
 " Flexible Electrode, with insulated stem.  
 " Extra Olive Tips, round or pointed, Fig. 21.  
 " Electrode, double current.  
 Rectal Electrode, partly insulated, Fig. 22A.  
 " " all metal.  
 " " insulated in middle.  
 " " Bolton's insulated.  
 " " with Ball and long insulated stem.  
 Urethral Electrode, insulated.  
 " " all metal.  
 " " elastic, double current.  
 Catheter Electrode, silver, half curved.  
 " " " full curved.  
 Needles for Electrolysis, straight, half-curved, curved. Fig. 22B.



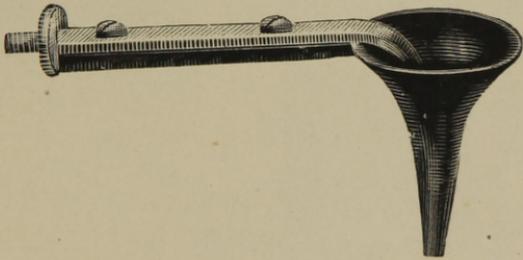
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16



17

ELECTRODES.

## ELECTRODES FOR STATIC MACHINE.

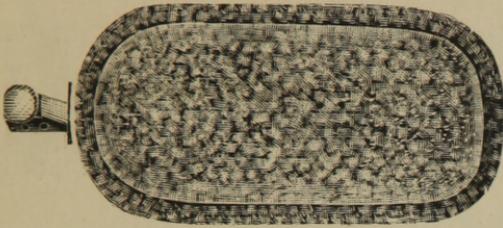
- 
- 1 Sharp Brass Point Electrode.
  - 1 2¼-in Brass Ball        "       Fig. 23.
  - 1 1¼-in       "       "       "       Fig. 25.
  - 1 Spinal Roller           "       Fig. 24.
  - 1 Wooden Ball            "       Fig. 26.
  - 1       "       Point       "       Fig. 22.
  - 1 Spray                   "       "
  - 1 Pair Sponges and Handles, Fig. 27.
  - 1 Adjustable Connecting Rod.
  - 1 Chain Holder, Fig. 27A.
  - Brass Point.
  - Morton's Pistol Electrode. Fig. 28.
- 

## ELECTRODES FOR CAUTERY WORK.

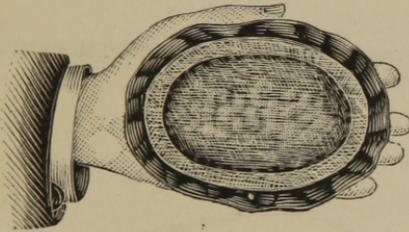
- 
- Point.
  - Post nares Curette.
  - Knife.
  - Laryngeal Curette.
  - Pointed bulb.
  - Tonsil (*spiral*). Fig. 29.
  - Bulb pointed.
  - Knife.
  - Curette.
  - Point.
  - Laryngeal (curved).
  - Nasal (straight).
  - "    (angular). Fig. 30.
- 

## Supplies.

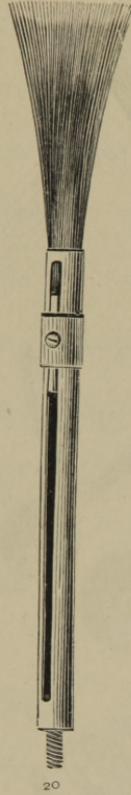
I find it a very good plan to purchase several yards of good cord. Never buy the tinsel wound around a cord; it is good for nothing, but buy a cord made of several fine copper wires and well



18



19



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21



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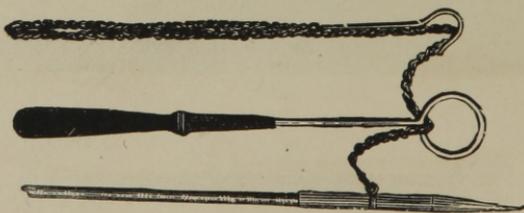
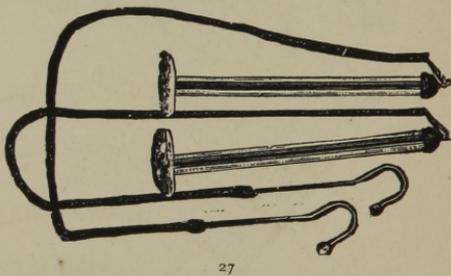
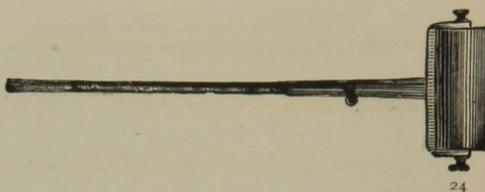
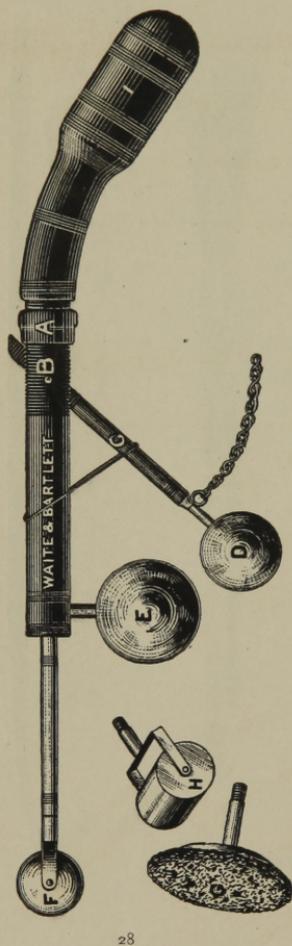


22A.



23

ELECTRODES.



ELECTRODES.

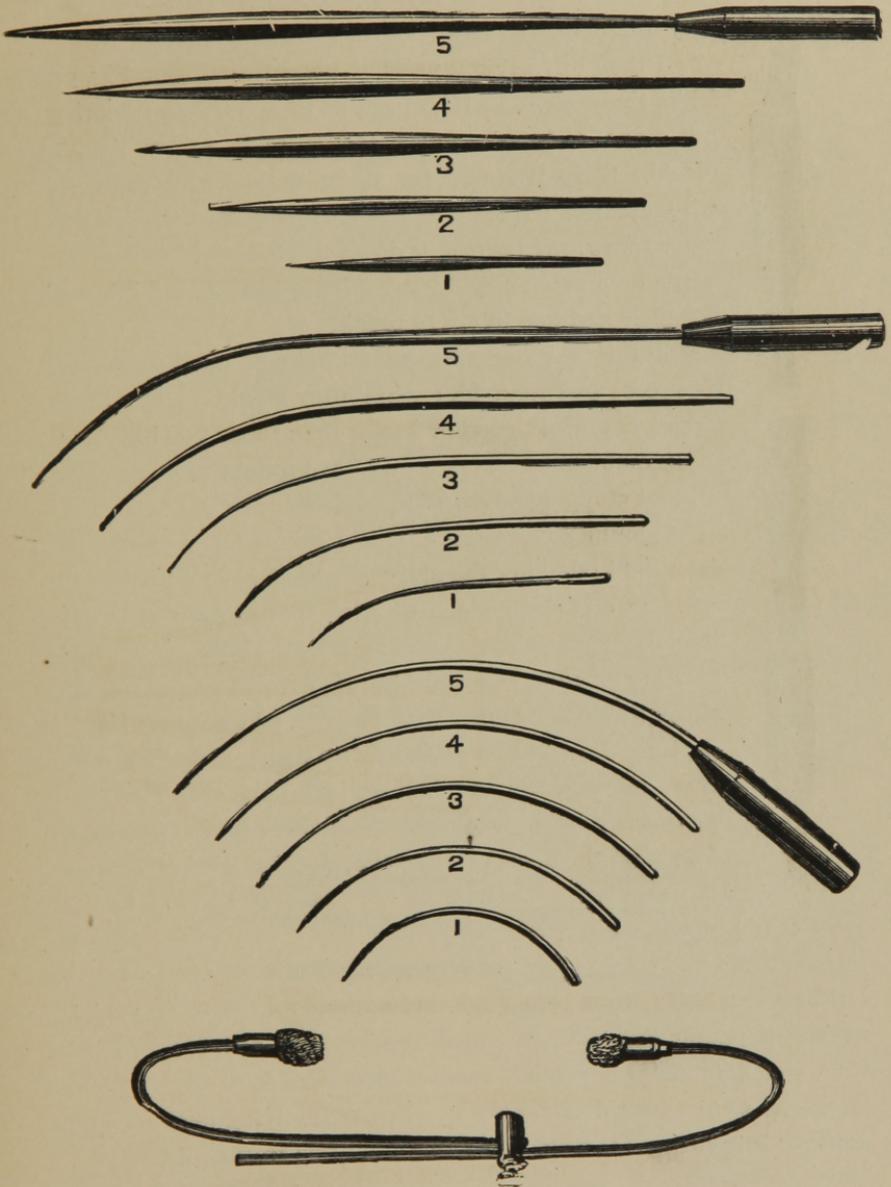


Fig. 22B.

ELECTROLYSIS NEEDLES.

covered. Then I cut it up to suit myself. I like the cords full long. Often it is very unpleasant to have the cord too short.



I then buy several pairs of patent tips. (See Fig. 31.) I like those made by McIntosh, as they need no soldering, but have a female screw and a male screw that fit nicely. Strip the cord for about three inches from the wire, and make a knob of it after it is passed through the inner screw, then screw it down to place. It will give a perfect connection, and not having solder around it leaves it limber and less likely to break.

In this way one gets several pairs of good cords, and they cost less than half what they would to buy ready made, and are as good or better than those you buy.



If one cord gives out, you have others to go on with, without stopping to mend the old one.

I would advise every one to buy a tap and die, the size used in making the electrode handles. With such a tool, one can fit a piece of wire to the handle at any time. Buy some brass wire, about an eighth of an inch thick (No. 16). See the size of wire in your sponge-covered disk that comes with battery, and get that size.



Fig. 31.

Cut off a few pieces, about two inches long, and cut a thread on each end, one-half an inch long, the other end one-quarter inch. Now get some sheet-brass one-eighth of an inch thick, and have several disks pressed out, of all sizes from one-quarter inch across to four inches.

Drill them in the centre, tap them, and screw the wires already tapped to them, and you have as nice an electrode as you can wish. Drill several holes around the edge, and cover with felt or two thicknesses of patent lint. When soiled, remove and recover. In this way, you can make any small special electrode you need without having to send a long distance for it. For those living near a manufacturer it is cheaper to buy, than to take all this trouble perhaps.

## Special Forms of Galvanic Batteries.

Fig. 32 shows a very convenient form of battery manufactured by Messrs. Waite & Bartlett, of New York, which is adapted for all work when it is necessary to carry a battery about, as it is simple in construction and easily managed, and not liable to get out of order.

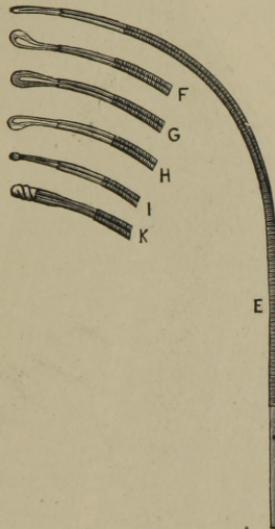


Fig. 29.

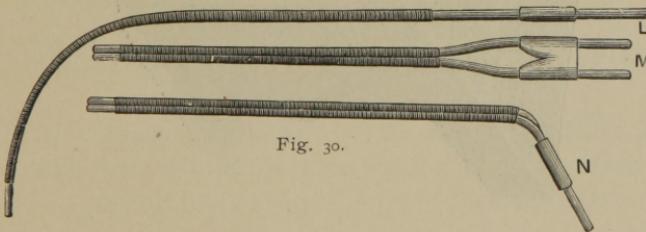


Fig. 30.

It is shown in the figure with its front, which is in form of a door, thrown open, exposing the zincs, carbons and jars to view, so that the condition of all may be easily and thoroughly inspected at any time. The tray or door containing the cells has a flush ring in the front, by means of which the draw may be pulled out and the cells

filled or emptied, or the condition of the fluid examined. The solution used is sulphuric acid 1 part, water 16 parts, bichromate of potash 2 parts, and 15 grains of bisulphate of mercury. If the fluid retains its reddish-yellow color it is still in condition for use; but if green or black it must be renewed.

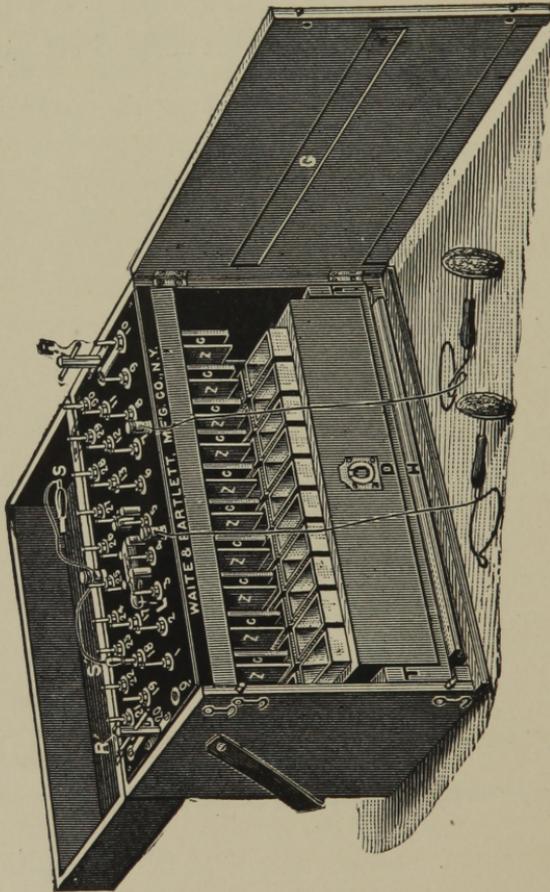


Fig. 32.

At the bottom of the box is shown a rubber-padded board called a hydrostat, which must be placed padded side down on the top of the cells. In the back of the box is a groove similar to that shown in the door at *g* and at the same height; after placing the board on the top of the cells, the door is closed and the two lifting-

rods are screwed up, thus raising the cell-tops against the padded board and sealing the cells, as the board cannot be pressed above the grooves. To put the battery in operation, the two lifting-rods (*RR*) are raised and then given a quarter turn.

This operation raises the platform and tray of cells so that the zincs and the carbons are immersed in the electropoion solution. The selecting of the cells will also be found convenient and easy of manipulation. At the back of the top board is attached a bifurcated cord, to the free ends of which are attached two sockets. To draw on the cells it is only necessary to place one of the sockets on the pin marked "one," when the current from one cell will pass to the binding screw (*SS*), and thence to the electrodes. If more than one cell is desired, place the other of the two sockets on the post marked "two," and then remove the socket from pin "one," and so on. The battery is also provided with a commutator or polarity change by means of which the positive pole may be made to be at either of the two binding-posts.

By means of the current selector a number of cells from any part of the series is brought into the circuit, and the sliding rod of the rheostat raised. No perceptible current is felt on placing the sponges on the patient. By gradually pushing down the rod of the rheostat the current may be more gradually increased than by the adding of one cell at a time.

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## A Word of Advice to the Neophyte.

Don't think because you may have a static machine, a galvanic and a faradic battery, that you have three kinds of electricity. It is not true; electricity, however produced, is the same. The machine by which it is produced gives you the different currents, gives you intensity and quantity. The dynamo that gives the electric light, with a proper circuit controller, will do all the work the several batteries will do.

Don't let your batteries get dirty. Keep them clean and bright; keep all connections as bright as when new, and every time you use

one, wipe the dust from it and it will look bright and inspire confidence in your patients.

Don't forget to amalgamate your zincs, as no battery will do good work unless you do. Were it possible to make zinc perfectly pure there would be no reason for amalgamating.

Don't let your drip cups (if you have a McIntosh battery, either galvanic or faradic,) get filled up and foul, for it will eat your zincs away just as high as it reaches them. When the fluid gets dark and green looking empty it out, and wash everything clean, amalgamate the zincs, refill with fresh fluid (it costs but a few cents) and you are ready for the next patient, knowing your battery is in good condition.

Don't immerse your plates till the patient is ready for the operation, and as soon as you are through, remove the elements from the fluid. In this way you save your battery, and will keep it in condition much longer.

Don't lay your electrodes down so that they can touch each other, as there is no surer way to spoil your battery.

Don't let the electrodes touch each other with a strong current on and your milliamperemeter in circuit, as the latter would be injured by so doing.

Don't use electrodes with a dirty cover.

Don't let your patients govern the current for you. Some will tell you: "Doctor, I don't think I am getting much electricity; I can't feel it much, and I can stand it *very* strong. Dr. Smith gives it until it makes me draw my arms and I have to let go of the sponge." Remember you are the best judge, and give what you know to be right, and no more.

Don't give strong currents when mild ones will do as well, and never give electricity so strong as to give pain. When you get to gynecological work then you will give stronger currents, and know how strong to give.

Don't use two sizes of electrodes the same sitting when operating for stricture.

Don't give a strong current to a woman with gravid uterus. It may bring on abortion.

Don't apply electricity in any form to a patient with inflammatory rheumatism.

Don't promise to cure a patient in so many days.

Don't hesitate to change the current if you find the one that you thought would be proper is not the right one.

Don't lend your batteries, unless you want them all done up when they come home.

Don't tell your patients to buy a family machine and apply it themselves.

Don't let your battery sit in your office until some one comes and asks you to give them electricity, but when you have a patient outside that needs it take it to them. The same in office practice. I know a good doctor who said to me, "I have a good galvanic battery, but I have never had a call to give electricity." At that time there was a patient in his office who could not pass his water from stricture. I had a set of Newman's electrodes with me, and operated for him. Since then he has picked up a large practice in electricity. Before that time no one knew he had a battery.

Last, but not least, don't animadvert too severely on this little book. Remember it is better to sympathize than to criticise. If I have made it easier for some beginner, who cannot have access to a large library, and who has no one to teach him, I shall feel more than repaid. It is hard to write on a subject so filled with interest as the subject taken here, without including the finer work of the expert. I have tried to leave out everything but that which any well-read physician with care and practice may perform without danger of doing harm.

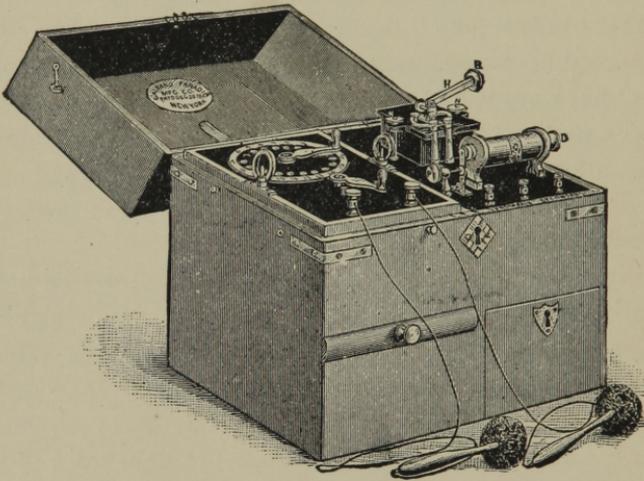
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## The Cause of So Many Failures.

Many cases that result in an absolute failure are due to a lack of skill and the lack of interest. The operators do not study the principle, and rush haphazard at it, with no idea of what is required, with little, if any, faith, and act as if they were playing with a toy. I know this to be true. I have seen many cases where the operator

did not know which current he was applying, which pole, nor the amount of current he was giving. Is it any wonder he failed? Would it not have been a greater wonder if he had succeeded?

Take stricture, for instance. One must see at a glance that it requires the nice manipulation of an expert. One mistake may ruin your patient, and if not ruined he is not benefitted. If the current is too strong it will act as a cautery, and do harm. If the wrong pole is used [see case mentioned elsewhere] great harm may be done. If two urethral electrodes are used at the same operation, harm will be done. Great care is as necessary as in the most delicate operation



Galvano-Faradic Combination Battery.

on the eye, yet any one can learn to operate for stricture with the electric current if he will follow with care the plain and simple directions in this work.

Then, for removing hair from the face. I have received many letters from physicians all over the Union saying they had tried it, and could never be sure of the death of one hair. A doctor from the West came to me and asked if I could take a large hair mole from his face. I looked at it, and assured him I could, and would do so then and there. He said: "It is but fair to tell you, I have had three electricians try it, beside myself." He wanted to sit before a glass so that he could see how it was accomplished. In an hour he

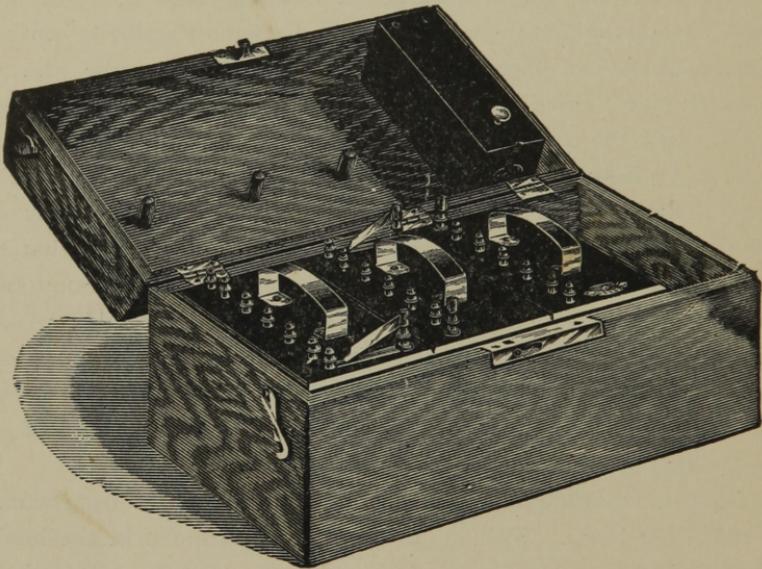
left, and the mole had gone before he left. He then told me how he had tried to do the same. He introduced the needle without any regard to the position of the hair bulb, and the result was nil. Then he also informed me he did not know one pole from the other, yet he had been giving the battery for six years (faradic I judged from what he said).

I will give one or two more instances where pure ignorance and dumb stupidity governed the operator, and failure was the inevitable result. Dr. ———, of this city, came to me and insisted I should sell him one of my galvanic batteries. Having several, I let him have a fine galvanic battery made by the Galvano-Faradic Company. He remained in my office from 9 p. m. until 1 a. m. I gave him all the instruction I could in the four hours. I became the patient and let him apply the current to me under my instruction. He informed me he had a lady patient, 60 years old, suffering with a certain disease. I cautioned him to be sure and not give her more than six cells (he had no meter). He went off filled with the idea that he had mastered the whole problem of electric currents. Some two weeks after I met him in the street. He called me and said: "Doctor, either you were wrong about the current I should give my patient, or that battery is no good." I asked for some explanation. Said he: "I have been giving her *the whole battery* for half an hour every day since, and it never made her jump."

I got in and rode down to see him give the whole battery and not make her jump. Well, he gave her the poles, one in the hand, and the other he applied as I had directed. He turned on the whole number of cells (36), and I began to think I did not know all about it. I knew there was a screw loose, and soon I found it. All batteries of this kind have what is called a hydrostat. A board passes between the elements and the jars when not in use. He had been giving that poor old lady the *whole battery*, and had never once taken out the hydrostat. She had not received one milliampere of electric current during the whole two weeks.

He took the battery home at my suggestion, and I explained the reason. This is not an isolated case by any means. It occurs every day in the week. He is well posted in his profession, with a large practice, but he had not learned *how* to give electricity.

One more case, and I am through. I sold the professor of a large, first class college, (one up in the New England direction,) one of my electric light batteries, with everything complete. He wanted an induction coil attached, so he could give the boys a shaking up. I took great pains to show him how it must be worked, and gave him printed directions. He appeared well pleased, and left for home. Ten days after he came in, black as a thunder cloud. The battery was a fraud, and so was I, only the adjective before mine was a big D. I took the machine and started it, and the light was



McIntosh Eighteen-cell Galvanic Battery.

bright, and the buzzer worked all right, showing that the battery at least was just as it should be. I found the current came as it should, and asked him to try it. "O, I know it hums, but that is all it will do." I took the sponges, and wetting them well, I sprinkled salt over them to make it as warm for him as I could, and placed them in his hands. I pulled the cord out full length, and let him have it. He was soon on his knees, and praying the best he knew for me to *let up*. I did so, and he rolled the cords and put them in his pocket, and catching up the battery, with "I am a d—d fool," started northward again. Here was a man who is known as one of

the best teachers in America, one who knows wood to be a non-conductor, yet he had been holding on to those wooden handles for ten days, and believed the battery was no good. It is for this reason I have taken so much pains to tell what most writers will say everyone knows. They do not all know it. Those who do, will not want to read this. Those who do not know it all may find some good in this detail of small things. It is for the beginner.

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## Fluid for Zinc and Carbon Batteries.

Every physician who has had much to do with batteries in which bichromate of potash combined with sulphuric acid and water serves as the exciting fluid, knows how annoying it is to have the forming of the ruby-colored crystals that are found in almost every battery. These crystals are very hard, and are insoluble in cold water, and but sparingly in hot water.

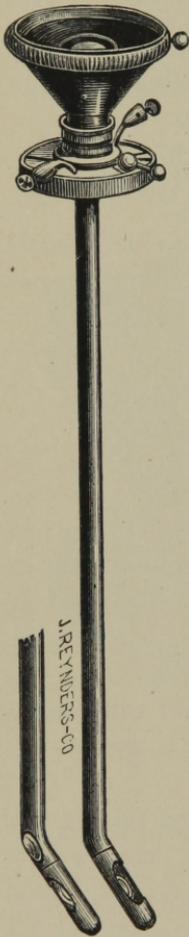
These crystals do much harm in a battery, and have been the cause of much study to find some way to prevent their formation. The great trouble with them is that they form and cling to the zinc plates, and are formed in the interstices of the carbons; and not only there, but they also form a thick, hard crust at the bottom and often to the sides of the cup containing the fluid. They form at all seasons of the year, but much more readily in cold weather. If the fluid is not left standing too long in warm weather they will give little, if any, trouble. *Boiling* water is the only thing to remove the crystals when found on the elements.

It is highly necessary to keep the battery free from the crystals, as they are *non-conductors* of electricity. Of course they must increase the internal resistance of the carbons, and to such an extent as to interfere with, and, in fact, almost destroy the action of the battery.

I have seen a powerful battery, with fresh fluid, so overcome by the *chrome alum* (the crystals are called chrome alum as they consist of a double sulphate of chrome and potassa,) that but a poor, feeble current could be obtained, and after a time even that would be an impossibility.

I have spent hundreds of dollars on experiments with batteries and battery fluids, trying to procure an electrolyte that would not crystalize. If pure chromic acid, instead of bichromate of potash, is employed in making the fluid no crystals will be formed, simply because they cannot form without the potash. That is all very well, so far as the solution is concerned, but the high price of pure crystallized chromic acid renders it impossible to make it from the crystals. I think chromic acid sells for something like \$2.00 or \$3.00 per pound.

The following formula was proposed, I think, by Dr. Seiler, of Philadelphia: Bichromate of potash, 2 pounds; hot water,  $\frac{1}{2}$  gallon; sulphuric acid,  $\frac{1}{2}$  gallon; dissolve the bichromate of potash in hot water, and, when cool, add to it the sulphuric acid. This should be mixed in an earthen vessel, as the sudden evolution of heat is very apt to break a glass vessel. When cold, place the mixture, which will be quite thick, in a glass funnel, the tube of which is partly closed with asbestos, and drain off all mother liquor, which is a saturated solution of sulphate of potash. Then re-dissolve the parts remaining in the funnel in a gallon and a half of water, and add to it one quart of sulphuric and two drachms of nitric acid. This fluid will not crystalize unless it is left standing for a very long time.



Leiter's Cystoscope.

## To Amalgamate the Zincs.

Take out the same as to refill. Take off brass nut, on top of frame, back small screw in nut on under side of frame, till spiral wire is freed. Take off the nut; take hold of zinc and pull it out. Put some quicksilver in a small dish or box and put zinc in it, and, with a tooth brush, rub well over the zinc till it is covered, using care not to get it on the brass rod.

Now replace as before and fasten spiral spring; then take the next one, and so on till all are amalgamated. When the light fades soon after lighting, it is certain they need amalgamating. When it only gives a pale light, and the next button on the switch does not improve it, nor the next, the fluid is worn out, and needs refilling.

A little care will give you a good light. Like all delicate machinery it needs some care, fresh fuel, to be kept clean. Observe

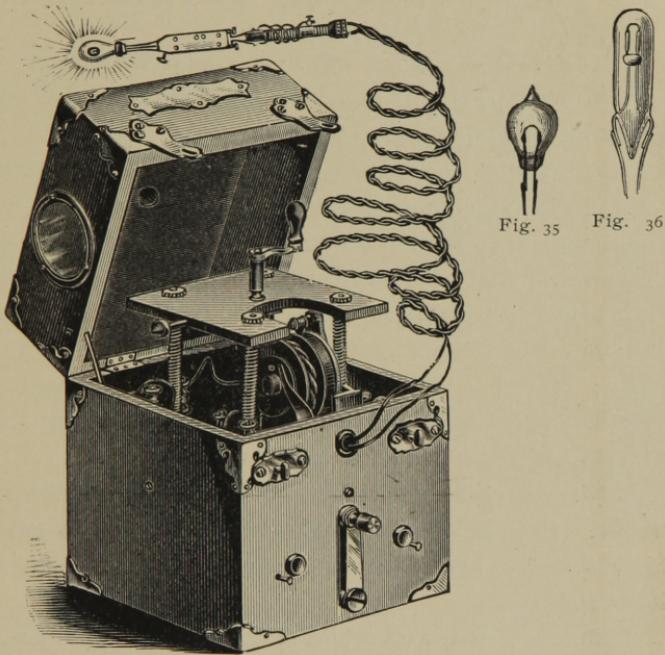


Fig. 34 St. Clair Dental and Surgical Electric Lamp.

these points, and you will be pleased and surprised at the amount of work your battery will do.

For photographing cavities it is the only perfect instrument.

## Testimonial from an Expert.

BUFFALO, DEC. 12, 1884.

DEAR SIR: I send you a blue print of a shell taken by your electric light. Magnified 5000 diameters it is very fine. Taking in consideration the fact I knew but little of the light, the result is wonderful. I am certain by a little

use of the light the most perfect work can be done. It is far ahead of sun-light, and cheaper. It is indeed wonderful.

Yours truly,

LEE H. SMITH,

Buffalo Microscopical Club.

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## Why Have an Electric Light.

"But," says one, "of what use would an electric light be to me?" That question I cannot answer. But if asked what good one would do me I could easily tell.

1st. The incandescent light for general examination of cavities of the body is superior to any other, either sun-light or gas. The great superiority lies in its steadiness and pure whiteness.

2nd. It does not heat the instruments and surroundings; it can be placed into the mouth, the vagina, rectum, bladder, and even in the stomach. It is so small it can be introduced into the posterior nares; placed in position as dark as a lead pencil, by pressing the finger it gives instantly five times as much light as the old tallow dip we used when a boy to light a whole room.

3rd. The light is concentrated and cannot smoke, nor will it flicker. The operator can hold it himself with no danger of burning his whiskers or eyelashes, as has often been done by the old-fashioned light.

4th. The ease with which it can be carried around, and its perfect adjustment to each and every case of surgery one may have to do at night.

I was sent for to bring my light to examine General Grant's throat. His was a bad throat to see. He held his tongue so no light from outside could penetrate beyond the soft palate. With a proper instrument for holding the mouth open and depressing the tongue, and with the small lamp in its place, the cavity down to the vocal cords could be seen.

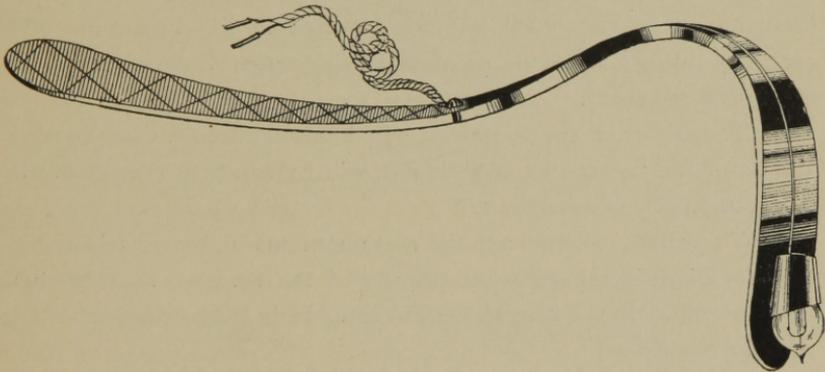
All who were there said it was the first good view they had been able to get.

I have a lamp fastened to a belt adjusted for the head. It can

be used in all cases where the operator wants the light kept from his eyes and yet shine upon the point before him. All endoscopic work can be better seen than by any amount of sunlight.

## The St. Clair Electric Lamp.

J. F. Griffin, M. D., of Cloutierville, La., in the *Medical Summary* says: "It is a well known fact, both in America and all over Europe, that R. W. St. Clair, A. M., M. D., of Brooklyn, N. Y., was the first to invent, and apply the small electric lamp for use in



Tongue Depressor with Electric Light.

surgery. The Philadelphia *Times* gave an account September 12th, 1884, 'of the most wonderful invention exhibited at the electric exhibition, the St. Clair Surgical Lamp,' and yet notwithstanding this fact the London *Figaro* contains the following :

"A LANTERN FOR HUMAN THROATS.—The young English electrician to whose ingenuity, I believe, Mr. Irving owed the cleverly contrived effect of the sparks which fly from the blade of Mephisto's sword in 'Faust,' has been further proving what I may call his electric versatility. His latest invention, I understand, turns electricity to account as an aid to laryngoscopic examination, by means of a tiny electric lamp, which is actually put down the throat of the patient.

"It was with this novel electric apparatus which Mr. Vesey has invented that Sir Morell Mackenzie examined the throat of the

Crown Prince. The lamp is appended at the end of what looks like a long, slender penholder, and the proportionately small battery which supplies the electricity is worn about the examining surgeon's neck.'

"The St. Clair lamp has been in the hands of our best surgeons for nearly five years.

"In 1884 all the daily and scientific papers and journals were loud in praise of the St. Clair lamp, and beyond doubt gave credit to Dr. St. Clair as being the first to put the electric light to the uses of illuminating small cavities like the mouth, etc. Since his lamp was introduced many others have been in the market, but none have equalled it so far as the writer knows.

"Mr. Vesey, of England, may have invented a lamp, but he is at least four or five years behind America in his invention, and certainly foreign surgeons are late in their use of such lamps for diagnostic purposes.

"The editor of the *Summary*, who has seen the St. Clair battery and lamp and has known of their use, will I think bear me out in the correctness of my assertions."

[We heartily corroborate the statement made by our friend and correspondent in regard to the priority of the St. Clair battery; his, undoubtedly, was the first successful attempt in that direction. — *Ed. Medical Summary.*]

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## The Battery for Electric Light.

As now perfected and manufactured, the St. Clair Dental and Surgical Incandescent Lamp fills a place in dental and surgical practice hitherto vacant. By its use the dentist is enabled to make the minutest examinations with ease, and the surgeon to throw light into dark places until now beyond his gaze. The lamp, manufactured under the supervision of the inventor by his own process, gives a light superior to that of any now in the market, being especially notable for remarkable clearness and steadiness. Conveniently shaped, covered and attached, it can be handled with as much ease as the simplest of dental tools.

The six half-pint cells are so protected as to render spilling an impossibility, while economy in fluid using and wear is secured by a ready lifting of the electrodes from the cells when idle. Further economy in force is secured by an adjustable switch, limiting or increasing the number of cells employed as needed. As two cells, when fresh, oftentimes are sufficient for ordinary purposes, the usefulness of this is apparent. A resistance coil in the lamp handle, with sliding gauge, makes possible the slightest adjustment.

It should be noted that through its superior power this little battery is available for any and all purposes to which such an article can be put. Especially useful is it in running the Griscom or other minor electro motors used in turning dental engines, etc. It will do the work of the common six-gallon battery, using ordinary fluid, better and with more economy, and is entirely odorless. For this it has been long tried and thoroughly tested, never to be found wanting. In minor cautery it is invaluable, and can be fully relied upon. Frequent utilization for this purpose, both in private practice and at clinics before eminent surgeons, has fully demonstrated its usefulness for such purposes.

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## What the Press Says.

"The lamp is no larger than a marble, the battery only five inches square, yet he gets a ten candle power light, uses a fluid that does not crystallize, and only uses about half a pint. The lamp is of carbon, but entirely new, and gives a very white light. The battery will light a lamp from three to five hundred times without filling. It is the most perfect and best battery ever employed to light an incandescent lamp, and does its work perfectly."—*N. Y. Sunday Mercury.*

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"Dr. R. W. St. Clair, of Brooklyn, has connected a small incandescent lamp with a portable electric battery. The apparatus is intended to be used in surgery for the illumination of cavities in the body. Many operations in surgery are difficult or impossible on account of the impossibility of lighting up the cavity to be operated upon. With this instrument, combined with the laryngoscope, the throat may be explored to a greater depth than heretofore has been deemed possible. The lamp will be very useful also in dental sur-

gery. It is very small, hardly larger than the head of a pencil. It has even been proposed to use the light for the purpose of photographing cavities of the body. The whole apparatus is about the size of a cigar box."—*New York Sun*.

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"Another very interesting exhibit which was yesterday added to the exhibition is an electro dental and surgical lamp, the invention of Dr. St. Clair, of Brooklyn. This consists of a tiny incandescent bulb on a convenient handle, connected with a five-inch cube battery of four one-ounce cells. The lamp is fitted with a well-regulated resistance coil from one to ten-candles power. The carbon is made of a vein of a beech leaf carbonized by a peculiar process; it will remain alight steadily for three hours, or will last for making examinations from two to five thousand times."—*Philadelphia Times*.

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"As an assistant to the laryngoscope some of the most eminent physicians of Brooklyn and New York pronounce its future usefulness unlimited. For a dental diagnosis it gives an illumination of such brilliancy that the operator is enabled to distinguish at once the faintest point or line of decay, and when his work is done to judge it justly and critically. Finally for obstetrical examinations its value, with the aid of that useful instrument, the speculum, is beyond computation. The demand of the physician is answered. 'More light' was his cry. It is here. The value of the fluids, zincs, etc., etc., for an instrument during an entire year is not more than two dollars, less than any coal oil lamp. The instrument can be used from fifteen hundred to two thousand times of from two to three minutes each without renewal; and that to crown its virtues this wonderful little box will do all minor cautery surgery with the same accuracy, rapidity and perfection as the tremendous galvanic cautery batteries, which use gallons of fluid, pounds of zinc, sheets of platinum, and cost hundreds of dollars."—*Spencer (N. Y.) Herald*.

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"Unique and valuable \* \* \* A marvel of originality, construction and efficiency. The battery, contained in a little walnut box hardly so large as a physician's medicine case, when put into operation lights a lamp of any size, from that of a marrowfat pea to a pigeon's egg, with a clear, dazzling flame—not dull and creamish like the incandescent lamp, but as bright and sparkling as the big carbon arc light \* \* \* Briefly described the apparatus consists of a six-cell battery, encased as above, and so manipulated by a spring lever as to limit the force by cutting off such cells as may be

desirable. Attached to an insulated copper wire is a conveniently shaped handle for the lamp. Round this is wrapped a resistance coil of nickel wire, with a sliding gauge, with which the electric current can be further gauged by a turn of the operator's thumb. \* \* \* One of the lamps has been lighted 3,500 times, and is apparently as serviceable as ever. Besides illumination, the battery furnishes force for the heating of a knife of platina wire, to be used in minor cautery. It has so far worked very successfully."—*Brooklyn Daily Eagle*.

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"Je presente aussi, Messieurs, une petite lumiere electrique pour eclaire la bouche et les autres cavites du corps, faite sur le principe Edison au moyen d'un fil de carbone, adopte a l'usage medical par le Dr. Saint Clair, un medecin de Brooklyn (New York).

"Il y a, comme vous le savez, beaucoup de difficultes a faire une lampe aussi petite que celle-ci, donnant assez de lumiere pour etre vraiment utile.

"Celle-ci reussit parfaitement aux examens de la bouche, mais degage trop de chaleur pour les operations.

"Pour la cauterisation, la pile, de la dimension au-dessous de celle-ci, est suffisante."—*The Societe Odontalgique de France*.

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### Directions for Working the St. Clair Dental and Surgical Electric Battery.

Unscrew the thimble in top of cover, and open the box. Place the hands, back down, on the edges at each end, with the tips of fingers, under metal frame, and lift the whole inside out, using care. Set it down, and fill the jars with fluid. Take each one out, and fill *just to top of black ring marked on each cell*.

For cautery the same, only use wire instead of the lamp.

If they are too full they will not work, but eat up the zinc when standing idle. Now replace the zincs, frame and all, the same as you found it. Close the box, put back the thimble in cover, put on the crank. Put the plugs (on end of the cord) in the holes in circular piece of metal on front of box, press them in well, snap the springs on the other end of cord into the end of electrode (or handle). Now turn crank four times to the *left*. Be sure the switch on front of box is on *first left hand button* (if it is on any of the others

you may burn the lamp out). Now press the knob on electrode (or handle) and you have the light. If the light is not bright enough, turn switch to right, to second button. After using, if it is not bright enough, turn to the next, and so on. When the switch is on the third button and the light is pale, the fluid needs renewing, which you do the same as filling first time, using care not to spill any inside the box, or on any of the connections. Keep the strips on inside the box (six of them) clean, and those on edge of hard rubber that comes in contact with them, as any dirt would break connections.

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## Electrolysis and How Performed.

Electrolysis is a term applied to the process of decomposing compound substances by the electric current. Electrolysis requires a galvanic battery, and, if the amount of work is great, a large battery will be the only one capable of doing the work satisfactorily. The office battery I have described, consisting of seventy-five Law cells, will do any work you will have. The faradic current is of no use whatever. The galvanic current is the one, and the only one, capable of separating the elements that enter into the composition of fluids and solids. This any one may illustrate in several ways. The easiest is to make a solution of the iodide of potassium (say 60 grains to two ounces of soft water). This makes a clear solution. Place the solution in a glass dish, with a large, flat bottom, and place the electrodes (each one armed with metal tips,) in the dish, one on each side. Now turn on a few cells and watch the chemical change.

In a few minutes the fluid will change color. At first at one pole it will become a pale yellow, gradually increasing in darkness until it reaches the color of pure iodine. The other pole will be lighter, and, if the dish be large enough and the liquid be kept quiet, it will remain entirely clear.

The explanation is very simple. The iodine and oxygen have a peculiar affinity for the positive pole, while the hydrogen and alkali are attracted to the negative pole.

It is the same in the human body, and when the two poles are

armed with needles unless the positive pole or needle is well protected with a gold plating it will soon corrode, and the tissues become hardened, so that in ten minutes it is removed with great difficulty.

It comes out like a rusty pin in a wet blanket. This of course will leave an eschar, and, if on the face, an unsightly cicatrix will be the result, and mars an otherwise beautiful operation.

I do not, and have not for several years, used both needles. The *negative* pole I arm with a needle or other metal electrode I may select to use, while the *positive* pole I arm with a sponge or felt covered electrode to be held in the hand, or near the seat of operation. I am certain, after long and patient trials, this is the better way. Many serious mistakes have been made simply from the wrong electrode being used.

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## Electrolysis.

### SEXUAL IMPOTENCE IN THE MALE CURED BY ELECTRICITY.

When a patient comes to me with a dull headache, suffering from forgetfulness, pain in the back and loins, palpitation of the heart, weak and dizzy, cold feet and hands, and with a feeling of impending danger, an anxious expression of countenance, with a tendency to melancholy, always feeling tired, drowsiness, yet unable to sleep, I always expect to find sexual disturbances.

Men, young and old, married and single, come to us complaining of the above symptoms, and, if closely questioned, they will tell us they do not have the same keen desire for sexual intercourse they had a few years ago.

One will tell us he cannot get an erection. Another that he is all right till he comes in contact with the opposite sex, when suddenly an imperfect and unsatisfactory orgasm terminates the whole business, while the organ at once becomes cold, flacid, and all the coaxing of the most passionate woman fails to erect it again for copulation.

The late Dr. Van Buren once remarked: "If a man cannot get

an erection, he will give his last dollar and suffer any amount of pain to be cured." It is true. He will rush off to some quack who advertises to cure just such cases, pay out his money, till he finds he is no better, then jump into the dock.

Men value the sexual function above all things! Many a good man has gone to ruin because he thought he was impotent. The treatment of these cases should become a serious consideration with us. We all know the treatment laid down in books, but do we all know what a great help we have in electricity? In the judicious use of electricity, the proper battery, the right current, the mode of application in each case (no two perhaps need the same treatment), we have the best therapeutic measures known to-day. A case in point will illustrate the condition of which I speak.

Last winter, O. P——, came to me for treatment. He was but 32 years old, and came from Cuba. He had read medicine here, and graduated. He married a beautiful girl, and took a trip to his own home.

He came to me as near crazy as could well be. He told me that during his whole "honeymoon" he had not once been able to have connection with his wife. He could not get an erection, and notwithstanding she had been very kind, and worn herself out trying to bring him up to a sense of his duty, she could not! What made it worse and more humiliating, was that after he had gone to sleep, disgusted with himself, swearing he would cut the offender off, he had a seminal emission.

Here was a "pretty how d'ye do." I saw the wife and had a long talk with her. She agreed to help me, and took a room by herself. I put him on the usual treatment, and at bedtime gave him grs. v. of monobromide of camphor.

At night I applied the galvanic battery, eighteen cells, the negative pole to the spine. In the morning I applied static electricity to the penis and testicles for five minutes, then to the spinal cord, drawing *three-inch* sparks for fifteen minutes more, then back to the penis. This caused the blood-vessels to distend, and the whole penis, that had been so cold and pale, would become distended and assume a deep red color, and as proud an erection as an alderman could wish for.

Every third day I applied ten cells of the galvanic battery to the prostatic portion of the urethra (this was to diminish the excitability of those parts). In ten days the nocturnal emissions ceased. After he awoke, he was made to walk five miles, then electricity, a bath, then breakfast. This was kept up for three weeks. He slept well, and awoke with an erection nearly every morning. He wanted to go to see his wife (who had gone in the country to live with a friend); he wanted to show her he had something to be proud of, but I kept him to his work for three weeks more. It is enough to say he is cured. He tells me now he is always ready and willing.

She tells me that: "Last month I did not come around as usual, and am *so* sick every morning." I believe this patient owes his restoration to health to electricity properly given. Anyhow, I have had others and treated them without the electric current, and they were never cured. They were helped, but far from a cure.

Since the above was written, I have delivered the wife of a fine daughter and am engaged to attend her again next month.

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## Why So Many Fail in the Removal of Hair.

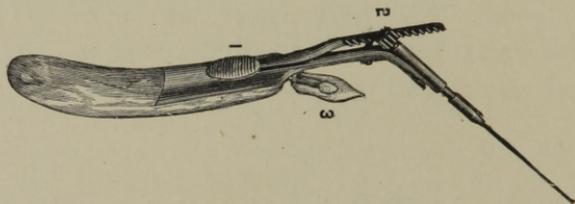
The question often arises "Why is it so many report an utter failure in removing the hairs from the face?" After looking it over with much care, I have been forced to the conclusion that the trouble lay, first, in the battery; second, the current; third, the needle, and fourthly, in the want of proper care, and the perfect ignorance of the operator on this one subject.

Some two years ago, a doctor called to see me and insisted the whole thing was a fraud. Said he: "I have tried it several times, and always fail, and I know of others who fail as well as I." Said he: "If you will take these hairs from between my eyebrows, I will confess I am wrong and you are right." In twenty minutes the hair had all been taken out, and he was enthusiastic. He showed me how he had tried it, and of course he failed.

When I first began to treat such cases I used a round needle. Then I learned the broach I now use was far superior. Again, I

found if I drew the temper, and bent the needle at an angle of about thirty-five degrees it would work easier. I then had another electrode handle made, like the cut below (the St. Clair handle), for this reason. I found if the needle could be turned while pressing against the flesh it entered very easily, and gave less pain. With this handle one can turn the needle the same as a drill, and when it is in situ the connection is already made. Should the day be dark, by pressing the little finger the lamp is lighted, and a strong light is thrown on the spot and plainly shows the direction of the hair under the skin.

The main thing is to have the point of the electrode in the hair bulb, and not outside of it. Figure No. 39 (for which I am indebted to my friend Dr. Wood, who employs electrolysis in his bath rooms



St. Clair Electrode Handle.

for the same purpose,) will show at once the proper and improper method. If it is outside the bulb it does no good, while if inside it *must* kill the hair. It will be found that one hair may slant one way and the next may slant directly the other. For this reason alone it is necessary to have a good light. If the day is dark I use the little electric lamp.

Then it is of importance in what position the patient is made to sit to make it easy for both patient and operator. The cut No. 38 will show the best position I know of. (This cut is also from Dr. Wood.) It is as easy as to sit in a dentist's chair, and is easy for the operator. With practice, care and close observation of the rules laid down in this little work, any physician may perfect himself in the operation and never fail. The first time a few hairs will grow again. But after one has tried his hand at three or four patients he will get nearly every hair the first time. PATIENCE! Do not be in

too great a hurry. See that your battery is all right, give mild currents, and, my word for it, you will succeed.

## Removal of Hair and Blemishes by Electricity.

There have been a great many chemical mixtures prepared and sold in every part of the country claiming to PERMANENTLY remove



Fig. 38. An Easy Position.

superfluous hair. These mixtures are all frauds, so far as their *permanency* is concerned. In nearly all these preparations quicklime and arsenic have been the principal ingredients used and they are

not only decidedly poisonous and injurious to the skin, but are deceptive, from the fact that if carefully used they will remove the hair for the time being, the growth, however, always returning coarser and more disagreeable than before. These preparations have no effect whatever upon the roots, except to stimulate their growth, the same as shaving would.

*Electrolysis* is the only operation that will *permanently* remove superfluous hair, and even in this much skill is required in order to make it entirely successful.

The engraving below illustrates how the needle may be inserted without killing the hair, and also the kind of insertion that is sure to permanently destroy in every instance, *C* being the improper insertion and *D* the correct one. The secreting surface that furnishes the nourishment for the development and growth of the hair is at the end of the root, which is usually from one-eighth to three-sixteenths of an inch beneath the surface of the skin. This follicle must be totally destroyed, otherwise the operation is of no avail, but when once destroyed it never re-forms.

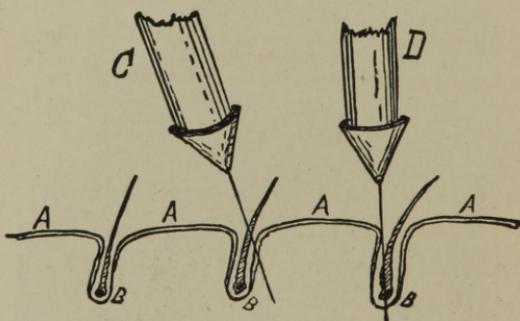


Fig. 39.

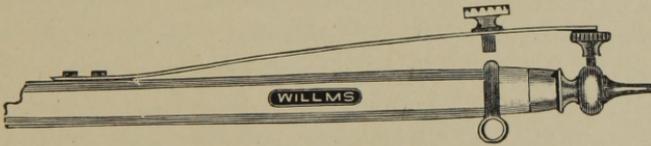
This engraving is highly magnified to better illustrate the manner of the operation. *A, A, A, A*, is the surface of the skin. *B, B, B*, is the end of the root and point to which the needle must go in order to effectually and permanently destroy the growth of the hair.

The number that can be removed at one time ranges between

twenty and fifty, the number of treatments corresponding with the whole number of hairs to be removed.

Some claim that removal of hair by electricity is not electrolysis. They claim that the heat generated in the needle by the passage of the electric current is the active agent in the destruction of the follicles, and the term electrolysis is a misnomer. One claims that "akido galvano cautery" is a more correct term. Now, while it is true that in this operation the temperature is slightly raised by its resistance to the galvanic current, it is not raised to such a degree as to be caustic in its action.

The frothing at the mouth of the follicles shows plainly that there is a decomposition of water and salts contained in the tissues taking place around the needle, consequently the escape of hydrogen. This is electrolysis. Some operators use two needles, some use one large needle, and some pull the hair out and insert the needle afterwards. The operation is a simple one, and any physician with a steady hand and a good eye can do it.



Chisolm's Electrolytic Needle Holder.

The advantage of using a fine broach is two-fold. First, it is not so stiff, and enters the follicle much easier, and being fine, you will have no wheals or pustulation. I have had no scars since I used the broach, and inserted the same before pulling out the hair.

The growth of hair on a lady's face, while it will never kill her or injure her health, is often a source of great annoyance. I have known ladies to pull out every hair by the roots, which caused their faces to be sore and red, yet they preferred that to the unsightly hairs. Soon the hair would all grow in again. There is but one sure, and at the same time safe, way to destroy this offensive growth, and that is by *electrolysis*. The *modus operandi* has been so often described one would think every one at all acquainted with the

battery would know how to do it without another word being said on the subject; but as this book is for beginners, I will tell my way of doing it. A galvanic battery is the instrument to be used. Any good make will do. Upon the style of needle used depends, in a large measure, the success of the operation. I use a fine, flexible, steel broach, such as dentists employ in extracting a nerve from a tooth. I have a needle-holder, very small and neat, with a circuit breaker that can be worked with the fingers of the hand holding the instrument. This holder must be attached to the *negative* pole. The positive pole should be armed with a sponge-covered electrode, and held in the hand of the patient. The number of cells to be employed depends upon the activity of the battery, the delicacy of the patient's skin, and the strength of the hairs to be removed. From three to eight cells of a zinc and carbon battery will do. Now that we have battery, needle and everything ready, the next thing is to get the patient in a proper position. Remember this is a long operation, and both operator and patient will be tired before it is over with. I prefer a high, reclining chair, one upon which the head can rest without exertion to the patient. The operator's eyes should be on a level with the patient's chin. He should sit with his eyes from the light, and the patient should face the light. Now we are ready. Insert the needle into the follicle beside a hair. Did it cause pain? If so, you did not do it right. Try again. That's better. Now close the circuit with the finger. In a few seconds you will see a slight hyperemia around the needle. That shows you the electrolytic action is going on, and soon it will give place to a blanching of the skin, and a little froth will appear at the mouth of the follicle. Now break the circuit and, with a small pair of forceps, seize the hair. If properly done, it will come out easily. This is all there is about it. Repeat with each hair till you are through, or till you are tired, and then leave the rest for another day. Many have written me saying *they* do not succeed. I am certain it is due to want of proper care. It requires patience, and one should never remove over fifty hairs at one time. It tires the eyes and the patient as well. If the operation is skillfully performed, there will be no scars. Some try to operate on two coarse hairs at once. This is a mistake, as nine times out of ten it will produce minute punctate cicatrices. Do

not think every hair will be killed, for about twenty to thirty per cent. will come back, and have to be operated upon again, and even the third time. But you will be pleased, and so will your patient, to find, when you are through with her, that her face will be free from her bugbear in life, and as smooth as any other face. Your next case will come easier, and after two or three times you will find only from two to three per cent. come back after the operation. Fig. 39 shows the right and the wrong way. Keep your needle bright, and never use the same needle on two patients. They are cheap. I once saw a bad face caused by the needle having been used on another patient. When through with a case, throw the needle away.

I will give one or two cases where hair from moles gave great cause for complaint. Miss —, a lady of 37 years, came to me with one-half of her upper lip covered with a black mole, filled with long, curling hairs. She had pulled them out, cut them off, and for the last three months had been treated by an eminent dermatologist. He had applied some kind of a depilatory, that had taken the skin off, but had not cured the trouble. I removed thirty-seven hairs the first day, and two weeks later found sixteen more had come back. These I removed, and to-day [that was six years ago] her face is the same as that of any other lady. The black mole has gone, and only by the closest inspection, and by one who knows what he is looking after, can any scar be found. I will speak more about moles in another place.

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## Nævi Materni.

All birth marks, port-wine marks, (true *nævus*) are believed by the patient (and, I am sorry to say, often by the physician), to be caused by maternal impressions. This I do not believe. But, be that as it may, they can all be removed by the galvanic current, removed without pain, and no unsightly scar left behind.

For this operation you use the galvanic current, current controller and milliamperemeter. The positive pole should be armed with a

sponge-covered electrode, and the negative pole armed with an electrode made for the purpose.

The electrode I use was made by Haslem, of Brooklyn. It has a small hard-rubber handle, with twenty-five slim needles projecting about one-half inch from the distal end. A hard-rubber sleeve slides over the end that can be adjusted at will, leaving the needles projecting the desired length, from the slightest pricking to the thickness of the skin, which is about right.



Fig. 40. The Haslem Electrode.

Let the patient take the positive electrode in the hand, and, after starting the current at about three milliamperes, place the *negative* electrode, with the needles projecting as much as is necessary in the case in hand, firmly on the mark to be removed.

Now close the circuit by pressing the spring on the handle, and keep it there for from three to five minutes.

Soon all the action of electrolysis will be seen. Should it hurt the patient too much, lessen the current. Have the patient come again in ten days, and repeat if necessary. Should the electrode not cover the whole *nævus*, do not move it around, but leave the rest for a future seance.

Mrs. R., from near Buffalo, brought her little daughter, aged six, to me with a *nævus* about the size of a silver dime. It was not red as most of them are, but looked blue like a vein. My electrode just covered it, and I turned on three milliamperes for five minutes.

One week from that day I repeated the operation, but kept the current on for eight minutes. The *nævus* disappeared, and to-day (three years since), there is not the slightest scar to be seen.

Miss M., came to me with a mark on her neck. She was eighteen years old. It looked like Jersey clay mark. She complained that every one who saw her wearing a low-neck dress would say to her, "Miss M., your neck has a muddy spot on it. Let me take it off with my handkerchief." It had become a source of great annoyance to her, as she had a fine neck and bust, and fashion said she must show

them. I removed it without a blemish in three sittings and she is happy.

These are blemishes which they are willing to pay well for having removed, and they bring other patients of the same kind.

One case that I have always taken pride in I will give, and then leave the subject.

William C., aged 14, lives in the country, among those who think anything of the kind to be a dispensation of Divine Providence, and to interfere with it is to fly in the face of the Almighty.

A friend of mine saw the boy and said to him: "That can be taken off." While he was anxious to have it operated on, his friends counselled him to let it alone.

The whole side of his face looked like liver, and around the mouth several small, warty tumors made it look as though one corner was an inch lower than the other. He was poor, and they wrote me and wanted to know what it would cost? I went near there to spend my vacation, and took my Barrett battery along.

I began treatment on the first of August, and I finished it the 15th of September. The tumors, or warts, took longer to get rid of in proportion than the rest. There are three very slight scars around the corner of the mouth, but the rest of the face is as fair as the other side.

Large hair moles on the face should always be removed, but if they are out of sight and do not trouble the patient I advise him to let them alone.

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## Electrolysis in Gleet.

I have found electro-therapeutics to be of great advantage in the treatment of old chronic cases of gleet, and have found no great trouble in curing them after all other methods had been tried and failed, and the case had been given up.

In such cases where there is no stricture and it does not show any narrowing of the canal, I can always detect tender spots. I always mark the locality of each spot, knowing the mucous lining is

more or less destroyed there, and, when measured and marked, I know where to find them again when ready.

A mild electrolytic current has a stimulent effect on these spots. It acts like a tonic and is energetic in the process of healing, even when deep excavations are found.

The current must be mild, *never* strong. Let the patient pass his water before the introduction of the electrode, and begin with five milliamperes. Be guided by the ability of your patient to take electricity, and, if thought best, run it up to ten milliamperes. Ten minutes is long enough for once, and should be repeated in ten days.

Do not give injections of any kind. Should there be pain to prevent sleep give a suppository—one of the many made for cases of this kind. You will seldom require to do even that, providing the patient is abstemious and drinks no coffee.

Case—George A., aged 30, sailor, had been treated for a year for chronic gleet. He came to me during the blizzard. He was greatly run down and in despair. I looked the ground well over, and said to him, "If you will do as I tell you, and give me all the time I need, I will cure you."

This he promised to do, and I began. I took my Barrett galvanic battery (Fig. 3, pp. 12), and armed the *negative* pole with a bougie, and placed the positive pole in his hand. I began with five milliamperes, and did not increase it. I gave him a mild tonic, saw to the bowels, and directed some attention to the kidneys. Ten days later he came again. I repeated the operation, and gave him ten milliamperes. He came in all six times, and he has had no trouble from the gleet since. He did have gonorrhœa, but it was cured without trouble and with no return of gleet.

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## Electrolysis in Ranula.

The peculiar disease of the sub-lingual gland known as ranula, is one often met with, and I think could be treated by the beginner. It is a tumor formed by the obstruction of the excretory duct and the retention of its peculiar secretion. It never becomes very large,

seldom as large as a marble. If it reaches the size of a pigeon's egg, it will impede articulation, and sometimes deglutition.

It is not hard to diagnose. It has a grayish, translucent aspect, like the belly of the frog. It contains a glary, ropy fluid, and is sometimes similar to the synovial liquor of the joints.

It is found most in children and young people, but I have seen it in a patient 50 years of age. Should there be any doubt as to its being ranula, the exploring needle will settle it at once.

This ranula can be cured in two ways. The cautery battery will take the whole gland out, with but little loss of blood, but leaves quite a bad sore to heal.

I prefer to remove it by electrolysis. Two needles attached to the *negative pole*, one being inserted from either side, till both are in the tumor, and the positive pole can be held in the hand of the patient. Begin with 10 milliamperes, and watch the tumor; increase the current to 15, and up to 25, if the patient can stand it and it becomes necessary. Ten minutes is long enough for one sitting, to be repeated in two days. This will be found the safest way to rid a patient of this troublesome tumor, and will never fail, if proper care is taken.

Mrs. H., brought her little daughter to me, saying she had been told the child had a cancer, and she feared she would die. Her mother had died from a cancer in the breast, and she was very much alarmed. I examined the little girl (7 years old), and saw at a glance I had ranula to deal with.

I operated then and there. I used but two needles, as the mouth was small, and the tumor was also small. I gave but twelve milliamperes, and for ten minutes only the first day. I repeated the dose every other day for three times, and cured the ranula without trouble. Any physician with a good battery, living in a country town, can cure these cases just as well as to let them go to some large city.

I went up the Hudson about 100 miles to operate on a large tumor for Dr. B—. After the operation he asked me to look at a case that had given him a great deal of trouble, and that had not given in to treatment.

The patient was a lady of 54 years, well preserved, who had a disease of the glands of the mouth. The history, as told by her, was this: "About a year ago my mouth began to water, and it has gone on from bad to worse, till now I cannot talk unless the water runs from my mouth in streams. I have to keep a cloth in my hand to catch it, or my clothes would be wet all the time."

On examination I found it as bad as she said, and worse. If she held her mouth open, and leaned the head forward, the water ran from it the same as in water brash—clear, with an acid reaction.

When she pushed the tongue back in the roof of her mouth, little jets came from the ducts like a small syringe, and would jet outside the mouth three inches. This would be repeated every time she moved the tongue.

The mouths of the ducts were open and very large, with a cyanosed expression and slightly swollen. I had never seen anything like it, nor had I ever read of a case like it. I had my cautery battery with me, and decided to cauterize at once.

I took a piece of platinum wire (No. 60), and doubled it over a table-knife to make it as slim as possible, and, after heating it to a white heat, I inserted it in each duct about a line. The fountain-like action stopped at once.

The next morning she came and reported a comfortable night. (Before this her pillow would be wet, and she kept cloths in her hand all night to keep the pillow dry, still the pillow would be wet.) Her mouth would fill, but she was so much better she was delighted.

I again cauterized them, going deeper than the first time, using care not to injure the glands and nerves under the tongue. I came away that day, and never saw her again, but Dr. B— reports the case cured from that date.

A few weeks ago a lady came to my office, aged 27. She had the same trouble. She could not speak without the water running in streams from her mouth, and the same fountain-like action when the tongue was turned back.

I treated her as I treated No. 1, with the exception I used the dome wire in this case, and saw her four times. I do not know what

to call the disease, but I do know the electric cautery will cure it. Both these cases had been treated for a long time, with no good results.

#### A GOITRE CURED BY ELECTROLYSIS.

Mrs. T., came to me with a large solid goitre. She is a Swiss and came to this country ten years ago; age 36; has had four children and has had two miscarriages.

The goitre first made its appearance soon after the birth of her first child. As many women in her country have goitres, she believed it had come to stay, and had never even thought it possible to be cured, until long after coming to America.

It was large, and covered both sides of the neck, and hung down over the clavicle. I used my large 36-cell galvanic battery, and armed the positive pole with a sponge-covered electrode (covered over carbon); this I placed over the nucha, and the negative pole I armed with three needles made of gold, and insulated to within three quarters of an inch from the distal ends.

The needles I use are spear shaped, made wide and quite thin. The needles are in separate holders, so one may be introduced at one angle, while the others may be inserted from any direction thought best, and to any desired depth. The first day I used but two, and for eight minutes. The patient did not complain, but wanted me to continue till it was all gone.

Ten days later, I used three needles for five minutes. She came ten times; the goitre was cured, with no scars to be seen unless closely inspected. But for fear of wounding some of the large blood vessels, no doubt it could have been decomposed in less time.

I see some advise in "cystic" varieties to introduce needles from both poles. I have never had one, but should say that would be the right way to do. Has any one tried it? If so, I would be glad to know the result.

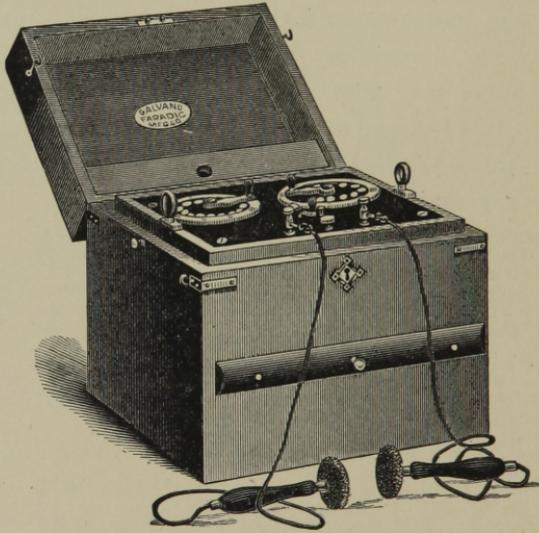
#### A LIPOMA OF THE NOSE CURED BY ELECTROLYSIS.

Mr. C., aged 54 years, came to me, with a large tumor on the end and left side of his nose. There was marked hypertrophy of the integument, and had developed very fast.

It had a lobulated appearance, and looked like a small boxing

glove fastened to his nose. It had been nearly painless in its growth, but had nearly closed the nostrils, so it was with the greatest difficulty he could eat or drink, as he must get his breath through his mouth.

He had been treated for two months, by sorbefacient applications and purgatives, but it continued to grow, and to grow fast. To remove it by excision was to encounter severe hemorrhage, owing to the enlargement of the cutaneous and other vessels. (There have been a few cases reported where the patient died from hemorrhage). I decided to remove it by electrolysis.



No. 41. Galvano-Faradic Battery.

Dr. H. assisted me. The positive pole, armed with a sponge-covered electrode, was placed over the right side of the neck. The negative pole, armed with three needles (each with its own cord, that one or more could be used as desired). I gave it eight-cells for six minutes, with all three needles, pushing them through the tumor, and he did not even wince. I used figure 41, a first class battery in every way.

The next seance was five days later, when I used six cells and only two needles, for five minutes. This was repeated every five

days for three weeks. I destroyed all the tumor, and the nose looked nearly as well as before he had the tumor.

There were a few scars, but nothing very bad. There was not a tablespoonful of blood lost, and he stood it without a murmur. The mass was firmly adherent to the cartilages of the nose, but with care, I did not injure them at all. It is best to go slow, use as few cells as will do the work, and have short sittings.

#### HOUSEMAID'S KNEE CURED BY ELECTROLYSIS.

Charles S.—, aged 16, and a boot-black, came to me with a soft and fluctuating swelling, hemispherical in shape, unaccompanied by discoloration of the skin, and enlargement of the subcutaneous veins.

There was some soreness, caused from over exertion at his work. It had been diagnosed as a "venous tumor," but the absence of the bluish color, and no pain through the femoro-tibial articulation and not being partly effaceable under pressure, and no hypertrophied and varicose veins, led me to decide it a housemaid's knee.

I decided to perform electrolysis upon it, and I did. I inserted three needles (*negative* pole), and the *positive* pole was placed on the calf of the leg. The current was turned on, and kept on for eight minutes. The boy was the whole support of the family, and could not remain in bed.

The operation was repeated in six days, and every sixth day for five weeks. The tumor entirely disappeared, and the knee is as good to-day as the other one.

The great advantage of the treatment in this case was that he did not have to quit his work (though he did not kneel down), and was not confined to his bed. Then the pain was not so bad as if it had been cut, and the cure is perfect.

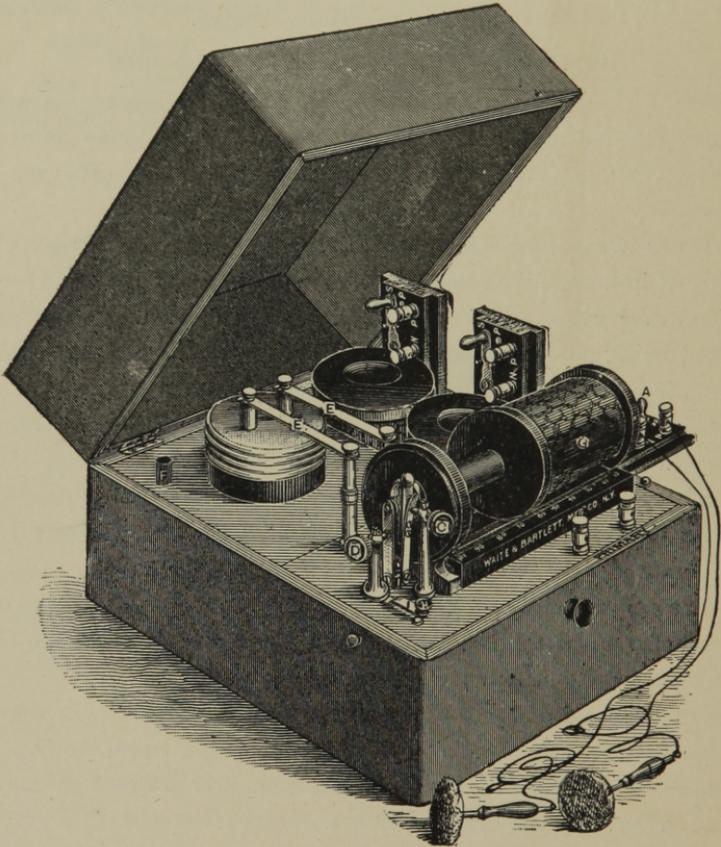
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## Treatment of Stricture.

What is stricture of the urethra? It is a pathological condition of the urethra from various causes, in which the calibre is so narrowed or contracted that micturation is difficult and at times impossible.

There is spasmodic, inflammatory and organic stricture.

You will meet with spasmodic stricture where it will be impossible to determine the cause. It may result from irritation, masturbation, acid urine, pyelitis, diabetes, cystitis, or nervous debility.



Waite & Bartlett Faradic Battery.

If you treat spasmodic stricture, do not give the galvanic current, as it will do no good, and may make it worse.

Take your faradic battery. It will help to confirm your diagnosis, and will help to overcome the spasm, and perhaps remove the trouble entirely.

In inflammatory stricture the calibre is narrowed by the product

of the inflammation thrown out by exudation, and is *inside* the mucous lining. It may be complicated by granulations. It becomes necessary to thoroughly understand the pathological condition if you wish to become successful in its treatment by electrolysis. The in-

flammatory stricture requires a much milder current to effect chemical decomposition than the organic stricture for the reason given above.

If there be symptoms of syphilis in any stage electrolysis should not be employed until after constitutional treatment has put the patient in proper condition to receive it.

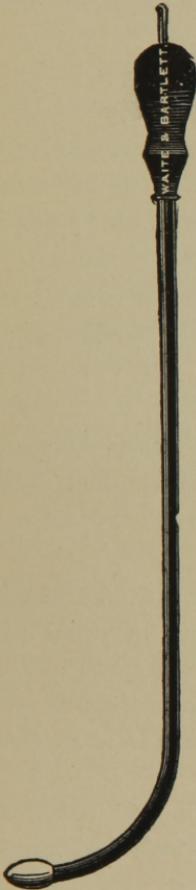
First, find the condition of the urethra. Take a sound nearly as large as the meatus will admit, and gently push forward till you reach the stricture. Now measure exactly in inches how deep down it is, and register it so you will remember it. Now find how large a sound will pass the stricture and the length of the constricted part.

This done, find if there are any more, and, if so, how many, their distance and the length of each.

Organic stricture, you will treat the same as inflammatory. You may need a stronger current, but not much. The current should be mild for any stricture, as too strong a current will act as a cauter, instead of electrolysis.

The treatment of stricture of the urethra, up to within the last few years, was purely a surgical operation, a painful one, and often a very uncertain one. To Dr. Robert Newman, of New York, is due the credit for what is known about the treatment of stricture by electrolysis. To-day, stricture is treated by electricity without pain, and when treated correctly, is cured in almost, if not in every instance.

The *modus operandi* is this. First, find out how many strictures the patient has, their condition, and decide the size of the bulb you intend to use. (It is well to use a bulb two sizes larger than the



Newman's Sound.

stricture, unless it is very hard and fibrous). Now let the patient stand up before you, and after lubricating the bougie with glycerine, not' oil, gently pass it down to the first stricture. Remember, he is to hold the sponge electrode of the positive pole in his hand, the negative pole is inserted in the penis, in the form of an insulated electrode, with a bulb at the end uncovered.

Start the current and slowly increase the strength, one cell at a time, until there is a slight pricking sensation. Never cause pain or a burning sensation; if you do, it will act as a galvano caustic. Never use force when you introduce the bougie, as it is due to the rough handling of instruments that urethral fever follows an operation. Let the instrument pass in almost by its own weight.

When the operation is complete, reduce the current slowly, one cell at a time, till the slide is at zero, and remove the bougie before you lift the elements from the fluid. In this way you will avoid a shock to the patient,

The bulb will be found covered with a white frothy substance that looks like coagulated albumen. This is the product of the stricture. The operation should be repeated again in from three to four weeks.

Strictures of many years standing can all be cured, and without pain. I have had patients come to my house who could pass urine only by drops, and after one operation could pass a good stream, and this without any pain. Certainly the profession owes much to Dr. Robert Newman, who has done so much to make this a perfect operation by electrolysis.

*Points to be remembered.* The positive pole to be held in the hand of the patient. The negative pole ending in a bougie insulated to the end and tipped with an egg-shaped bulb, inserted with great care to the stricture. Plunge the battery before you introduce the bougie. Use a weak current. Never inflict pain. Never use two sizes at one seance. Do not force the bulb through the stricture, but let electricity do the work.

G. F., aged 34 years, came to me, had led a wild life among the Creoles, south; could not pass a stream of water—it came away in drops with much pain and great straining. A No. 11 sound passed

into the urethra easily, but found a stricture four inches down. I passed a No. 3 sound with difficulty and found another stricture two inches further down. Galvanism was applied with the positive pole in the hand. Eight cells were used, and in thirteen minutes the bulb passed all the strictures. It caused him no pain, and he passed a full stream in ten minutes. Three weeks later he came and I renewed the treatment for six minutes. He has had no trouble since. That was one year ago.

The one great thing to remember is this. The negative pole is the one always to be used for the absorption of stricture. The positive pole should be armed with a carbon, covered with sponge, well moistened and held in the hand. It may be placed against the leg, but I prefer the patient to hold it in his hand.

I have just finished a case that will illustrate my meaning, and he is one that can be seen by any person if they doubt the perfect cure. W. K., aged 28, has had stricture four years; has been treated by dilatation, and has been cut twice. I found three strictures, all of them hard and fibrous.

At two inches, a soreness was encountered, which I diagnosed, by aid of the endoscope, as granular urethritis. Jan. 12th, with ten cells, the bougie (No. 8) passed the first stricture in three minutes, the second in five, the third in two minutes. He immediately passed a fair stream, passing a spoonful of decomposed stricture. Feb. 8th, I passed No. 11 through in about the same time, with no pain whatever. March 9th, I used No. 15, and April 2nd No. 17 was used, and passed nicely.

This was in 1886. He has been well, and has had no trouble. Last week, I again passed the same size I last used, and found the urethra had retained the calibre of 17. I pronounced him cured, as the urethra is small, and to go a larger number would be wrong.

Will any fair-minded man say it would be better to cut that patient, simply because our grandfathers cut? Remember, he *had* been cut twice (the two first ones), and they were much harder to absorb than the last one that had not been cut. The man had suffered the agonies of the damned, had spent hundreds of dollars to get relief, yet was cured by electrolysis without pain, was

relieved in a few moments, and was able to go about his business from the first. It appears to me there can be but one answer to the question, "Can stricture be cured by electrolysis without pain?" Yes. "Does cutting cure?" No.

I like the bougie designed by Dr. Newman. Some use a bougie with the olive at the end fitted with a thread to remove and replace with any size desired. I do not use them now. I have known the olive to come off during an operation, and it is not a pleasant thing to happen. It is better to have each one complete in itself, then there can be no such accident.

When the stricture is near the meatus, or not more than six inches down, I employ a straight bougie. It is much more convenient and easier to manage. They come in sets, or you can buy such sizes as you think best to have.

I could give at least one hundred cases in my own practice where a cure was made. I call a patient cured when he has no trouble; when he can pass a good stream with force, with no pain, and when he tells me, "Doctor, I never think of it now; I am as well as ever."

Case 96 on my books. Chas. H., was sent to me from up the North River, some one hundred miles, by Dr. B. I found three strictures, with whalebone bougie, *a boule*, at two, four and six inches. I used a bougie electrode No. 11, and with ten milliamperes went through them all in eight minutes. He passed a good stream immediately, with about a teaspoonful of the product from the decomposed stricture. He returned home, and about a year later Dr. B. wrote me that he was not troubled at all, and would not come again.

The following is from the pen of Dr. Newman, in his reply to Dr. Keys, in the *Philadelphia Medical Times*, of December, 1888.

"I myself have practiced this method successfully for nineteen years, and off and on have honestly reported cases which were complete for such purpose. Hundreds of cases could not be used for publication, because the cases were too incomplete; many having been seen only once in consultation, or operated on only once or a few times; many were lost sight of, and almost all of the charity

cases in hospital and dispensary were even unknown by name. But the two series of one hundred cases each will stand on record, as I had previously reported cases in detail. The first 100 cases were selected particularly to show that no relapse had taken place; they were not consecutive cases, but collected from consecutive cases to meet the following conditions: The patients were to have been under treatment regularly for a reasonable time; they were to have been discharged as cured, or at least so improved that the patients were content with the result, and did not wish any further treatment or improvement; they were to be cases that were heard of afterwards, by reliable information, and mostly re-examined; a reasonable time having elapsed between the discharge when cured and the re-examination, which in these cases were respectively three to eleven years.

“The proof of ‘no relapse’ was that the same sized sound was used in the re-examination which passed the last time at the close of the treatment. In the report of my second 100 cases I have omitted under result the word, ‘cured,’ purposely, because there is a diversity of opinion as to the meaning of the word ‘cure.’ Some surgeons insist that there cannot be a cure admitted unless the urethra will admit a No. 40 sound, and we have seen that the cutting has even been extended to a No. 44. My idea of a cure was, however, when patients were dismissed, or stopped treatment themselves because they felt comfortable and well, had a calibre of the urethra which enabled them to void freely a good-sized stream, and, if wanted, could exercise sexual intercourse. Therefore, to suit my fastidious friends, I omitted the word ‘cure,’ and instead stated to what degree they were improved, and the size of the number to which the calibre of the urethra had been enlarged, etc. For the details of such results, I refer to the original papers, ‘Tabular Statistic of One Hundred Cases of Urethral Strictures Treated by Electrolysis,’ *New England Medical Monthly*, August, 1885, and ‘Synopsis of the Second One Hundred Cases of Urethral Stricture Treated by Electrolysis, with Cases,’ *Journal of the American Medical Association*, September 25 and October 1, 1887.

“I am well sustained in my report of several hundred cases in a record of numerous cases by an array of physicians from all parts

of the world, among whom I will mention, Drs. W. F. Hutchinson, T. F. Frank, David Prince, Jacob Butler, J. M. Glass, A. T. Douglass, D. O. Farrand, A. J. Wolff, J. B. Green, G. C. H. Meier, F. F. Dickman, R. J. Nunn, T. F. Sanders, J. Craft, A. J. Wolff, Jr., W. C. Wile, Benson, Edw. J. Smith, R. W. St. Clair, J. H. Kellogg, G. W. D. Patterson, T. H. Burchard, L. Wolf, J. J. Berry, W. T. Belfield, Geo. E. Pitzer, C. A. Bryce, G. W. Overall, and W. R. D. Blackwood in the United States; next comes Canada with Drs. C. R. Dickson, J. J. Cassidy, Dr. Rosebrough, A. Laphorn Smith; and eminent surgeons in Great Britain; among them are W. E. Stevenson, W. Bruce Clark, Edwin Morton, T. J. Hayes, T. Swinford Edwards, etc., etc. A recapitulation of this bibliography is also in the *New England Medical Monthly*, December, 1887. Suppose now that some cases have been reported prematurely as success in an overflow of enthusiasm—I do not say they have, I only suppose that it may have happened—suppose even that some have suffered a slight contraction in after years—there are certainly enough left by hundreds of cases, and if tabulated they probably will swell to thousands, which stand as a solid phalanx, as an unquestionable proof of success, which cannot be overcome by a few failures, even if such cases were fairly conducted according to established rules of surgery and electricity.”

Successes of electrolysis in urethral strictures are on record in abundance, as stated above, and at the present time more documentary evidence is received, which I intend to reserve for another occasion.

Dr. Newman gives the following directions for the management of the battery, etc.:

1. The *battery* needed is any good, steady *galvanic* battery.
2. The *fluid* for the battery ought not to be too strong.
3. *Rheostat* and *galvanometer* attached to its batteries are convenient niceties, but, for our purpose and the battery used, *not* necessary.
4. For the positive pole a carbon electrode is used, covered with sponge, moistened with warm water, and held against the cutaneous surface of the patient's hand, thigh or abdomen.

5. For the absorption of the stricture, the negative pole is always used.

6. Electrode bougies are firm sounds insulated with a hard-baked mass of rubber; the point is a bare metal bulb, egg-shaped, which is the acting part in contact with the stricture. These electrode bougies are made by Waite & Bartlett.

7. The curve of the bougies is short; large curves are mistakes.

8. The plates must be immersed in the battery fluid before the electrodes are placed on the person; and raised again after the electrodes have been removed.

9. All operations must begin and end while the battery is at zero, increasing and decreasing the power of the current slowly and gradually; avoiding any shock to the patient, or any interruption to the current.

10. Before operating, the susceptibility of the patient to the electric current should be ascertained.

11. The problem is, to absorb the stricture, not to cauterize.

12. At first it is best to operate only by the first method of absorption: *weak currents at long intervals*.

13. The exact number of cells to be used cannot be given; it must be regulated according to the work to be done. As a general rule, two to six cells may be used.

14. The seances should be at intervals, not too frequent in succession.

15. The best position for the patient to assume during the operation is that which is most comfortable for him and the operator. I prefer the erect posture, but the recumbent or others may be used.

16. Anesthetics I like to avoid; I want the patient conscious, so that he can tell how it feels.

17. Force should never be used; the bougie must be guided in the most gentle way; the electricity alone must be allowed to do the work.

18. During one seance, two electrodes in succession should never be used.

19. All strictures are amenable to the treatment by electrolysis.

20. Pain should never be inflicted by the use of electrolysis;

therefore it should not be applied when the urethra is in an acute or even subacute inflammatory condition.

A SUB-PERITONEAL HÆMATOCELE TREATED BY ELECTROLYSIS, THEN  
ASPIRATED.

Mrs. D. was taken very ill with severe pain in the pelvis, vomiting, coldness of the extremities, metrorrhagia, and interference with the bladder. I was called to see the patient at the end of the second week.

I found her very low, great exhaustion, extremely pale, constipated, a tendency to chills, and much tympanites. The uterus firmly fixed, and the vaginal canal almost entirely closed. The uterus pressed out of position, upwards and forward.

Rectal touch showed the bowels closed by pressure of the tumor. She had peritonitis, pelvic cellulitis, and in short the whole pelvic cavity had become involved in one mass of inflammation. The pulse 135, temperature 104½. She could keep nothing on her stomach. I ordered Beef Peptonoids. (Reed & Carnrick's). And let me say here it was the only thing she could retain for days.

I also applied a blister over the hypogastrium, gave an opiate and promised to see her the next day. The next day I saw her in company with Dr. Woodruff. Dr. W. said "hæmatocele." The next day I saw her with Dr. Alex J. C. Skene, who confirmed the diagnosis.

It was decided to perform electrolysis, which I did, and as it was in the late stage, I used the negative pole to promote absorption. I started with 25, and ran it up to 100 milliamperes. As soon as the serum became separated, I used the aspirator, then followed with positive galvanism, ending by galvano-puncture, to hasten absorption.

This book is intended only for beginners, and I did not intend to take up work of this kind, but leave it for a later work or, perhaps better still, refer them to able works already published on the subject.

Hæmatosalpinx, hæmatoma, hæmatocele, and all this class of work, should be attempted only by an expert, and does not come within the limits of work for beginners. On the last page I shall

mention the works that will give all the information on these and kindred subjects known up to the present time.

Doctors in the country often meet with pelvic exudations, adhesion and contractions of long standing. The patient cannot go to an expert, nor pay him to come to them, consequently the doctor has to depend entirely upon himself. The solidified, immobile condition found in severe pelvic peritonitis or cellulitis can be overcome by patient administration of the galvanic current of high intensity. In many instances it will be found necessary to carry it up to 200 milliamperes.

If the physician has the proper galvanic battery, and understands it, he can win pleasure and profit as well. As soon as he can manage what he finds in this little work, he should buy others, and soon he can treat anything that comes his way.

I will give one case of pyosalpinx that came to me from the country, because her physician gave it up when he should have cured her at her home.

Mrs. D., aged 28, came to me with severe pain in the right pelvic region. She had the most profuse leucorrhœa alba I ever saw, I think. I saw her in company with Dr. S., and we diagnosed pyosalpinx. I emptied the tube by aspiration. This was followed up with the galvanic current, every second day for two months. She returned home as well as ever, and has remained so ever since (three years).

When she returned home, she reported herself cured by electricity. Her doctor immediately bought a large battery. He came out as a full-fledged electrician. That winter he had a patient whom he thought a good subject, and gave her a full dose. She went home, grew worse, and that night she aborted, and came near dying.

I simply state this case to show one thing. Electricity must be studied with the same care one would use in the practice of medicine. It is not enough that you are a doctor, or an electrician, but you must be both. READ! READ!! *read!!!* read!!!! and you will know.

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## Neuralgia.

In most neuralgia I find the galvanic current the best to give relief. Yet this is not always true. One rule I have observed, and I find it to be a good one; it was first noted by Dr. De Watteville. That is this: If on pressure over the affected nerve the pain is aggravated, always use the galvanic current, and apply the *positive* pole over the painful part of the nerve and the *negative* pole at the distal end of the same nerve, or at some remote part of the limb or body.

Begin with a mild current, and increase according to the susceptibility of the patient. (Always remember that one patient may take ten times as much as another, even though the other may be much more robust than the one who can take it so strong.) When the nerve is made more painful on pressure, the faradic current will produce soreness and will not ease the pain.

If on pressure the pain is not increased, then use the faradic current throughout, and do not change. Do not forget this one point. *Always* begin with a mild current, and increase to the amount your judgement tells you is enough, then diminish again; in all let it occupy at most fifteen minutes.

If the treatment be near the upper extremities, or the face or neck, the patient will no doubt complain of a coppery taste in the mouth. If so, do not increase the current after that, as it is high enough.

Another point to remember is, that notwithstanding the pain may all leave, and the patient get a good night's sleep, it may return again, though perhaps not so severe. Repeat the operation and keep up medicament. You will find cases which the electric current will not relieve, and others that appear to grow more painful from its use. If so, there is but one thing to do, and that is to stop.

I have a patient now who will retire as well as ever, and in an hour's time will have to sit up in bed, holding her head, and be almost in spasms. Nothing she can do gives any relief. They send for me, and I apply the *negative* pole at the nucha and the *positive*

pole first at one temple, then the other, alternating them occasionally for ten minutes, when the pain will entirely cease, and she will not have it again perhaps for a month. It usually comes on at her time for menstruating.

## Storage Battery.

Figure 42 represents a new and improved form of Storage battery of three cells for cautery and electric light purposes. The

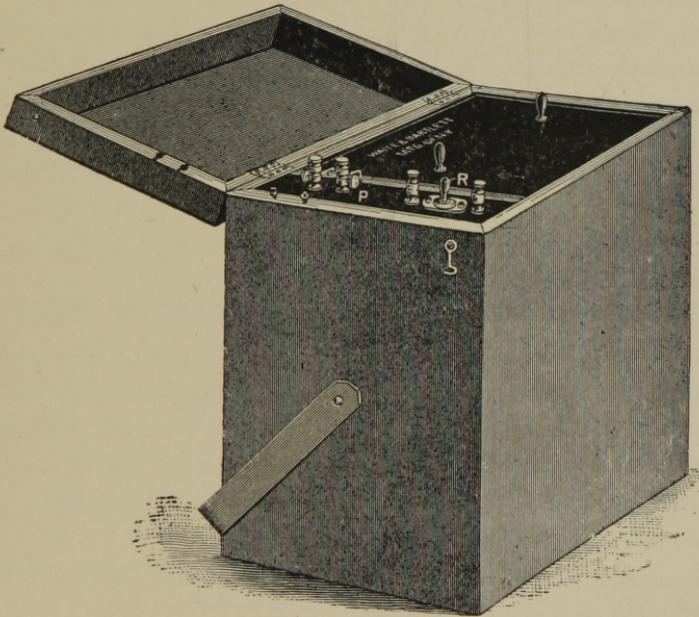


Fig. 42. Waite & Bartlett's Storage Battery.

storing power is furnished by gravity batteries, 6 x 8 inches, which can be placed in a closet or cellar.

About twelve hours is sufficient time to thoroughly charge the Battery. For cautery it will meet any requirement, and by means of a rheostat which is provided, the current may be increased or diminished at pleasure.

One charge will hold a two-candle power lamp in a state of in-

candescence for ten hours. *The battery does not deteriorate when idle.* When through using, the wires connecting with the gravity batteries can be attached, thus keeping the storage cells charged to their full capacity.

One cell is suitable for light nose, and throat, eye and ear work. Two cells suitable for same, platinum loop, and all light operations requiring use of motor. Three cells suitable for all general and special surgical work, running electric motor, bone sawing, etc.

A cautery battery is so constructed that a large quantity of electricity is given off with small tension. Large plates are used, and are so arranged that they can be connected up for surface or quantity when it is desired to use a cautery knife in which the resistance is very slight, and consequently requires but little intensity, and in series when it is desired to use a large loop which has more resistance, and consequently requires more intensity.

Figure 12 (page 32) represents the Piffard cautery, which for *all* purposes is also a good instrument.

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#### Directions for Setting Up and Using the Gravity Battery.

Spread the copper open like a star of six points, and set it on the bottom of the cell, with the insulated wire running up and projecting above the top of the cell. Fill the jar with the sulphate of copper, worked well between the interstices of the copper star until the latter is all covered. Do not have the lumps of sulphate of copper too large.

Hang the crow-foot zinc on the edge of the cell. Fill with water to within one-half inch of the top.

Before filling with water, melt some tallow or, better still, some parafine, and coat the inside of the cell one inch down, and the outside one-half inch down the side to prevent creeping—i. e., to prevent the salts from coating the cell.

When you have thus filled twelve cells, connect them in series (as in Figure 43). Connect the insulated copper wire frog (the star-shaped piece in the cell) to the zinc hanging in the next cell, and repeat with each cell until the last is reached.

The last copper wire attach to the post on the storage battery (marked P), and the zinc of the first cell connect with the other post of the storage battery, N.

Fill the cells of the storage battery fully one-half inch above the top of the composite plates with the following solution :

Water.....	19 parts.
Commercial Sulphuric Acid....	5 parts.
Sulphate of Soda.....	1 part.

To make the sulphate of soda mentioned in the above formula make one pint of saturated carbonate of soda (sal soda) solution, and while stirring thoroughly pour into it 6 ounces of strong sulphuric acid, and after mixing thoroughly let it stand till cool before using. Let the battery solution also stand till cool before pouring into the cells. Keep the solution in the cells above the square part of the plates by the addition of solution from time to time. If the work required from the storage battery is only occasional, one of the wires from the charging cells may be disconnected from it during the day, and reconnected again at night.

To use the storage battery, connect one end of the conducting cord to the binding posts A B and place the sockets at the remaining end of cord on the end of the knife handle, insert the burner in end of handle, press the contact spring on handle in firm contact with the point underneath, and while keeping spring in contact, gradually raise the Rheostat Knob R until the desired heat to be used in application of knife is obtained. Keep Rheostat pushed down when battery is not in use, and remove the cord from binding posts to prevent accidental short circuiting. It is not necessary to remove the wires from the charging battery while using the storage battery. They may be disconnected, however, and the storage battery taken anywhere for use. After returning from the operation connect the battery again with charging cells.

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## Gravity Battery.

Figure 43 is a three-cell gravity battery. The longer I live the more I am convinced it has no place in a physician's office, except,

perhaps, to charge his storage battery. It is an exceedingly dirty battery, on account of climbing salts. When evaporation takes place and the zinc is left above the water, the circuit is broken.

I use it to charge a storage cautery battery and to run my electric clock. They remain down cellar, and trouble me but very little.

The Gonda, a Leclanche battery, made I believe by Waite & Bartlett, is a good battery for office work, but I like the Law battery better than any other I know of.

Figure 43 illustrates the circuit very nicely. I have illustrated this work more fully than I should, but it is to show the beginner what and where to buy. This book is not written in the interest of

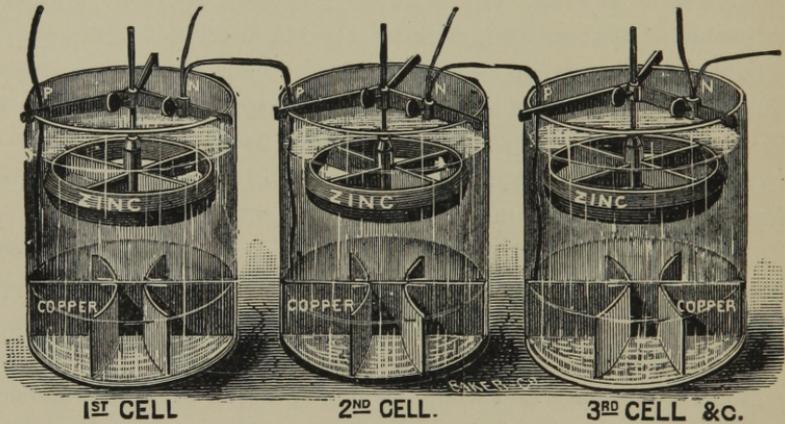


Fig. 43. Three Cell Gravity Battery.

any manufacturer, and the instruments illustrated are those that I have owned and worked with for years.

Any of the firms who have so kindly loaned me their electro-types can be depended upon to sell you what you send for as cheap and as good as any in the world. I have used them all (except the Queen triple-plate machine), and will vouch for every battery and electrode illustrated here.

When one thinks of purchasing anything in the electric line, and cannot go see it for himself, it is a great help if he can see a picture of the design he wants; he can judge from that if it is what he wants.

This is why I have given so much space to illustration. If it is

a help to any Doctor who lives away from the city to make his selection, I shall have accomplished my desires.

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## Local Electrization.

Local electrization is used perhaps more than any other form, and, in fact, as much as all the rest together. The disorders for which it is used are infinite.

Among the most general disorders for which I use it may be mentioned persistent localized neuralgia, mono-paralysis, infantile paralysis, wasted muscles in all parts of the body, chronic rheumatism and all localized pains of any kind but acute inflammation.

It stands to reason, that if there is a pain in the biceps, that is the place to apply treatment, and not give general electrization. It matters little which pole is applied to the local trouble, as the two are so close to each other that it makes little or no difference, yet I prefer to keep the positive pole stationary, and move the negative pole lengthwise of the stria of the muscle treated.

In some cases I reverse the current, and in others I give it through my hand, pinching and kneading the muscle the while. In infantile paralysis, I have found it good to give the muscle quick, sharp strokes, flexing the limb while working on the flexors and *vice versa*.

In severe hemicrania, I have found it best to place the positive pole against the neck, just back of the ear (on the side that aches), and the negative pole on the other side, and pass it along the spine down as far as the fifth dorsal vertebræ. As the nerves cross at the medulla oblongata, this appears to be the only way to electrize them, I have tried many ways without relief, and after all failed this accomplished the desired end.

The great field for local electrization, will be found in all uterine maladies. To the gynæcologist the galvanic battery seems to me to be indispensable. I believe when the day comes (as it surely will come) when this matter is rightly understood, the use of the curette, strong acids and iodine will be left out of the general treatment.

But as for treatment of these cases, I will leave that to be spoken of under its proper head—amenorrhœa, dysmenorrhœa, stenosis, involution, etc.

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## Which Pole to Use.

Some physicians claim it makes no difference which pole of a galvanic battery is applied to the part affected. Others claim the positive pole should always be the one, while still others assert it should be the *negative* pole.

There are certain principles that should govern the choice of pole in every instance. This holds good only with the galvanic current, as it makes little or no difference which is the active pole when the faradic current is employed.

The *negative* pole of the galvanic current has the power of disintegrating substances, and, in fact, nothing can withstand the negative pole. To this pole the various salts of the tissues, such as lime, soda, and potash, will be found to assemble, while the acids and oxygen go to the positive pole.

Chemical local action being set up around the poles when in contact with the body, it is of vital importance that the operator should understand this and know what pole to apply to each individual case.

In all cases of electrolysis, of fibroids, stricture and similar cases, disintegration is the object, and the *negative* pole, armed with a proper electrode, is the one to be the active pole.

Electro-chemical caustic action causes a liquefaction of the tumor, and the desired end is attained.

Now suppose the arresting of severe hemorrhage be what is most desired? The negative pole would increase it, instead of diminishing it, while the positive pole would arrest the bleeding, as the tendency of the positive pole is to coagulate and thus seal up the capillaries. Great harm has been done, is being done every day, by not knowing which pole to apply as the active pole.

A case in point happened to a friend of mine. He went to an old practitioner, one who had been giving electric treatment for only

about a year, to be treated for stricture. He began, passed the bougie in till he came to the stricture and then started the current. It gave the patient more pain than he had been led to suppose would follow the treatment, and he complained bitterly. The doctor could not move it either one way or the other. He tried for half an hour, and at last, drew it out by main strength. It took with it the whole lining of the urethra. Mr. C. had enough, and went home. Urethral fever set in and there were rumors of war. The doctor wrote me, asking why it performed as it did? The answer was, "You used the positive pole." This proved to be the case. It became a caustic, and became fast as a rusty pin in a wet blanket. I know of many similar cases.

Had the operator known what the trouble was, even though he had made the mistake, and turned the switch and reversed the poles, he would, in a moment, have found the electrode loose, and with the proper care and right strength would have cured the stricture no doubt.

Many good physicians claim that stricture cannot be cured by the electric current. Some say they have tried it and failed. No doubt of that in my mind. The doctor spoken of above, may claim the same, but was it the fault of the electric current, or of the doctor? To accomplish anything one must understand what he is doing, have good instruments, and at the same time, know how to use them, and exercise great care.

It is a positive fact that the worst stricture can be cured by electrolysis, and that without pain, which is more than can be said of the knife.

I have treated many cases by electrolysis, and do not now know of one that I could treat till he was cured, that ever had any trouble afterwards.

Drs. Robert Newman, W. F. Hutchinson, T. F. Frank, Prince, Butler, Sanders, Dickman, Burchard and many others, have treated many cases of stricture and pronounce it a perfect success. Robert Newman, alone, has treated several hundred, and in nearly every case where he could treat the patient till he pronounced him cured, the operation proved a perfect success.

Of the controversy between Dr. Keys and Dr. Newman I do not care to speak, only this: I have the greatest regard for the opinion of Dr. Keys. He was my old teacher, and his name is on my diploma, but I feel Dr. Newman is right, and, if let alone, until the patient could have been treated till the doctor pronounced him cured, he would have been perfectly cured.

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## Herpes Zoster (Shingles).

While this is not a dangerous disease, *per se*, yet most of the laity firmly believe if it surrounds the body, when it meets, death is sure and quick. In some cases of herpes, the neuralgic pains are very severe. The galvanic current has proved of great help in these cases in my hands.

I apply the negative pole to the arm, or give it to hold in the hand, while the positive pole armed with a large electrode, covered with absorbent cotton, is applied to the herpes. After the neuralgia has let up, I then apply the faradic current to the herpes, and I have never had any ulcerating when I applied the electric current, and often had it ulcerate when I did not apply it.

In cases where there has been great nervous debility after the eruption has disappeared, I return to the galvanic current, and put the patient on some good tonic, and the mineral acids.

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## Eczema of All Kinds.

In eczema, give the galvanic current. It will relieve the itching, and by applying the positive pole to the hot, tender and often bleeding surface, it will act like magic. The hot, inflamed surface will soon become moist, and the patient gets almost instant relief.

Mr.—sent for me to see his wife. I found she had eczema mammæ. The inflammation extended half over the breast. It was hot, and the whole surface was bleeding, and she could not resist the temptation to scratch it, though in doing so she made it worse. I sent a boy for my galvanic battery, and applied the positive pole

armed with a small clay electrode, (size of the two hands, and small for the kind,) over the whole breast, and the *negative* pole I placed in her hand. I gave her a mild current of six cells, and kept it on for ten minutes.

Soon the pain left, and I dressed it with an astringent unguent, and repeated the dose next day.

After the second day I left all dressing off, and applied electricity every other day for two weeks, and notwithstanding the child nursed all the time, it healed nicely, and she had no further trouble. She told me that with all her children (four of them) she had gone for months before she could get it cured.

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## Electricity in Diagnosing Disease.

The employment of electricity as a therapeutic agent for the past few years, has developed the range to which it may be applied to such an extent that it bids fair to reach an exact science long before medicine will, if the latter ever does, which I doubt.

At the same time, it has been so often misapplied that many do not believe in it. Some of our physicians do not know how to apply it, and consequently let it alone. Some buy a small faradic battery, and give a patient with inflammatory rheumatism the full shock, and, as it cannot do the patient good, it is painful, and does more harm than good. The patient wants no more of it, the doctor is discouraged, and that ends his electric treatment.

The machinery for producing and applying electricity has been perfected, and brought to a fine work of art. Batteries of all kinds are nearly perfect. Faradic batteries can now be had so small, and yet so strong, that they will do all required of any faradic machine, yet they can be carried in an overcoat pocket, and, as there is no fluid, there is no danger of spoiling one's clothes.

Galvanic batteries are also very small, and some of them also have dry cells, and can be taken in the carriage without injury either to battery or carriage.

Static machines are too large and too fragile to take from the office, but all other kinds can be relied upon, even the electric lamp

battery. Now the machinery is so perfect, with everything to work with, that it is the duty of every medical man to understand what diseases can be cured by electricity, which battery he needs, how to care for the battery, and, in short, make himself as well posted in the use of this great and wonderful agent as possible.

A physician, to-day, with his batteries, his electric lamp, etc., has an advantage over those who can not, or will not, employ them. Electricity has often decided a case for me which I could not decide in my own mind, and when others had expressed doubts in regard to the nature of the disease.

Electricity is not only remedial in its uses, but it is also one of the best diagnosticians. Many cases that appear very doubtful may be satisfactorily settled with the aid of a good battery, or, at least, two batteries. A case in point will illustrate my meaning.

Mr.—from Lockport, came to consult me. He is a butcher, aged 38, full-blooded, and a man of fine muscular development. Temperate, and he never used tobacco. His right arm was nearly useless. The history he gave me was that some ten years before he had been bitten by a hog. The wound, a bad one, healed after a long time, but blood-poison set in, and it was feared he would lose his arm. However, he had never had any trouble with it since, until about a month before he came to me. One morning he found it was all he could do to put his hat on. There was little or no pain, and he had taken electricity, but it did not appear to either help or injure him. It became so much in the way, and troubled him so that, fearing he would become wholly paralyzed, he gave up business, and came to see me.

I applied galvanism, and faradism. I found the electric reactions were normal, and as good in the paralyzed arm as in the other one. The biceps, flexors and extensors all gave me as good motion as any one expects to find in a perfect working arm. What was I to infer from that? In spite of the history of the blood-poisoning, with the free reaction, I could do nothing but diagnose it a case of cephalic trouble, instead of spinal, which I first thought it was.

Had he complained of rheumatism, with the same weakness of fingers, together with numbness and pains along the ulnar nerve on

application of the electric current, I should have said it was peripheral, and that the galvanic current would help, and no doubt cure him.

If a patient comes to you complaining of neuralgia, how are you to decide between true neuralgia and hysterical or pseudo-neuralgia? Here electricity comes to your aid again. Neuralgia will yield to galvanism, while the faradism would serve to increase the pains.

The hysterical neuralgia would yield to the faradic battery, while galvanism would do it no good, though it would not increase the pain. Neuralgia will always yield to the constant current, if the positive pole be applied to the refractory nerve. It will return again, but each sitting will find the pain less severe, and, as I have remarked elsewhere in this work, it takes time to cure a bad neuralgia, and the patient should be made to understand that point in the beginning, then he will not run away to some other doctor before you have had a fair show to demonstrate to him the fact, that *you* could cure him, if he will give you reasonable time.

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### To Diagnose a Case of Peripheral Paralysis.

That electricity is a great remedial agent there can be no question; but that it will not cure everything is equally true. And while one current may be just what is needed, another would do positive harm.

A good battery is one of the best aids in diagnosing. Take a case of peripheral paralysis for instance. Take any good electromagnetic machine, use sponge electrodes, place one pole in front of the ear, and the other to the cheek, and move it over the face.

Use a mild current at first, and if the muscles do not contract, increase the strength. If the muscles do not respond to the action of the faradic current, it is one of the best evidences that the case is one of peripheral origin and not central.

Now try a galvanic battery of from 24 to 36 cells with a current interrupter. Connect the rheotome, and try 24 cells; place the electrodes as before. If there is a drawing of the face and a closing of

the eye, as the pole is drawn toward the temple, you have proof positive that it is simply a case of peripheral paralysis.

Would you use a faradic battery on this case? Most certainly not. Faradization would be of little, if any, use. But take your interrupted galvanic current, which takes a much deeper effect, and from the first the patient will improve. The prognosis is favorable, and you may safely promise a perfect cure.

Our next case is one of sciatic rheumatism. The faradic current is of no use; the galvanic is but little, if any, better. Static electricity is what is needed here, and to get this another kind of machine is required.

The Waite & Bartlett, of New York, is the best static machine of which I know.

I am particular in defining the makers of each machine, because for years I have received hundreds of letters asking what to get, and where to get the batteries required, and this will answer those who have asked whose static machine I use.

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## Bell's Palsy.

There is nothing, perhaps, in which electric treatment is better employed, in which it aids diagnosis, and in which relief is more certain than in facial paralysis, or what is known as Bell's palsy.

When a patient comes to you with paralysis of the facial muscles, complaining of smarting or burning sensations in the eye, with the eye looking red, and the tears constantly running from it, the eye remaining open, with inability to close it, with saliva dripping from the mouth, and he unable to stop it, it is a fair diagnosis to pronounce it a case of Bell's palsy.

Now, to make sure of your diagnosis, take your faradic battery and place one electrode immediately in front of the ear on the affected side. The other pole apply to the cheek. Begin with a mild current, and increase it slowly, till you have a pretty good current.

Now, if you get no contraction, if the muscles fail to respond to the vibrations of the machine, you may rest assured it is a case of peripheral origin, and not central. That is, it is not intercranial.

You need not hesitate in saying it is Bell's palsy. But to make it a positive fact in your mind, take your galvanic battery and place the *positive* pole in front of the ear, the same as with the other battery, and the negative pole on the cheek, (or any other part of the body; let them hold it in the hand if necessary, though I always prefer the cheek,) and, as you move it over the face, you will see a drawing of the muscles that before remained quiet.

If you break the circuit with the circuit-breaker you will see a jerking motion of the muscles. Why is it? Simply because the galvanic current goes deeper, and acts on the nerves deep down below the affected terminal branches.

The galvanic current is the only one that will do any good in this case. Give it every other day, with not more than twenty milliamperes, and for five minutes, ten at most, each sitting. When you find the muscles will respond to the faradic current, you may alternate them. Give the galvanic current one day, and in two days give the faradic current. Do not give it too strong, but just so strong as the patient can stand it easily.

Never forget that when you give pain you may do your patient a positive injury if continued. It is a rule that, if followed, will never cause you to regret having done so, while the reverse may.

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## Torpid Liver.

When you find a patient whose liver, from smoking, or any other cause, appears to need attention, skin showing a derangement of the portal circulation, and eye-balls yellow, the best remedy for one who is obliged to keep at his daily avocation is the faradic current.

Take your faradic battery (any one illustrated in this work will be just the thing), and let the patient hold one electrode in the hand, and with the other pass it thoroughly over the liver. Give a current as strong as the patient can take without flinching. Keep it up for fifteen minutes. Repeat the dose every twenty-four hours for two or three times, and you will find the stools will show its action on the liver as well as if you had given a full dose of calomel.

It is more pleasant to take, and safer, inasmuch as there is no danger of taking cold. The eyes and skin will clear as quickly as if a hydragogue cathartic had been given. I have often tried this method of acting on the liver, and know it is the better way.

If you have a static machine, then give static insulation and draw sparks from over the liver for fifteen minutes without having the patient undress. It will do the same thing, and obviates the necessity of undressing.

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## Ptosis.

This is, as you know, a disease of the eye-lid. The lid falls down, and there is an inability to raise it. The trouble lies in the elevator muscle. Your good sense will tell you it is of no use to shake up the whole body in order to treat that one muscle! Certainly not.

Take your faradic battery, arm one pole with the glass-cup electrode filled with water; the other pole must be held in the hand of patient. Let patient lean over until the electrode is placed firmly, but easily, over the eye. Then he can sit up in a more comfortable position, as the water will not run out if the electrode fits the eye nicely.

Pass a not too strong current through, till he can see flashes of light, for ten minutes. Repeat every three days. Four or five times will cure most cases.

Should you prefer to employ a small electrode, applied direct to the elevator muscle, it will do as well, though it is not so pleasant for the patient.

Should Ptosis be due to hypertrophy, instead of cutting out a portion of the redundant integument, the same as in entropion, take your galvanic battery, apply the *negative* pole to the eye-lid, for electrolytic action. I have never seen a case but what I could overcome without having to resort to the knife, or strips of plaster, or hooks to hold it up. Tonic treatment is of course employed at the same time. It is always well to give constitutional treatment along with the electric treatment in nearly all diseases.

## Atrophy and Aphonia.

I have been asked what battery I used, which current, how strong, and how long, in a case of atrophy of the testicle.

Some ten years since I wrote a paper on "Atrophy of the Testicle, Pathology and Treatment." I gave it as my opinion that partial or complete paralysis of the sphincter muscles of the vesiculæ seminales was the true pathology, and that electricity was the sheet-anchor in treatment. I have never had cause to change my mind in regard to it.

I use a galvanic battery of at least 24 cells, with a sponge electrode on the positive pole, and on the negative, a long, properly-insulated, olive-tipped bougie, half rubber and half metal, (so that but one-half of the olive makes point of contact). I employ from four to six cells, from five to ten minutes, and once, or perhaps twice, a week.

The sponge electrode I apply over the pubes, and the long one, per rectum, with the metal half of olive over, or as near the parts as I can place it.

I have never had a case but what I have been able to arrest atrophy, and with electricity alone. Perhaps I cannot illustrate better than to give a few of the cases treated by myself.

Geo. H., came to me with his left testicle no larger than a hickory nut. He was suffering from spermatorrhea. He was 38 years old, married, and the father of one child. But for the last six years had been unable to keep an erection long enough to have coitus with his wife, and the poor fellow was tempted to end his life. I took the case, and applied electricity from the first.

I avoided anything that would excite his passions; saw and had a talk with his wife, who agreed to help me by severely letting him alone. He came twelve times, and improved from the first. No spermatozoa passed after the fifth application. In three months I had another talk with his wife, and the next day he came to me, his face covered with smiles. The first thing he said was, "Doctor, I did it!" He has had no more trouble, and finds he is a better man with one good testicle than he was with two.

Case No. 2. James S., had been treated for the same trouble. The left testicle had nearly half atrophied. He had used sounds, and stimulated the sexual organs, while he grew worse daily. The organ was cold, leaking spermatozoa, and, as he truthfully remarked, was of "no use around home, to say nothing about taking it to camp-meeting." I treated him as above, and in three months he was the happiest man I knew of. And why not? A man in the condition he came to me, had better be dead, unless science has a cure for such cases, and I know it has.

Case 3. B. S. (colored). I have him under treatment now. I have arrested the atrophy, and he begins to feel his oats. I do not think the diseased testicle can be brought to do any any work itself, but it can be prevented from going away, and one good testicle is enough.

In answer to Dr. Wesselowski: I have treated several cases of aphonia, with good results in nearly every case. I have long since come to this conclusion: a change of climate has no lasting good in any case that improves in summer, and as soon as the cold, damp weather comes on, all the old, distressing symptoms return. Cases in which aphonia is caused by specific disease, and are alike summer and winter, with a thickening of the vocal cords, will get little, if any, benefit from change of climate. I will give one case, with treatment, that was very much like the one the doctor speaks of.

Mrs. G., came to me with aphonia. She was 34 years old, the mother of six children; had the best of health, was regular every month, and her only trouble was aphonia. When she came to me it was in the early part of December. She had been in the mountains all summer, with the best of health. Every winter for five years she had been unable to speak above a whisper. This would last till April. I began to treat her with the galvanic current, at first six, then eight, then ten cells.

The positive pole, armed with a carbon, sponge-covered electrode, I placed on the back of the neck. The same kind of electrode on the negative pole I placed over the larynx, first on one side, then on the other. The next time she came I used a throat electrode, and

applied it over the whole buccal cavity, and over the nerve of phonation. These I alternated.

I think she came, in all, twenty-three times. Inside of three weeks she could speak loud enough to be understood anywhere in the room. She left cured, at least, for the time being. The next fall her voice became husky, as if she had a bad cold. She came back, and in two weeks was all right again. That was six years ago this winter. I went over and called on her recently. She was well, and told me she has had no return of aphonia.

The patient must be made to understand this one thing—*it takes time*. Twice a week is often enough to apply the current, and do not use too many cells. Begin with six, and increase. Fifteen minutes is long enough for one sitting, and if the patient is not strong, ten is better.

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## Lumbago.

In cases of lumbago the galvanic current is the only one that will give satisfaction. Apply the positive pole over the sacrum, and the negative pole pass up and down the spinal column. Begin with fifteen milliamperes, and carry it up to thirty, for from ten to fifteen minutes.

I very seldom fail to give relief in ten minutes. The patient should call at least three times a week, and two weeks will finish the case to your perfect satisfaction, as well as to the satisfaction of the patient.

I had a patient call on me for treatment, and when I proposed to give him electricity he protested, saying "I have been taking the battery for three weeks, and am worse to-day than when I began." I asked him who had been treating him. Said he, "My family physician did treat me, and told me to buy a battery and apply it myself." I asked him which pole he applied, and it was all Greek to him. He had a small faradic machine, worth about \$5.00, and that was the treatment—simply holding the sponge in his hands, and taking all he could stand.

Was there ever anything more absurd? Is it any wonder so

many cases are reported failures, when the attending physician tells a patient to buy a battery and apply it without fear or judgment? If electricity is good for anything it is well worth applying properly—the right current at the right time, and the proper dosage.

I find that those who know electricity the best are its best friends. Every day some new application of this wonderful power is found out—not by telling the patient to apply it himself, but by the patient, painstaking doctor who tries to keep up with science, and believes in himself, and is determined to master the problems of electricity.

I gave the above patient the galvanic current three times a week for a month. At first I gave him 20 milliamperes, and increased it to 75. He improved from the first; in fact, he left the first day without pain, and could walk as well as ever. But it came back, though less severe, and after the third seance he had no more pain. He gave his battery to his boy to play with, and when he thinks he or his family need electricity they come to me.

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## Fractures.

In dressing a fracture great care should be taken not to impede the circulation. Nature, in her perfect manner, has made every provision to carry all necessary supplies to the wounded parts, and, unless interfered with by our bungling manner of dressing, will supply everything needed.

When a limb is broken there is an extravasation and effusion of serum and lymph to the parts. About the ninth day, a pale plastic jelly that looks like isinglass, containing carbonate and phosphate of lime, forms the provisional callus.

When this provisional callus has performed its function (to serve as a splint), whatever is redundant or superfluous must be removed, and nature proceeds to remove it.

At first, much of the extravasated blood is intermuscular, and must be absorbed. It is the duty of the surgeon to assist all he can in this work.

In dressing a fracture of the femur, do not put it in a fracture-box, nor bind it up in a plaster of paris dressing. It does not help to make it a perfect piece of work, and is very unpleasant for the patient. The proper method is to attach a weight to the foot, and fasten the leg so it will not turn over, and let it alone.

The weight should be about two pounds to the year, up to twenty years. If the foot of the bed is raised, and the patient properly arranged, with counter extension, (this is not the place to give the *modus operandi* for dressing the fracture,) the leg, if dressed in the manner followed by Dr. Buck, or that by Dr. Swinburn, will be left in proper position to use the electric current on it.

After the leg is properly dressed, and the galvanic current is passed through it for five minutes every other day, with the *negative* pole passed over seat of fracture and the positive pole placed on the other leg, with five to ten milliamperes, it will increase the circulation, and aid in carrying fresh blood loaded with material for repairs, while the dark and poisonous venous blood is hastened back to the lungs to unload its carbonic acid, and, reloaded with a fresh supply of oxygen, it goes back to the injured member.

Again, when the provisional callus begins to be absorbed, nothing will aid and strengthen the limb more than the faradic current. I have tried both ways, and must vote for the electric current every time where the limb can be dressed so as to leave space for the application of the sponge electrodes. It is so much liked by the patients that they always look pleased when the battery is brought out, and say, "Doctor, I wish you would do that every day. I can sleep for hours after you give me the battery. The leg feels warm, and as though it was nearly well."

Mr. C. K., a very wealthy gentleman, received a fracture of the right tibia and fibula. I dressed it after the mode of Drs. Buck and Swinburn, with a few modifications of my own. One of the best New York surgeons, who was a friend of Mr. K., called to see him on a friendly visit.

Said he: "Charley, that is the best dressed leg I ever saw, and it will come out all right, but you will always be a trifle lame."

I was determined he should not be lame if scientific treatment

could make him otherwise. I was very busy, having six broken legs in the town, beside my other work. I applied the battery to the limb every other day, after the eighth. (I put the bones in position the day it was broken, as I always do when possible, and the weight held the limb just the same as several strong men, who knew their business, would hold it for a few moments.)

One morning while I was giving the battery, Dr. S. sat there looking on. Mr. K. made the remark, "I feel so much better after the battery has been applied. I am able to read for hours afterward, and wish it could be applied every day."

"But," said Dr. S., "do you know every time he gives the battery it costs you a cool ten dollars?" "If that is all, give it every day," was all the satisfaction the doctor got.

That was twelve years ago, and to-day if asked which leg was broken, Mr. K. cannot tell until he thinks of the position of his bed. He made me a present of one hundred dollars in cash, and an order on his tailor for two of the best suits of clothes he could make (about three hundred dollars above my bill). I simply state this to show that it does pay to do a perfect piece of work, and I *know* the battery was one of the best helps I had. It kept the circulation perfect, and the patient was out of the house at least two weeks sooner than those on whom I did not use it.

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## Angina Pectoris.

*Never use any kind of a battery* in a case of angina pectoris. I have tried each current in several cases, and it not only did not ease the terrible pain, but I always thought it made it worse. The faradic certainly did, the static I thought did, and the only one I know did not, was the galvanic with a mild current. I am certain it did no good. Others may have a different experience, but mine would prompt me to caution you, at least while a beginner, to fight shy of any current during the paroxysms of pain.

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## Encephaloid.

The encephaloid (sometimes called soft cancer, medullary sarcoma, cerebriform cancer, and fungus hematodes,) comes spontaneously, at all ages, and on either sex.

They grow rapidly, and often attain great size. I have seen them as large as a man's head. They are more or less lobulated, with large fungus granulations, with brittle walls that easily break down, and are highly vascular. They look like a great brain at times, then again like a cauliflower.

They never get well, but at times, if removed, the patient may live a long time. More frequently the person dies soon after its appearance.

It is better to remove them, if they can be taken out without making a bad matter worse. The knife causes such profuse hemorrhage that it is doubtful if it is ever best to interfere with it. The galvano-cautery is the only safe way, and then only to preserve life as long as possible.

Mr. S., aged 37, by trade a lead-pencil maker, came to me with a large encephaloid situated on the outside of his left leg, just above the knee. In fact, it extended a little below the knee. It was very vascular, so much so it had twice nearly caused his death by hemorrhage. I made ready to take it off. Drs. H. and H. were with me. I was fearful I could not heat so long a wire, and having two electrodes, I had one armed with a loop, and began with the cautery knife, thinking to cut around it until the loop would be small enough, when I would apply the latter.

At the first incision the blood came in a perfect deluge. I never saw anything bleed so in all my practice. I threw down the electrode, picked up the one with the loop, drew it taut, and, in less time than it takes to tell it, had the wire as hot as I dared to make it, for fear it would fuse at some point, and drew it down as fast as I could work the rack. It burned through it about as it would had it been a brain, and inside of two minutes it fell into the pail like a big sponge filled with blood. If I had had but one electrode he would

have died from hemorrhage before I could have prepared another. Strange to say, the wire held through it all, and he did not lose two ounces of blood after the loop became hot. It looked like a big potato cut with a dull knife.

He came out from the anesthetic, but I feared he would die before night. He improved, and it healed around the edges, but grew up in the centre, till it was six inches high, but only three inches at the base. Then I put the loop around it again, and cut it off. The healing went on, but it again grew till it was two inches high, and one inch at the base. I cut it out the third time, and eight months from the first operation, he died. For the last four months all repairs stopped, and as it grew up, I cut it out, to have it grow like a weed again. He lived long enough to attend to some particular business in the country he came from (Germany).

He left his family well provided for, which he could not have done had it not been cut out. That was all the good it did—to try to keep him alive till he could secure his money.

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## To Take a Needle from the Flesh.

Should you be called to remove a needle that has been run deep into the flesh, with nothing to show where it entered but the inflamed spot, you will find it hard to locate it well enough to take out. If you attempt to cut down to it, it will be very much like hunting for that needle in the hay-mow.

Should the knife by chance hit it, it will glance aside without giving you a positive knowledge of its location, and every motion of the muscle will serve to drive it in further.

If you have an electro-magnet (two spools of copper wire wound like two spools of thread, with the end of the wires of each spool twisted together, leaving the other end of each spool free to attach to the battery, and one end of the spools fastened together by means of a plate screwed fast to each spool, like the magnet on a telegraph sounder,) it will be very easy to get the needle out almost every time.

Connect one free end of the wire to one post of a cell of the

battery, and the wire of the other spool to the other post. It is better to have three or four cells in circuit, so you will get a strong magnet. Place the magnet close to the spot where the needle entered the flesh, and let the patient lie quiet, keeping the magnet close to the flesh.

In a few minutes you will find it fast to the magnet, unless it is fast in a bone, or too far in to be drawn out by the magnet.

Case 1. Miss W. sent for me to cut out a needle she had driven into the heel while walking around her room. She had been in great pain for twelve hours, and her family physician had tried to cut it out. He had made three deep incisions but could not find it. She had a high fever, and the leg was swollen to the thigh. I saw I could not work at the wound without doing her harm. I took my electro-magnet and placed three Bunsen cells in circuit. It would lift fifty pounds from the floor. I put her to bed, and fastened the magnet to the limb. In twenty minutes I found the offender fast to the magnet. She had no further trouble.

Case 2. Miss S., a dressmaker, sent for me. She had sat down on a large button needle, that had entered the gluteus magnus muscle, and it had broken off one-half inch from the eye. It had been but an hour before I saw the patient. I placed the magnet in bed with her (on a hard bed to prevent sinking away from the magnet). I went to call on other patients, appointing a sister of hers to watch that the magnet was kept at right angles with the nates. I returned in two hours, and the nurse met me with the needle. It came against the magnet in less than ten minutes after I left the house. It is much nicer than to cut for it, or to leave it in.

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## Alopecia.

I know it seems like blowing hot and cold with the same breath when I say the epilation of hirsutes, or blemishes due to any abnormal development of hair, can be easily accomplished by the electric current, and to say the hair on the head can be made to grow with the same current, but such is the fact nevertheless. When you

have a patient who has lost his hair, find out the first thing if the hair-bulbs are alive. If they are dead, *nothing* will ever cause the hair to grow, and you had better let it alone. But if the hair-bulb is alive, (and with the electric light and a good glass it can easily be determined,) if you apply the galvanic current properly, it can be made to grow, and the scalp covered with a fine growth of hair.

Apply the *negative* pole with a slow movement all over the scalp, while the positive pole may be held in the hand, or, perhaps as well, apply it to the spine. Give from ten to twenty-five milliamperes for ten minutes at each sitting. This will act as a strong tonic, and also as a stimulant to the hair-bulbs. I have seen a case where the hair had been almost white before he lost it after a bad fever, and when he was well again he became bald, and remained so for two years. The hair would start and grow about half an inch long, and then fall out. It was a dirty white.

I took the case in hand and found the hair-bulbs were alive. I applied the galvanic current. I began with a very mild current, only five milliamperes, but increased it each day until I gave him twenty. The hair began to grow, and, as it came in, I increased the current and the length of sitting. The hair was dark from the first, and when it had grown five inches long, it was a fine brown. His wife told me it was the same shade of color as it was when she married him forty years ago. His hair is still full and strong, but it has become gray in places for the last three years. I do not know what the current of electricity will do, but shall try it again to find out. I think it may act on the coloring matter and make it brown again. However this is but conjecture on my part.

It is safe to say that when the bulbs are not dead, the hair can be made to grow on a bald and shining poll.

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## Electric Belts, Etc.

I could never understand why the laity have so much confidence in the so-called electric belts and clothing. The belief in their efficiency is not confined to the laity, for I find many doctors also who believe in them.

'Tis said "it is easy to believe what we want to," and from letters I have received from physicians asking me which belt I thought the best, saying that "some of their patients wished them to find out and procure one for them," I have been led to believe the wish was father to the thought.

The truth is, there is no such a thing as an electric belt. They are a delusion and a snare. I had a physician call on me, and he said, "I have tried one, and when I was in a state of perspiration there *was a mild* current passing through me all the time."

I do not believe it, but allowing for argument's sake that it is true, who would want to be in a "cast-iron sweat" all the while in order to get a mild current of electricity? I would not, and doubt if any one of my patients would.

I received a call from a person, in company with his lawyer, who was trying to get a patent on a new electric belt. The patent office officials have found out the whole thing is a fraud from A to Z, and refuse to grant a patent unless they procure the testimony of some electrician that there is a current of electricity passing through the belts, etc. I gave them my opinion, which was not very flattering. But they persisted that theirs was built on a new plan, and would do what was claimed for it.

I took my galvanometer, and promised if he could show me two milliamperes I would give my testimony in its favor (knowing it to be impossible for him to do so). With a fine copper wire he connected the whole belt, and I placed it in circuit. There was not the slightest movement of the needle. He had a brass rod, hanging to which were six small compasses. The belt, when held in a proper position, would deflect these a little. This was what he claimed should warrant its introduction as a remedial agent. That is not electricity; it is magnetism—quite a difference, and the sooner this fact is learned the better for all parties.

If a belt could be made that would, when worn, give a mild current, one that could be increased or decreased at will, it would be a good thing when recommended by one's family physician for certain conditions. All throat diseases would be much benefitted, and it would aid in other cases I could mention. But even then it should

be worn only when advised by one who knows the disease for which recommended, and the action of electricity on said disease.

That mild currents of electricity are good for the throat and its own peculiar diseases, is clearly shown by the use of a string of amber beads. It is a fact that in a string of amber beads there is a constant current of static or frictional electricity constantly passing through it that will be shown by the milliamperemeter. Amber was the electron of the Greeks, and it is truly electric.

My daughter when a child was constantly troubled with false croup. I tried every known method of relief, and at last placed a string of large amber beads around her neck. From that time she had no trouble for at least three years. Thinking that she had outgrown the trouble they were left off, and inside of two weeks she had the croup as bad as ever. The beads were again worn, and she has never had a return of the distressing disease since.

I know of many cases in my own practice, and of others in the hands of brother practitioners, in which amber worn around the neck proved of great benefit. Dealers tell me they always make large quantities of amber beads, knowing that the doctors will order them to be worn for throat troubles. They sell thousands of strings.

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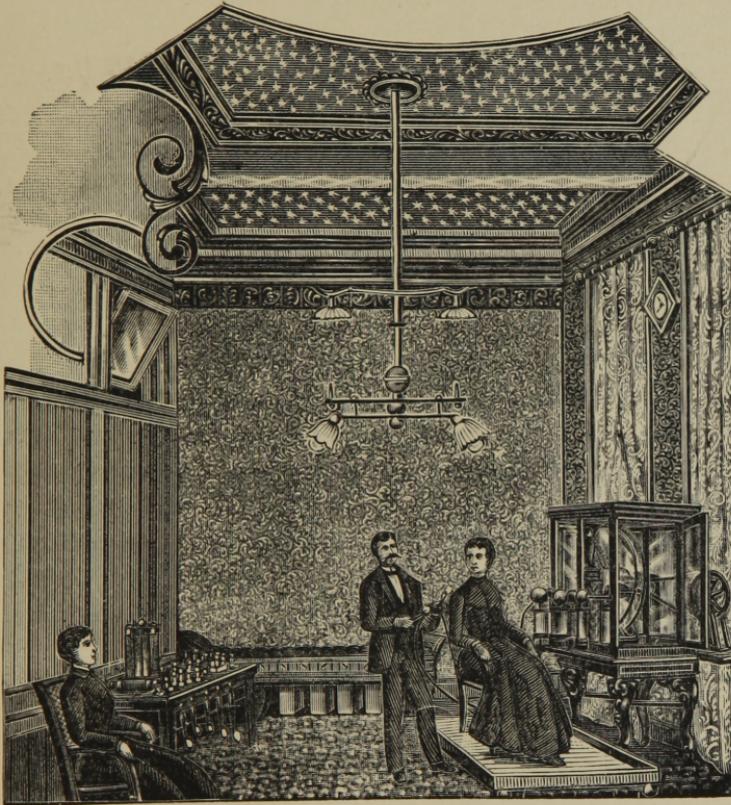
## The Electric Bath.

In many skin diseases electricity given in the form of electric baths will be the better way. It is not always convenient for the practitioner to give an electric bath, but if he lives in the country, he can improvise a very good one with little expense, and be more than repaid for his trouble in seeing his patient get well after others have given the case up.

Should the doctor live in a large city he will have no trouble, as nearly every city has a Turkish and Russian bath, and nearly all of them embrace the electric bath as well.

When I have a patient whom I think the electric bath will do more for than electricity in any other form, I send him to Dr. A. L. Wood, 32 and 34 Clinton St., Brooklyn, N. Y. Dr. Wood

has one of the best appointed bath-rooms in the State. The sub-joined cut shows the electric room, where all kinds of the latest and best electric instruments are kept. A patient sent to the doctor, with full directions of what current, how strong and how often it is to be given, will get it just as prescribed by his family physician.



Dr. Wood's Electric Room.

I can speak only in the highest of terms of Dr. Wood's electric baths, as I have sent several patients to him, and without exception they were treated as I wished; just so often, so long, and so strong. I believe every patient was cured of the disease treated for.

Some patients can take the electric bath when the current applied direct cannot be tolerated.

If I did not live where it is more convenient to send patients to an electric bath than to have one of my own, I would certainly have one built. They can be made cheaply and very fine. It is not pleasant to give one the electric bath in an office during office hours, as it takes time and the patient must necessarily disrobe, and with ladies that takes more time than a busy practitioner can well afford to lose.

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## Chronic Eczema.

In chronic eczema, and also in psoriasis, there is nothing that will give greater satisfaction than the galvanic current. It is specially indicated where the disease is consequent on stomach or liver trouble. When you get a case due to liver disorder use the central method; that is place the positive pole over the epigastrium, and the *negative* pole apply to the parts affected. Give mild currents. Begin with ten milliamperes and increase to twenty-five. Do not give it stronger, and in some cases the patient will not be able to stand over fifteen.

Remember all eczematous skins are very sensitive, and cannot take as strong currents as that of other patients. When a patient has been frightened by strong currents, it will take a long time to convince him that he will not be hurt again. It is better to give mild currents and continue them longer. Fifteen minutes will not be too long a seance.

Case 1. Mr. P., aged 57, an Englishman, a minister by profession, came to me with a bad case of eczema. At times the burning and itching were intolerable. I began with the galvanic current, and gave him as high as twenty-five milliamperes for twenty minutes. He began to improve from the first, and in three months I discharged him as cured. The finger nails gradually became more like normal, and to-day (three years after) they are as good as ever.

Case 2. Mrs. C., has had three children, and while pregnant became sadly afflicted each time with eczema. I never saw a worse case. For hours she would sit and scratch her limbs until the whole

inside of the thighs was a raw, bleeding mass. She had used many things, and had tried the best medical skill she could find, but received no help. She would grow worse until her child was born, and then, after a time, she would get well and remain so until her next pregnancy.

I was engaged to attend her. One day, while stopping to see her, I found she was wild with the smarting pain of eczema. I was told of her condition at former periods of pregnancy, and what she had done for it without experiencing any relief. I concluded to give her electricity. I took a battery to her house and left it there so that I could use it three times a week. I applied the positive pole over the epigastrium, and the *negative* pole, armed with a large, sponge-covered electrode, I passed slowly over the parts that were sore and itching. I could not give her more than ten milliamperes, but I kept it going for a long time.

She at once improved, and in two weeks had no more trouble. With the next child she began to be as bad as ever, and she sent for me. One week finished the case this time.

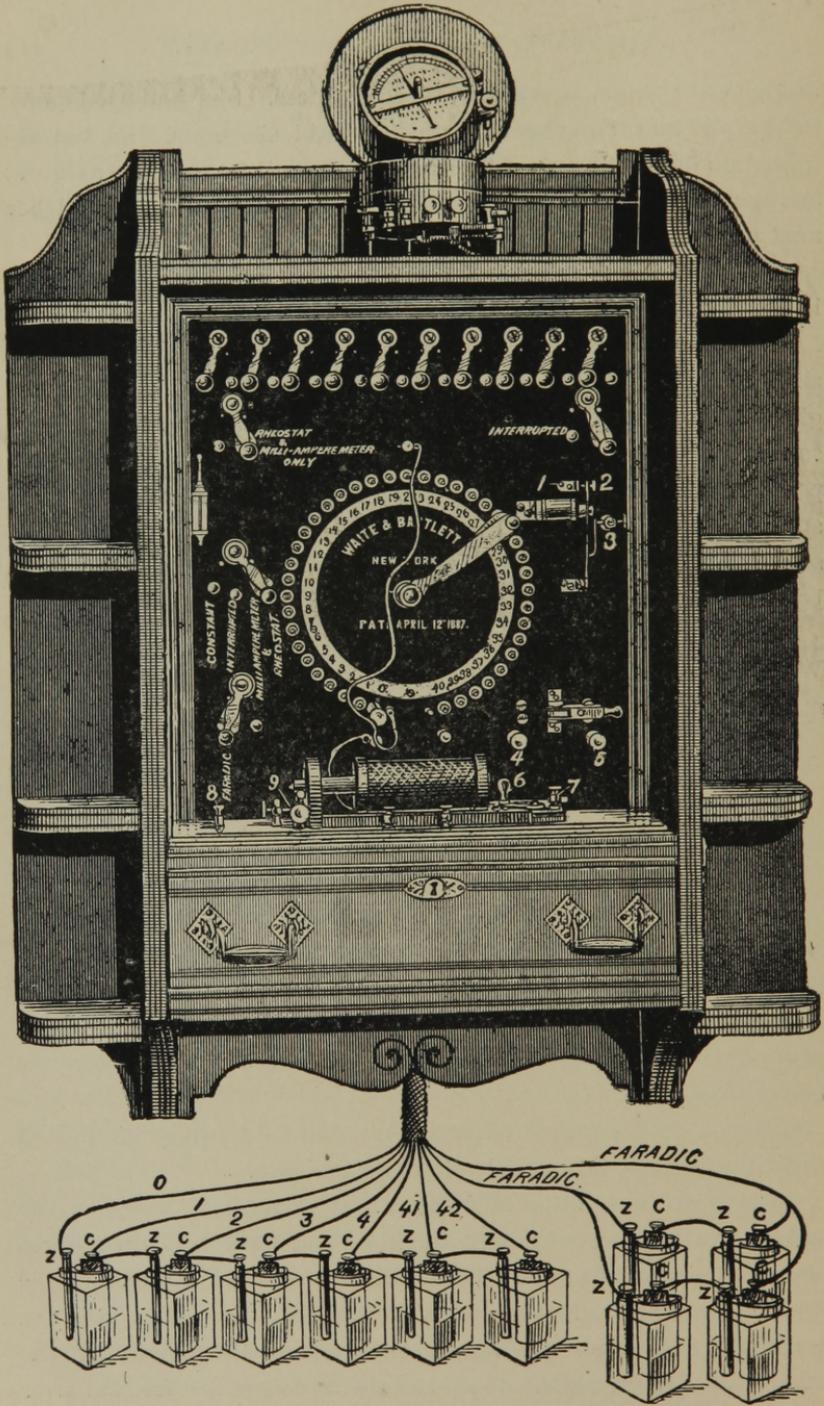
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## Lentigo (Freckles).

Almost every doctor will have patients with freckles who want to get rid of them. All kinds of lotions have been fostered on a gullible public warranted to cure freckles, and leave the face as fair and smooth as a lady can wish for; but the chances are the face will be rough, and, in many cases, poisoned, while the freckles are worse than at first.

With a good galvanic battery they can be entirely eradicated without a blemish left on the otherwise fair skin.

There are two ways of doing it. It depends entirely on the patient. Some have very dark freckles, and have had them from their earliest recollection. These will be treated with the same electrode as used in the removal of moles, etc., (see figure No. 40). Attach the electrode to the *negative* pole, and let the patient hold the positive pole in the hand. Place the electrode on the freckle, after



Switch-Board

first adjusting the needles so they project about two lines, then turn on the current. Do not give more than five milliamperes, and not more than thirty seconds for each freckle.

When the freckles are of a pale, bran color, the sponge-electrode will do the work. Always apply the *negative* pole to the freckle. The patient will have to come several times, for this reason: It will take some time to go over a face, and often it needs the second, and sometimes the third, application to entirely remove them.

Some persons freckle easily. A young lady starts out with a clear complexion, and after an hour's sailing will come in with her pretty nose covered with "horrid freckles." All cases of this kind will disappear with one application of the galvanic current, with both electrodes covered with sponge.

I had a lady come to me whose face, neck, and hands were covered with freckles, and they had come to stay. She had injured the skin by washing with every freckle lotion she could find. I began on the face, and covered about one half the first seance. I had to leave home for five days, and when she came again she looked very peculiar. The part I had operated on was as clear as could well be, and the other looked worse than ever by comparison. It took eight sittings to cover the face, neck and hands as high as the dress sleeve. She freckles if she exposes herself to the sun or goes on the water, but I can drive them all away in an hour's time with the sponge-electrode.

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## Switch-Board.

One living in the country (or city either, for that matter,) can buy the switch-board on opposite page, and fasten it to the wall. He can purchase any of the cells he fancies, though for my part I prefer the Law, for reasons given elsewhere. He can set it up himself, and have as fine an office battery as any one could wish for.

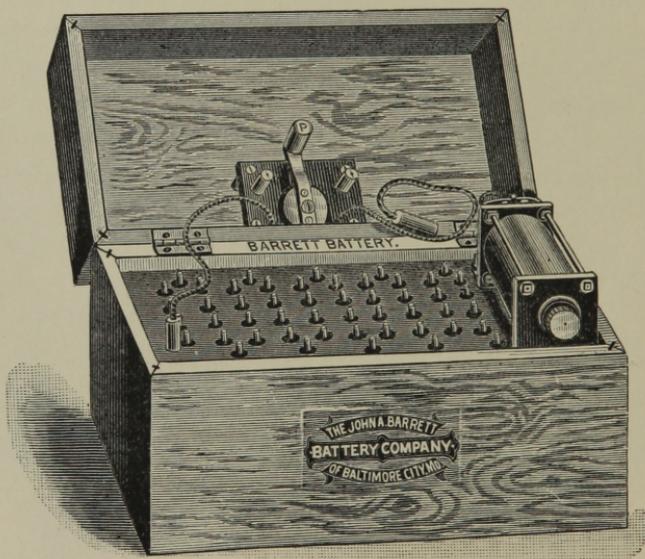
This is made by Waite & Bartlett, who, no doubt, will supply one less grand than will do for any one. Electrodes can be had from all the dealers, as nearly all fit the universal handle. When you find

you need any peculiar electrode, and can not find it in any catalogue, go to work and make it yourself.

Perhaps it will be so good that every one who sees it will want one like it. There is much room for improvement in electrodes, and the only way to perfect them is for each one to invent something better than anything of the kind now on the market.

## Combination Battery.

This combination battery, so far as the galvanic part is concerned, is precisely the same in every particular as the No. 1 on



Barrett Combination Battery.

page 12, but it contains in the same box a compact faradic coil and cell, capable of producing the most delicate, as well as the most intense and powerful, induction current.

The galvanic part of the combination batteries will work 720 hours continuously. The faradic cells have a capacity of 100 hours.

The cut represents one of the Barrett combination batteries. It is a chloride of silver battery, and has many good points in its

favor. It is clean, and always ready for use, without the trouble of filling with fluid. For small operations, such as the removal of hair from the face, for stricture, nævus, and all small operations, I like it very much.

For large operations I should prefer a fluid battery. Some find fault with the chloride of silver battery, but I see McIntosh is making them, and, as he has a good fluid battery, why does he make a silver one if it is good for nothing? It *is* a good battery, and, if made large enough, will do any kind of work, and then will not be heavier than the fluid battery, at that. I use a fifty-cell chloride of silver battery, and like it, as I said, for light work. I use all kinds, Waite & Bartlett's, Fleming's, and McIntosh's, and the first battery I ever had (and it is good yet) I bought from the Galvano-Faradic Co. When I have an operation out of the office I take the first one that comes handy. They are all good, and one buying either of the batteries illustrated in this book cannot go wrong. Keep them clean, and in good order, give them half a chance, and they will never fail you.

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## Active Cerebral Congestion.

Active cerebral congestion is the most common form of all the congestions of the brain. It is this form that nearly always precedes an apoplectic or epileptic fit.

It is not my intention to give the symptoms, diagnosis, or prognosis of the disease, and I will content myself by giving only the treatment.

I will say, that if you get a patient who cannot sleep, but gets up unrefreshed, feverish, and ill-prepared for any kind of mental work, and who complains of severe pains in the head whenever he tries to add up a column of figures; who decides to do one thing and quickly changes his mind; has illusions, hallucinations, or delusions, and one who is known to be good-tempered, to be fretful, and to who trifling circumstances produce great annoyance, he should be looked after at once.

Now is the time to save your patient. Don't let him go till he falls down in a fit, but begin at once.

Remember you have a case of *active* congestion, and act accordingly. In the active type of this disease, the force of the cerebral circulation and the quantity of blood in the blood-vessels of the brain are to be lessened, while in the passive type, the force of circulation must be increased.

Do not resort to the lance, as our grandfathers did, but keep the body erect, apply leaches, with something cold to the base of the brain, and *hot* water to the feet.

There is *nothing* that will contract the blood-vessels and reduce the blood from the brain so quickly as the galvanic current. The sympathetic nerve should be stimulated.

To do this, the *positive* pole must be placed over the sympathetic nerve in the neck, and the *negative* pole over the seventh cervical vertebra. Give from fifteen to twenty-five milliamperes for not more than five minutes.

Should it produce vertigo, reduce the current. Observe the eyes, and if the current is doing its work well you will see the retina contract, and you will know the brain, or the blood-vessels at least, are doing likewise.

After about five minutes, change the poles to the mastoid processes for two minutes.

Now give patient the following (or anything you may think better):

℞. Bromide of potassium.....  $\frac{7}{3}$  j  
 Aquæ pura.....  $\frac{3}{3}$  iv  
 M. et sig one teaspoonful every four hours.

Renew the electric treatment every four hours, but never give it more than five minutes, or more than the amount spoken of above.

By following the above treatment, you will save your patient every time, if taken in its first stage.

#### THE SECOND STAGE.

The patient, if walking the street, will be seen to stagger, lose consciousness, and fall. The loss of intelligence is seldom complete,

and does not last long as a rule, but he will be found to be partly paralyzed. One limb only may be affected, perhaps all one side. It is never complete, and the face is seldom involved.

He will speak indistinctly, the respiration will be loud, but never stertorous. The pulse is slow, hard and full.

Give the galvanic current as for the first stage, and also give it once a day for the limb that is paralyzed. Apply the *negative* pole to the arm, or leg that is to be treated, and the positive pole may be held in the other hand of the patient.

You want to quicken the circulation in the arm without molesting the head. Ten minutes a day will be enough for that.

#### THE THIRD STAGE.

There is little to be said about the third stage that would change the treatment, so far as the electricity goes. The principal phenomena are those seen in secondary lesions, inflammations, etc. One circumstance always exists, which is that other paroxysms are liable to occur, and while they may be prevented by close attention and giving the current often for two minutes, yet they may come for all that.

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## Warts.

Warts are the outgrowth of the papillæ of the skin, covered by indurated epidermis prolonged over them in the form of small rods, of which every excrescence of this kind is composed. While warts are most common on the hands and fingers, they are found on all parts of the body.

When on the face or neck, if left to themselves, they often develop into epithelioma.

The excrescences which are often found around the anus, and on the glans penis, perineum, vulva, and inside of the labia majora, belong to the wart family, though they often receive the name of condylomata. They are sometimes congenital, but more frequently they are a consequence of inoculation with the venereal virus from some afflicted lover.

They sometimes are seen so thickly on the hands of young persons as to denote a genuine verrucous diathesis. They often attain an extraordinary size, become very painful, bleed easily, and prove to be very annoying customers.

In structure they are cellulo-fibrous, and the fluid from one when cut is believed by many to be inoculable. This is not true.

Take your galvanic battery, arm the *negative* pole with two or more small, spear-shaped needles, and place the positive pole in the unaffected hand of the patient. Pass the needles through the wart at the base on a level with the skin, and another at a different angle; then give ten to fifteen milliamperes for five minutes. This will take the wart off, and a second application is seldom required.

Should the wart be on the vulva, or inside the labia, it is the better way to use the cautery battery. Either use the loop, or a knife made like a curette, and make it just white hot.

Case 1. Miss W., aged 49, a maiden lady, very stout, came to me with the whole inside of the vulva filled with warts of from one-half inch to one inch long. A part of them were very painful, and the slightest touch would cause pain. I took my cautery battery, and with a knife made in the shape of a scoop, I took them all (fifty-four) off at one seance! In three days she could walk around, and at the end of the week she was cured, and had no more trouble.

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## Polypi.

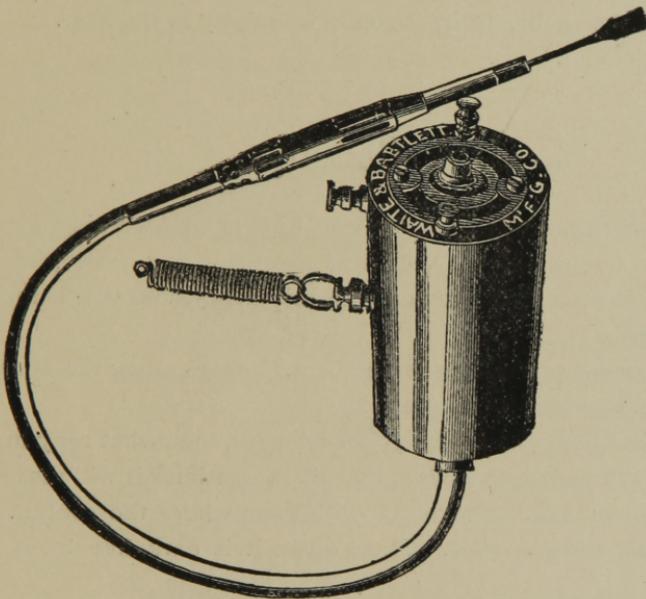
There are certain growths, known as polyps, polypi, or polypoid, that are always found in the mucous cavities of the body.

They may be small, but are often seen very large. They become a source of serious mischief unless attended to early. They are met with in the ear, nose, maxillary sinus, vagina, rectum, and, rarely, in the larynx and throat.

They are always, I think, benign in their structure. There is the gelatinoid polyp, the most frequently met with. When snared away it is prone to return. But if taken off by electric cautery, and all of it is taken and the small ones surrounding it are killed, it never returns.

The fibrous polyp is met with in the cavity of the uterus. If removed with the knife it produces severe hemorrhage, an unpleasant feature, but if removed by cauterly, with the knife, shaped like a curette, at white heat, no hemorrhage will annoy the operator. They are inclined to return, and have been known to become malignant.

The granular polyp is never large, and is seldom found any place but in the ear and uterus. It is easily detached, and if it be



Nasal Electrode. (As suggested by H. Holbrook Curtis, M. D.)

in the ear a pair of plyers will take it out without trouble. If in the uterus I always use the cauterly.

The vascular polyp will be found in the nose and rectum. I do not recall having met with it in the uterus or vagina. It requires to be removed by the cauterly, as severe hemorrhage often follows, though it is nearly always small. I have never had one return after removal.

As all polypi act obstructingly, and, if large, may close the whole cavity, they should be removed at once. It should be the aim

of the operator in each and every case to get the whole of it, or it will often return.

With a good cautery battery, (and I greatly prefer the storage battery to a fluid battery, inasmuch as the desired heat may be decided on,) and the wire or knife placed in position while cold, although it may be impossible to see it when so placed, the operator knows the heat he will get when the circuit is closed, without an assistant to rock the elements in the fluid.

There is no danger in their removal, but care must be taken not to burn the surrounding tissues, particularly in the nose.

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## Ganglion.

This tumor will often be met with among working girls. It is known among the old ladies of the town as a "weeping sinew." Where it became christened with this lachrymose title is more than I can tell.

It presents a circumscribed cyst, situated along the course of a tendon, to which it is united.

It is filled with a thin, yellowish fluid, somewhat ropy in character, which looks not unlike olive oil. Sometimes it will resemble the white of an egg. I have met with them where the contents of the sac was entirely solid. Then again it is dark, like black currant jelly.

No one claims to know what causes the cyst to form, but I believe it is caused from a sprain, as it is so often found on the wrists of girls who work hard and have heavy lifting to do.

The former method of treatment consisted of bursting it either by firm pressure with the thumbs, or more frequently by holding the hand firmly to a table or the knee, and with a book, giving it a blow that would burst it. It was a cruel and unscientific method at the best. Often the blow would fail to rupture it, and the chances were ten to one that the patient had enough of it the first dose, and would not let it be repeated.

Now, when you get one you have a chance to show your patient

that your battery is good for something. Take your galvanic battery, and arm the *negative* pole with the electrode you use to remove moles, etc., and let the patient hold the positive pole in either hand. Let the needles project about one-half inch. Give from five to fifteen milliamperes (depend upon how the patient takes it) for ten minutes. You may be obliged to give it again in three or five days, and have to repeat the operation several times, but I never have had to give it more than twice.

It is a nice operation, and one that will give you a good name. The wrist will be the same as the other, with no scar nor any discoloration. It gives little or no pain, and the patient will be more than pleased.

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## A Bleeding Tooth.

Mary D., aged 20, an Irish servant girl, of hemorrhagic diathesis, had her second molar tooth drawn, and the bleeding, while not very severe at first, kept up for 48 hours, until she became alarmed. The dentist who drew the tooth did all in his power to stop the flow of blood, and sent to New York for advice. A pine plug was driven in the cavity, filling the whole space as far as possible, but after a few hours it broke out anew, and this time it was worse than before.

They sent for me. I took my cautery battery and went to see her. I found her very weak, the heart's action showing she had lost about all the blood she could spare, and live. With a pair of forceps I drew the plug from the jaw, and, while the blood came freely, it was no worse than with the plug in situ.

I took my battery, and armed the electrode with a dome wire, made about the size of the hole in the gum. After heating it to a white heat, I inserted it as far down into the hole as I could. I did not keep it there longer than was necessary to burn it well, and to see that the stream had stopped.

I remained with her for an hour. She went to sleep, and after seeing that she was all right I returned home. I left word if it broke out again to let me know immediately. The next day I called and

found that there had been no more blood lost. She recovered nicely, and at present is living in this city.

I feel sure she would have bled to death but for the cautery. The operation is simple, and any one can do it. It is a nicer operation than to cut down and ligate—a much quicker operation, and I think a safer one.

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## The Morphine Habit.

When you get a patient who is a morphine fiend, and wants to be liberated from bonds that are worse than living in Siberia, you have a case that will try all your patience, all your Christian principles.

He will lie, (I speak of the man morphine has made, not the man that he was before he become addicted to the habit,) and he will steal, if by doing so he can ease that devilish craving for the drug that has stolen all his manhood from him.

He may and does try to give it up by slow gradations, but when it comes to the falling temperature, the cold sweats, the shivering, the poor devil must succumb, and again he is back to his former dose, and beyond it. Again and again he tries, but like the fly in the spider-web he struggles to give up in despair.

God help him! for unless he falls into the hands of one who is humane, one who knows the terrible hell he is passing through, knows all that he suffers, and becomes his friend without the thought of how much it will net him in dollars and cents, he has little to look forward to but torture so acute that it is fiendish.

There is one way by which he can be cured if followed with the determination to save him.

First, secure his utmost confidence. Find out how much he takes each day, and begin by cutting him down one-half. Watch him, and make sure that he cannot get a grain unless you give it to him. You will find that he will get along with one-half, and feel better than while taking enough to keep him half drunk all the while. Look out for his kidneys and bowels.

In five days again cut him down one-half. Here begins your

first hard struggle. He will grow cold, and nothing you can give him will increase the temperature, but morphia. Your galvanic battery will do what medicine will not do. Let him hold the *positive* pole in one hand, and apply the *negative*, armed with a large electrode of carbon, covered, all over the body. In fifteen minutes he will have lost all the "goose flesh," and the thermometer will indicate normal temperature. Give the current as strong as he can take it without pain; if you hold the electrode still he will complain that it burns him. Repeat three times a day, and in a week's time you can again reduce the quantity one-half. Now the battery will be needed several times a day. Each time you cut it down the more he will need the current.

Do not think you will cure a patient of the morphine habit with electricity alone, because if you do you will meet with failure every time. It is the best thing, however, to overcome the falling temperature and the nervous condition.

You will find many symptoms that will call for active treatment. The bowels will give you trouble, the kidneys, the stomach, and the loss of sleep. For sleep, apply the battery at bed-time, and give a dose of sulphonal.

Each time you lessen his supply of morphine you will need to increase the current. The first day you may have trouble, but each day you can let up on the electricity, until he can get along without the battery, then again cut down the dose. In two months you can stop the morphine entirely. Give the battery every day for a few days, with proper medical treatment in each individual case, until the patient can sleep well, and his bowels and kidneys are all right.

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## Constipation.

For constipation, take your faradic battery and give the patient as strong a current as he can take without pain. Apply one pole (it makes no difference which with this current) stable, and the other pass all over the bowels, as high as the sternum, down to the pubes and around to the back on both sides.

Give it over the liver as strong as he will bear it without a decided flinching away from the electrode. Repeat it every morning, and keep it up for from ten to fifteen minutes each seance.

After the third, or perhaps fifth, time you will find that the bowels will move every morning, with a decided improvement in the peristaltic action. The action will be continuous and last for weeks, but it is the better way to keep up treatment for some time. Impress this fact upon the mind of your patient, that it has taken years of abuse to get the bowels in their present condition, and it will take at least weeks to cure it.

Mrs. R., living in Boston, aged 35, came to me to be treated for obstinate constipation. Her husband informed me that he "had spent a fortune on her case, without any permanent relief." I began with my faradic battery on the 23d of March. The 5th of April she told me she was "all right," that she "had an operation every morning before breakfast." I kept her to the work for three weeks more, every other day for the first two weeks, and twice a week the rest of the time. I sent her home the 5th of May, feeling that I had cured her. That was five years ago, and I get a letter from her husband once or twice a year, telling me "she has never had any trouble since."

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## Buboes.

Our grandfathers always opened a bubo with a lance, and the more it pained the patient the more likely would he be to go and sin no more. But our grandfathers did many other things that would be called butchery now. They used to bleed a patient, and, what was worse, they would use an old-fashioned spring lancet. They would place it as near the right position as they could, and, after commending the patient's soul to God, would bang away.

To-day we open a bubo with the electric knife. It is less painful, and much the better way for this reason: the drainage is facilitated, because the opening does not tend to heal by first intention, nor nearly so rapidly as when opened by the ordinary bistoury or scalpel.

The heated wire or knife is thoroughly aseptic, and the severe hemorrhage sometimes met with in using the knife is avoided when we employ the cautery.

The cautery knife is a safe and efficient therapeutic agent in all cases of this kind.

You must have several different shaped knives to choose from. If you have a Piffard battery you will need an assistant to attend to it, but a storage battery you can manage yourself.

Do not attempt to operate with a knife too cold, nor must it become too hot, it should be past the red heat, and just reaching a white heat.

For knives, I purchase several inches of No. 30 platinum wire and cut off as much as will make one. I then, with a hammer and a solid piece of iron for an anvil, pound it in the middle till I get it the shape I want, and as thin as necessary. Some I make the shape of a curette, others as the case may require. In this way I always have what I want, and am ready for anything that comes along. They must be as thin and light as possible, as it is hard to heat a heavy knife that is no better than a light one, and costs more. The old and short pieces can be sold for old platinum, and you can get a good price for it.

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## Neuralgia.

It is strange, but true, nevertheless, that any pain in or around the head, the origin of which cannot be readily ascertained, and even if known, and known to depend upon central lesion, is called neuralgia.

I shall speak of neuralgia under the different heads, according to the position and branches of certain nerves. When the electric current is applied to a nerve it follows it the same as the current follows the telegraph wire. To do this one pole should be at one end of the nerve, and the other pole at the other end.

First—Neuralgia of the fifth pair.

Either division of this pair may be the seat of disease, and the whole ramifications of this wonderful pair may be afflicted.

Take the ophthalmic division. It is distributed to one side of the nose, the eye-lids, the lachrymal gland, the globe of the eye, the scalp.

The ciliary ganglion communicates with the nerve, and it connects with the superior maxillary branch by anastomoses.

Certain parts of the nerve or branch may be more painful than other parts, and there may be pain in one part and then a space free from pain, and again another painful spot in the same nerve.

When a nerve passes through a foramen in a bone, or penetrates a fascia, these points are liable to be the seat of severe pain. This will be seen in the ophthalmic nerve, as there are several points to be found where pressure upon the nerve will cause great pain. The most prominent of all these points is where the nerve passes out of the supra-orbital foramen to distribute its terminals over the forehead.

Another is seated in the upper eye-lid.

Another in the nasal branch, as it passes through the nasal bone and cartilage (where they join).

Another in the eye-ball, and still another at the inner angle of the orbit.

These are peculiar to the ophthalmic branch, situated near the parietal eminence, which corresponds to the inosculation of other branches.

Hemicrania is the most common form of neuralgia of the ophthalmic branch or division of the fifth pair.

It comes periodically; so much so that it is often attributed to malaria, and the sheet anchor, quinine, is given in full doses, but seldom gives the desired relief. The pain, while severe over the frontal bone, is greatest at the point corresponding to the supra-orbital foramen, and at the parietal eminence.

The pain comes in the morning, and will last all day, being at its height about noon, disappearing at bed-time or before. No doubt it is from this peculiarity it is so often called by the laity "sun-headache."

Bright light, loud noise, sudden movement, stooping or straining

will greatly intensify the paroxysms, and photophobia is not unfrequently met with.

Often toward night nausea will set in, and if the patient can vomit he feels that he is on a high road to recovery, when if it had occurred early in the day it would be found to be of little good.

It is for this reason it has received the name of "sick-headache" (migraine).

In a few cases it will be confined to the eye-balls. It seldom lasts more than twenty-four hours.

Neuralgia of this branch can be driven out in twenty minutes if properly treated. Take your galvanic battery, and place the *positive* pole over the most painful point, and the negative pole hold over the nerve at points where it comes the nearest to the surface. Give a mild current of from five to ten milliamperes, and continue it for twenty minutes.

I approve of constitutional treatment, but that will do for the future, together with electric treatment. For the present, nothing will take the place of the galvanic current properly applied.

Be sure and keep the *positive* pole nearest the terminals of the nerve under treatment, and do not try to treat the whole head, but give your attention wholly to that one branch, and you will succeed.

Then you will meet with cases where the pain is all in the superior maxillary region. This division is distributed to the upper jaw and teeth, nose and upper lip.

Some few terminals supply the temple, and often the most intense pain will be at that point.

To treat this division place the *positive* pole over the nerve where it emerges from the infra-orbital foramen, to be distributed to the lower lid, etc. Place the negative pole over the highest point of the malar bone, where the nerve is very superficial.

If necessary, place the positive pole, armed with a metal electrode, at the points on the gums of the upper jaw where the nerve is the most superficial, and under the palate.

For the inferior division, you must know this is distributed to the lower jaw, teeth, tongue and sub-maxillary gland. It is connected with the sub-maxillary ganglia.

Place the positive pole on the auriculo-temporal branch, just in front of the ear, for ten minutes; then change it to the inferior dental nerve, where it emerges from the inferior dental canal, through the mental foramen, and keep it there for ten minutes.

You will find facial neuralgia about five times as frequent in females as in men. When found in the male it is much harder to dispose of, but it will give way to electricity, which must be given with a perfect knowledge of all the anatomical points, and the current to be used, and time to administer it.

When you find a man over thirty years of age with facial neuralgia, look out for syphilis or gouty diathesis.

There is one form of facial neuralgia that will be troublesome, and one you may fail entirely to cure. I speak of "tic-douloureux."

The pain in this form of neuralgia is simply hellish. It is caused, at least sometimes, by the bony structure pressing upon the nerve filament as it passes through the foramen. I have a patient that has been a sufferer for fifteen years with "tic-douloureux," and though he has been to Europe, and everywhere, he has never had any relief from pain. He would draw his face in all manner of shapes while speaking, eating, or sleeping. About two years ago, I divided the fifth pair, and the pain has left. So has taste, smell and hearing on that side. He is well now (of the neurosis).

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### Cervico-Occipital Neuralgia.

In this form of neuralgia it is the sensory branches of the first four cervical nerves that are the cause of the disease.

The nerves are distributed to the occipital and posterior parietal regions. I have not had as good success in treating this form of neuralgia with the galvanic current as I have with the static.

When I get a case of cervico-occipital neuralgia, (and it is easy to diagnose, as the pain will nearly always give one an insight into its locality; then when the spasm has passed away there remains a dull, heavy pain which continues for days,) I give the electric bath with static insulation. (See description.) This will work wonders. I have seen a spasm cut short in ten minutes, and it did not return again for months.

### Cervico-Brachial Neuralgia.

The cervico-brachial nerve comes from the five lower cervicals and the first dorsal to form the brachial plexus. It is distributed to the subclavicular region, and supplies the mammary gland.

The greatest pain will nearly always be the axillary in armpit, in the scapular region near the inferior angle, and at the acromion process. It may extend to the median cepalic in the bend of the elbow-joint, the ulnar nerve at the back of the elbow, and the radial where it becomes superficial at the lower forearm.

Treat this with the galvanic battery. Apply the *positive* pole to points where pain is most severe, and the negative pole nearer the body. Fifteen to twenty milliamperes will be strong enough, and half an hour long enough. Repeat every day, or at least every other day.

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## Description of the Galvano-Faradic Batteries.

In the bottom of the box is a movable tray in which the cells are placed. This tray is controlled by two hinged rods which are fastened to it, and these by two lifting rings at the ends of the rubber table.

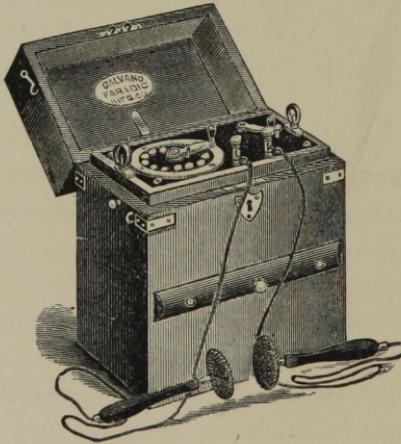
These rings, being screwed tightly down, hold the cells firmly against the hydrostat, or being loosened, allow the hydrostat to be removed from the front of the centre of the box; they also serve as handles to lift the tray of cells.

The zinc and carbon plates are arranged in couples, and fastened to a base under the rubber table. Wires connect the elements with the button within the circles on the rubber table, each button corresponding to a cell. These wire connections being incased, the fumes from the fluid cannot reach them; *consequently no corrosion can take place, and the battery is always ready for use.* To use the battery, draw out the hydrostat and raise the tray of cells, thus immersing the elements in the fluid. To bring any required number of cells into the circuit, turn the current selectors to the figures marked on

the circles. Before the selector leaves one button, it is on the next, *thus insuring a gradual increase of the current without the possibility of a shock.* All of these galvanic batteries are provided with a commu-



24-Cell Battery.



12-Cell Battery.

tator or polarity changer. The hydrostat is perfect, and they can be carried about without danger of spilling the fluid.

The case of electrodes on next page contains a very good set

of those often used. Put up in a neat case, they are easily kept track of if they are cleaned and returned to their places each time after using them.



Case of Electrodes.

This case contains :

- |                        |                  |                      |
|------------------------|------------------|----------------------|
| 1 Interrupting Handle, | 1 Ear Electrode, | 1 Uterine Electrode, |
| 1 Eye-Cup Electrode,   | 1 Rectal “       | 1 Wire Brush,        |
| 1 Vaginal “            | 1 Tongue-plate,  | 1 Ball, 2 Olives.    |

## A Good Faradic Battery.

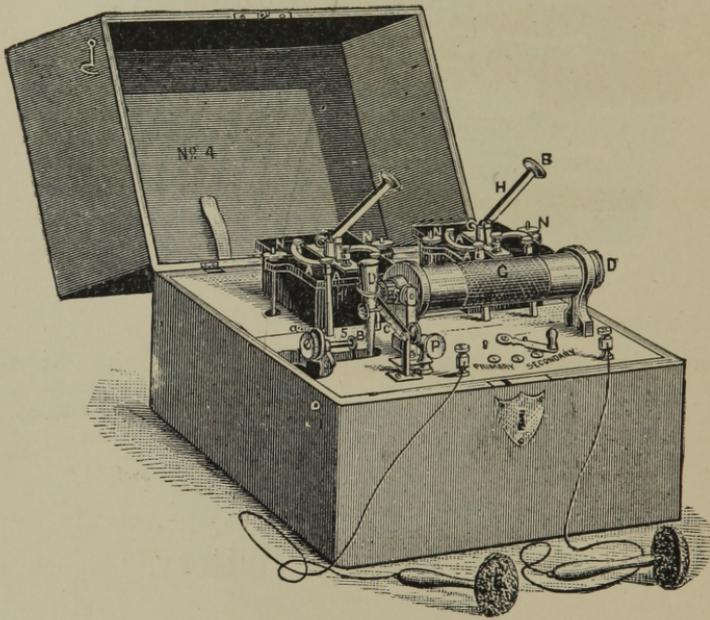
The No. 4 machine is the best for physicians. It has two cells (see next page). In case one becomes broken or exhausted the other is in reserve. The two cells can be united when great power is required. This has very powerful primary and secondary coils, gives four variations of the current and has both rapid and slow vibrators.

This is a good battery. I purchased one like it fourteen years ago, and it is in use yet. Of course many parts have been renewed, but it is a battery that one can rely on, and, for a fluid battery, it is as good as any made.

## How to Abort a Chancre.

It is not always easy to diagnose a chancre in its earliest stages, and it may be mistaken for herpes, eczema, balanitis, simple excoriation, a fissure, or abrasion, the result of friction or other accidents.

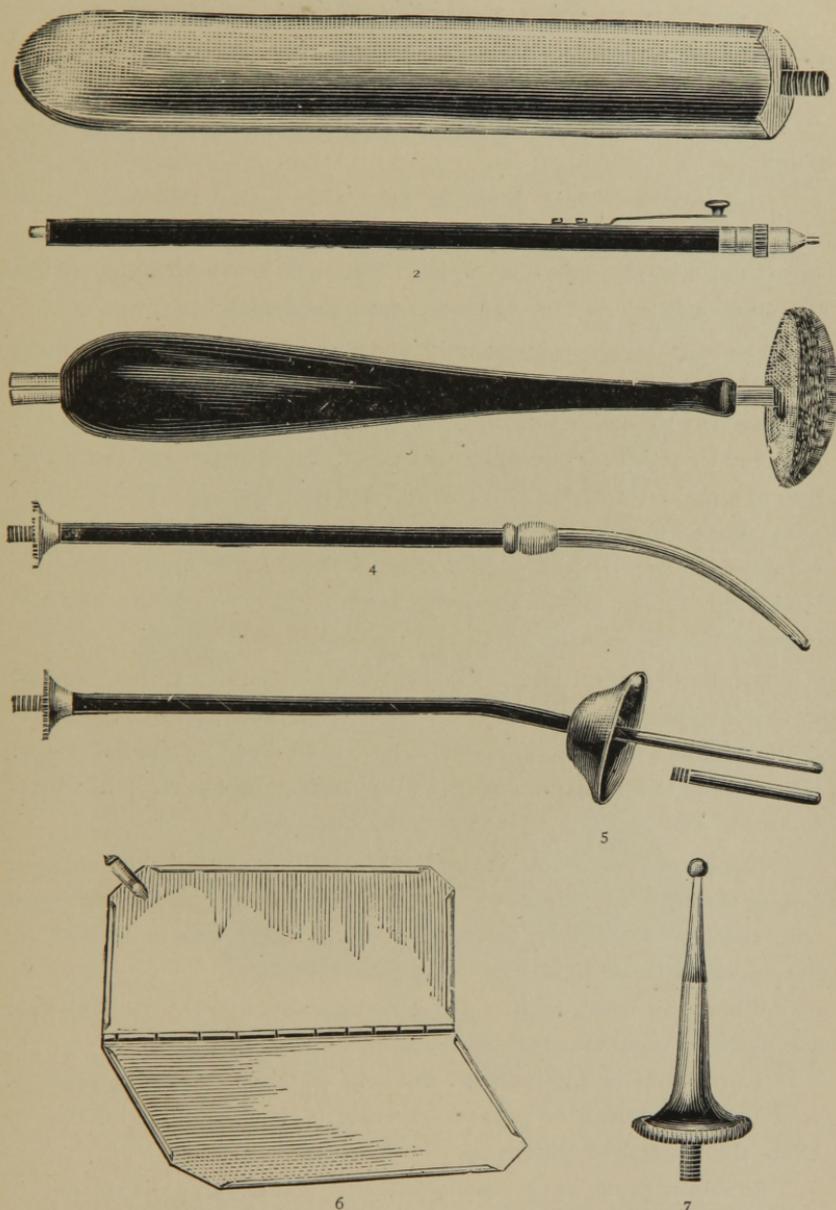
The abortive treatment of chancre consists in effectually eradicating it before the fifth day from the inoculation, to prevent



No. 4 Battery.

the constitution from absorbing the virus (a specific poison) into the system.

If the poison enters the lymphatic vessels, constitutional contamination will be inevitable, and the result will not only be felt during the whole future life of the patient, but will be seen in his children, and his children's children down to the third generation. I believe the Bible means syphilis, when speaking of "the sins of the fathers shall be visited upon the children even to the third and fourth generation."



1.—Vaginal electrode ; 2—Needle Holder, for holding fine needles ; 3—Plain Handle, with sponge-covered disc ; 4—Intra-Uterine electrode ; 5—Intra-Uterine electrode with adjustable stems ; 6—Metallic Foot-plate ; 7—Aural electrode.

In addition to these, Figures No. 13, 15, 16, and 17, on page 35, and 18, 19, 20, and 22A, on page 37 of this book, are also used in connection with the Galvano-Faradic battery.

It should be an object of earnest solicitude on the part of every practitioner who has a chancre to treat to prevent the absorption of the poison if within his power. The happiness of a wife and children are in his hands, and, if he neglects his duty, he is to blame.

The treatment laid down in your text books will tell you to dissect the chancre out, and with acid nitrate of mercury, and other eschrotics, to kill it and heal it up. This will do it perhaps, but it is a slow, painful, and not always a sure treatment.

The *cautery battery* is the only sure, quick and almost painless method of eradicating the whole business. Take your knife shaped like the curette and heat it to a white heat. If it is red hot it will be far more painful than when white hot. Be sure you get the whole lesion, and do not hesitate to take off another thin slice if there is a doubt as to its being all out. Dress as for any burn. It will slough off and discharge for a few days, but will heal kindly, and when it is healed you have accomplished what would take you longer by the old method, which would not insure complete eradication.

If, on the second or third day after the operation, there should appear bright red spots, with a thin, whitish discharge at the base, with perhaps a look as if black pepper had been sprinkled on it, immediately cauterize that spot and its surroundings with a white-hot knife with the flat surface applied to the sore.

The above treatment is applicable only when you commence before the fifth day, and seek to abort it and keep the poison from the system, as *gentle* treatment at all other stages should be employed, with cleanliness.

When you meet with a serpiginous chancre you will find that you have an obstinate and troublesome sore to deal with.

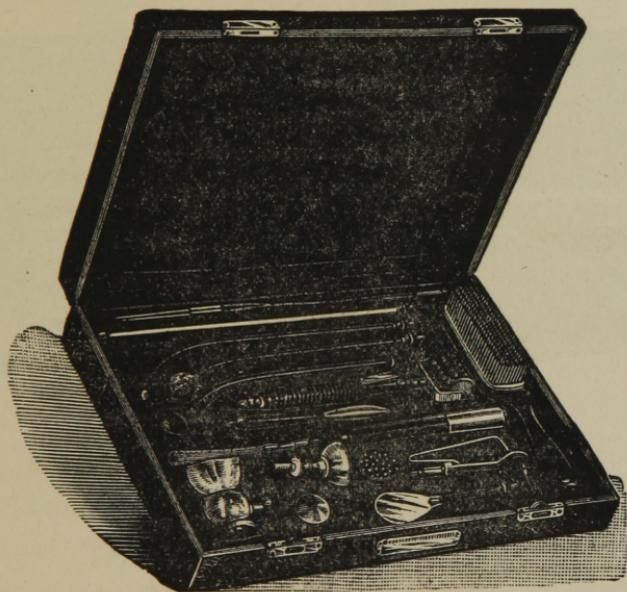
The best local application I know of in these obstinate cases is a saturated solution of potassio-tartrate of iron, applied on two or three thicknesses of patent lint.

Should it prove very obstinate, (and it will nine times out of ten), cauterize the whole surface with the hot wire (knife made flat and bent so that it can be brought in contact with every spot). This will change the nature of the sore, and will start healthy granulations.

Keep up constitutional treatment, and, above all, there should be perfect cleanliness. As long as the pus looks laudable let good enough alone, but if it becomes at all thin and stained with blood, take the hot point of the knife and touch all spots that require it. Should there be an inclination to spread, cauterize the edges with your white-hot wire.

On the diphtheritic chancre, you will seldom, if ever, need to use the cautery.

The indolent chancre will show deficient action, and while it may depend upon the condition of the patient, and may take on



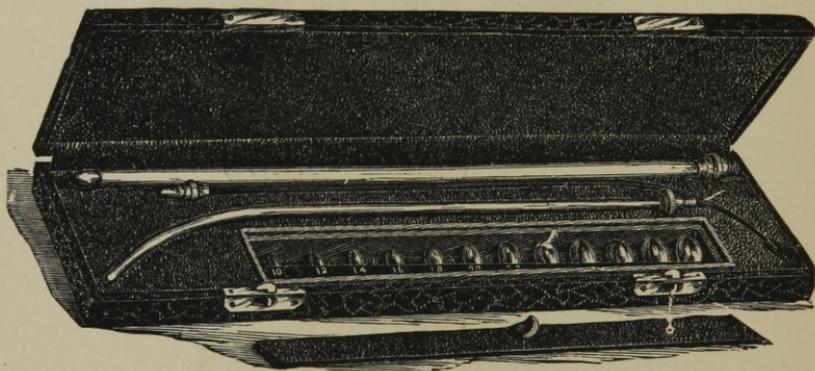
Case of Electrodes.

healthy action if the patient is toned up with tonics, it will be the safest way to cauterize the whole surface of the ulcer, and thus promote healthy granulations while you treat the patient with tonics.

Some recommend cutting off the hardened, shelving edges with a sharp pair of scissors, and cauterizing the incrustated surface with the nitrate of silver. They then cover the sore with blue ointment. I do not like this way of doing it. It is not to be compared

with the galvano-cautery, and the dressing makes a dirty mess of it. Cleanliness is half the battle, and cautery, prompt and thorough, is the other half. Take your curette-shaped knife, and cut off the hard, serrated edges, and see that it is not undermined around the sides of the sore leaving a space under it to conceal filth.

The indolent chancre is more frequently accompanied with a hard, indurated base than any other. It will often continue long after the ulcer has completely cicatrized. Don't let it stay there. Take your galvanic battery and thrust into the chancre two needles attached to the *negative* pole, and destroy it by electrolysis. Give about fifteen milliamperes for ten minutes. Either do this, or take



Case of Electrodes for Stricture.

it out with the electro-cautery. Use a white-hot knife. Your own judgment will tell you the shape of the knife to be used for each case.

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## Hemorrhoidal Tumors.

Hemorrhoids will be met with in all classes of society, in all states of health, at any age, and in both male and female. When they are mild they cause little trouble, but when it comes to tumors they need prompt action, and excision is the only sure cure.

Hemorrhoidal tumors are of a close, spongy texture, similar to that which surrounds the orifice of the vagina, and are somewhat erectile like it. They have no internal cavity.

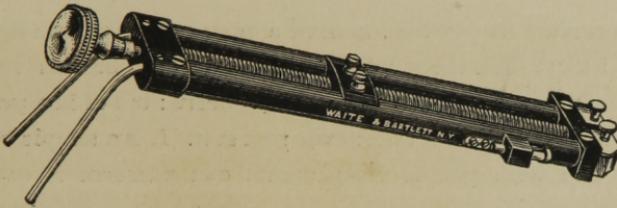
Take your cautery battery, and let the loop (use small wire) be drawn tight before heating it. When ready, heat the wire to nearly a white heat, and cut the tumor off. There will be no hemorrhage.



Cautery Electrode.

Take the next one, and so on, until they are all off. Dress the same as you would a burn. Witch hazel unguent will a good dressing.

This is a radical cure, and, in my opinion, it is as good as any.



Large Cautery Loop Handle.

## Fistula.

Fistula may be either complete or incomplete. When you find one that is complete you will not need much of an operation to cure it. Many prefer to cut it with a probe-pointed bistoury, but the better way is to use the electro-cautery. When you have decided to operate, have everything ready. Pass one end of the wire through the fistula from without, inward and upward. With a proper speculum the end can easily be caught and brought down, and fastened to the electrode. Make it as tight as possible without severe pain to the patient.

I have had doctors tell me they had fistulas the opening of which was two, and sometimes three, inches up the rectum. I must say I think they were mistaken, as out of over one hundred I have operated on, I have never seen one over three-fourths of an inch from the sphincter.

As soon as ready, heat the wire and quickly cut through. That is

all. Unlike a clean cut, it will not heal outside first, but will discharge like a burn, and heal from the bottom. Keep the bowels locked up for a few days, and use an injection when necessary.

Should it be a blind fistula, find the pocket, and at the most extreme point, cut through into the rectum, and operate as for true fistula. You may find an abscess pointing one or two inches down on the nates. Open it as soon as possible, and as



St. Clair Rectal Electrode.

near the rectum as possible, to save a deep cut when you operate for fistula. I have seen them where the abscess had broken itself, and I thought it best to employ an elastic ligature; but of late years I use the hot wire every time, and never regret it. It is a simple operation and any one with proper instruments can perform it easily.

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## Chancroid.

Chancroid, or, as Lancereaux would say, "false or local syphilis," should never be mistaken for true chancre. It is a distinct disease, and, in some respects, worse than chancre.

Of the three diseases, gonorrhœa is undoubtedly the most frequent. Next comes the chancroid, then the chancre.

The seat of this troublesome disease is most frequently in the neighborhood of the genital organs, and for good reasons. But if chancroid virus becomes inserted beneath the epidermis of any other part of the economy, a chancroid will follow just as sure as New York wanted the World's Fair and did not get it!

It is often found on the lips of both men and women. It is auto-inoculable, and any virus taken from the mother sore and carried to an abrasion anywhere, will take as quickly as small-pox.

It is treated with caustics, nitric acid, *lapis infernalis*, etc. But there is nothing that will make it let go its hold as quickly as the galvano-cantery. When you get a case of chancroid, take your

cautery battery, arm your electrode or handle with the dome wire, heat it to a white heat, and *kill* it the first time! If there be phimosis, so that it cannot be exposed, treat the phimosis with the knife, and the chancroid immediately after.

Miss C., aged 19, came to me with a sore on the labia majora. It was a small ulcer, cup shaped, with a thin, yellowish secretion. The edges were abrupt, jagged and undermined; its outline, circular; its floor of a grayish color, presenting slight elevations and depressions. I diagnosed chancroid, but dare not tell her so, for fear I was wrong. I inoculated her on the chest to avoid phagedæna, and awaited the result. In five days I had two chancroids to deal with. I took my cautery battery, and with the dome wire burned the whole poison out. I did not have to apply it again, and in a few days both ulcers were well, and there was not another one on her person.

She then told me how and when she got the first one. She had loved too well and not wisely. She was so situated that had I not cured her she would have been covered with them, and all caught from the first one. Nothing else will cure chancroids so quickly as the hot wire.

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## Fungus Growth.

Those who have large wounds to treat know how troublesome they become when fungus growth sets in. Many times this growth may be overcome by gentle compression, or, at most, some gentle caustic, but at other times nothing will do but excision.

This is an unpleasant operation, as hemorrhage is often severe, and the growth will return.

There is a sure and easy way to destroy all fungus growths without pain or the loss of a drop of blood, and leave the wound with healthy granulations.

Take your galvanic battery, arm the *negative* pole with two or three, long spear-shaped needles, and trust them through the growth to be removed as near the base as you can. Place the positive pole on the patient, or let him hold it in his hand, and give not more than fifteen milliamperes for five minutes.

Now take the shavings from a cow's horn (scrape them with a piece of glass till you have a good handful), wet them with water, and apply to the whole wound. Make a poultice of it, and bind it on at night, and next morning the whole lump will come off, leaving the wound looking healthy.

I have never known this to fail, and have seen it tried many times. During the late war I tried the poultice from the cow's horn many times, with the best results, so much so that it became the regular treatment in some hospitals. We knew nothing about electricity then, but since that time I find it is a great help, and these remedial agents never fail when used together.

While I was practicing on Staten Island, Mrs. H., from Jersey, came to me and wished me to see her son, who had fallen on a stake, and torn his thigh from knee to great trochanter. After the first dressing he had been for a long time without treatment. Proud flesh had set in, and the doctor who was then treating him could not



Munde's Combination Electrode.

keep it out. I went over, taking my battery with me. I found a fungus growth eight inches long, and the leg was in a bad condition. The family doctor came, and I inserted five needles with about ten milliamperes (I had to guess at it then), and applied the poultice of cow's horn.

The doctor wrote me in a few days, saying: "I never saw anything like it. Next day when I went to dress the leg, the whole piece came out in a lump. It is healing beautifully now." The boy got well, and had no more fungus growth in that wound. Try it. It will never fail.

## Malingering.

You may run across a malingering, and, if so, it stands you well to know how to treat them. It will not always do to tell parents that

their son or daughter is not ill, that he or she is playing on their sympathies, for the chances are they will believe their own, and send for another doctor.

Take your faradic battery and give the patient a current that will make it interesting for him for about ten minutes. The next day begin where you left off the day before, and increase the current until he thinks you intend to kill or cure. When you leave, express a wish that there may be an improvement by next day, if not you must double the dose.

The chances are that he will be better when you call again. If not, keep your word good and increase the dose. You will not injure him, for he will always give in before that point is reached.

During the late war many an old "coffee cooler" tried to play off sick, and would take all kinds of nauseating medicines, but when it came to applying the electric current with a view to making him cry peccavi, it was a grand success every time.

Some fifteen years ago, I was called to treat the eighteen-year-old son of a Mr. K. The father wanted the boy to go to college, and the latter was determined he would not go. The mother took sides with the boy. I found him suffering great pain, but he could not locate it very well. His health was as perfect as any boy's could be. I soon found out he was playing off on us all, and so informed the father.

"What is your bill?"

I told him, and was paid and discharged.

Of course I felt sorry to lose so good a paying patient, but what could I do?

Another doctor was called, and he treated the boy for two months. The time had passed for the college opening, and the boy got along all right.

The next year the same thing began with the time to start for school. The father came to me, and said: "Doctor, I think you were right last year, and I don't care to pay another hundred dollars if it is not necessary. Will you go over and take a look at Will?" I went, and I took my best faradic battery with me. I looked him over with care to make sure I was right in my diagnosis,

and began treatment. Three days later the boy expressed a desire to start for school. The members of that family are my patients to-day. The boy owned up, and said he thought I would kill him, so he got well. It is not an isolated case by any means.

The boy has grown to manhood now, and is one of our best electrical engineers. He often laughs and says, "but for Dr. St. Clair's electric wire-brush, I should never have been an electrician."

There are other reasons why one should be able to detect when a patient is trying to play off on the doctor. There are also other tests.

It often happens that we are called upon to testify whether a man or woman is really sick or lame, or playing off to get money. Take one who holds a position as medical examiner for an insurance company, (an accident insurance company, for instance). If he could not decide for certain as to the patient's condition, he could not fill the position long.

A patient may complain that he is suffering from paralysis of a limb, caused by a fall in a railway smash-up. The faradic battery will decide it very quickly.

A case which came under my care will explain. While living on Staten Island, I was called by the members of the German society in the town, of which I was examiner and general practitioner at the time, to attend a patient. The man was a large, two-fisted German, weighing over 200 pounds. He had fallen from the clay bank down thirty feet.

He had lost the use of his left arm. He could not eat without his food being cut by some one. I found the arm as large as the other. When I tried to move it either way he would screech at the top of his voice, and he threatened to strike me if I made an attempt to lift the arm.

I took my faradic battery and gave him a good strong current. I could see he tried to keep it from contracting, with all his strong will power, and was determined to take it without a tremble. I thought he had about all he could stand, and I drew the core out full length. With a whoop like a Sioux Indian, he threw his arm as high as his head, and struck out as if he was a near relation to Sullivan.

I cut the current off, and he shook his arm around and showed it to be in as good condition as the other, only that it was stiff from being held in one position so long.

I reported his case adversely, and inside of three weeks he was at his work again.

There are many cases where the patient may fool the best of us, but he cannot fool the battery. If I could not make him cave in, I would give him an anesthetic, and then the muscles would tell the truth, while he had no control of them.

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## Electro-Bioscopy.

The test for death is called "electro-bioscopy." There is no test, in doubtful cases, so decisive as the faradization test. It will indicate life or death with absolute certainty. Your faradic battery is the proper one to use for this test. The smaller it is (and yet a good one), the more convenient it will be. For this reason I like the Barrett faradic, as it can be carried as easily as a book, with no fear of spilling acid on your clothes.

Death is certain when the muscles have entirely lost their faradic contractility, while there is life when the faradic contractility is preserved, even if impaired.

When you find a decided diminution of contractility, and still it diminishes slowly as you apply the test, you may know death has but recently taken place, but that it *has* taken place there can be little doubt. Any way, a few minutes more will decide the question.

Crimotel found that in newly-born infants contractility often continued for from twenty to sixty minutes after death, at least after the heart had ceased to beat.

There is one thing certain, and that is, no disease, not even asphyxia, or poisoning of any kind, will abolish contractility in *all the muscles* before death.

When we remember how many persons have been pronounced dead, and were buried, or placed in the casket, and came to life again; to hear them relate the terrible horror of being able to hear

their friends talking without the power of letting them know they were alive, it is a pleasure to know we can prevent any such suffering in our patients.

Had the electro-bioscopy been tried on Bishop, *perhaps* it would have been learned that a great wrong had not been done him. Certainly his mother would have been spared a life-long sorrow. As it is, she will go to her grave firm in the belief that her only son was buried alive.

This test will allow the practitioner to determine positively as to the life or death of any drowned or asphyxiated person.

The test is so easy, so uncomplicated, that any practitioner can apply it without a possibility of failure. All that is necessary is to apply the poles of the battery to different parts of the body, over the phrenic nerve, over the diaphragm, and pneumogastric nerve and if there is no contractility, death is certain. If diminished and it grows less, it is safe to say death has taken place.

A case in point will show how necessary it is to be able to decide as to life or death, not only for the happiness of those immediately concerned, but yourself as well.

Eight years ago I was called to see a lady who, apparently, had died five days before. She had been placed in a casket, and all but her mother pronounced her dead. The mother said: "A few years before, she had lain for three days as dead and had revived at night without treatment, and I feel she will do so again."

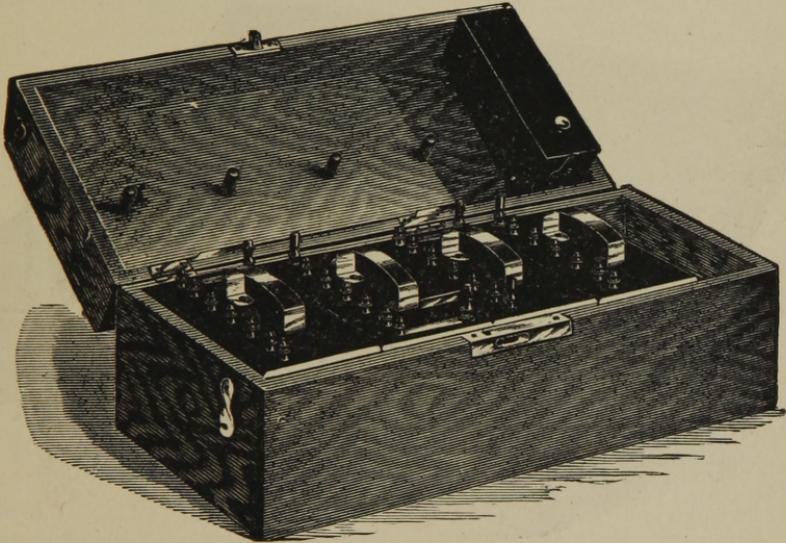
The body was cold and looked as though dead. There was some rigor mortis (so supposed). All known tests had been made, and the doctor, a man of 68 years, was somewhat indignant to find they had called in other help. I took my little Galvano-Faradic battery along with me. I could see a look of scorn on the old doctor's face when I began to apply the current. I found contractility almost normal in every muscle I applied it to. I looked at the doctor, but it was all Greek to him. He did not know what I was trying to do, but remarked: "Well, she don't get up very fast." "No," said I, "but *she is alive*, and must be taken to a warmer room."

I called the same evening, and applied the galvanic current, as I also did the next day, and every day for a whole week. Some thought

I was wrong, but the mother clung to me as though her very life depended on me alone. I said she should "never be put in the grave so long as I could get a contraction with my battery."

The old doctor went to New York and saw Dr. Rockwell. He told him that "if there is contractility when the doctor gives her the faradic current, *she is not dead.*" The doctor told me this months after.

On the sixteenth day she had a flush on her cheeks, and the heart began to pulsate. She came out all right! The first thing she said, after kissing her mother and thanking her that she would



Twenty-four-cell Galvanic Battery.

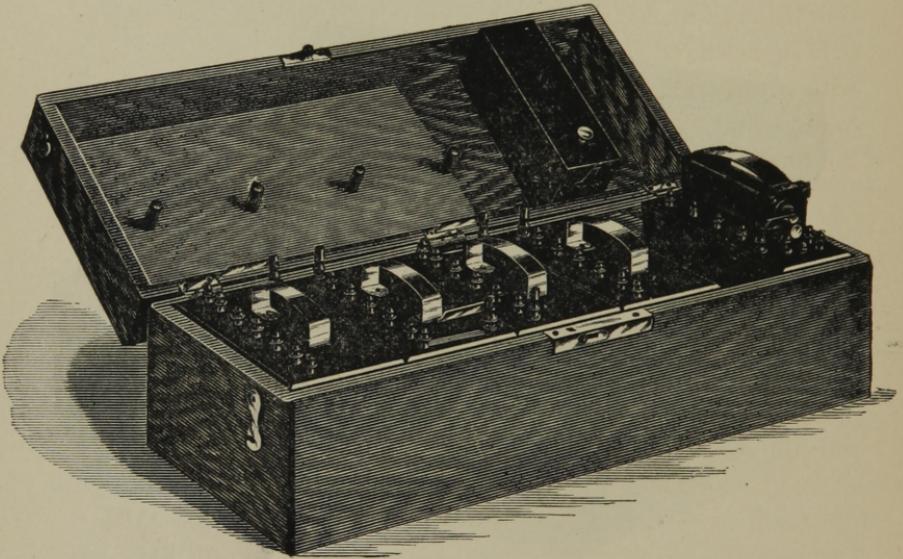
not let them put her in her grave, was: "Where is that doctor who said I should not be buried?" She had been able to hear all that was said from the first.

I was made a present of a nice fee, and to-day mother and daughter are among my warmest friends.

If I never have another case (though I have had several, but not like this one), I feel amply repaid for all my study on the electric current. To know that one life was saved by my little \$27.00 battery is a pleasure not to be purchased with money.

## Two McIntosh Batteries.

The twenty-four-cell galvanic battery has the same style of case, finish, electrodes and cords as the eighteen-cell battery. Case is 18 inches long,  $8\frac{1}{4}$  inches wide, and  $7\frac{1}{4}$  inches high, with lock and handle and hard-rubber electrode case; weighs less than 20 pounds. This battery gives a galvanic current of great intensity, sufficient to treat any case where it is indicated.



Twenty-four-cell Combined Galvanic and Faradic Battery.

The twenty-four-cell combined galvanic and faradic battery has the same style of case and finish as the above,  $20\frac{3}{4}$  inches long,  $8\frac{1}{4}$  inches wide,  $7\frac{1}{4}$  inches high, with first-class faradic coil, polished hard-rubber ends and cover, extra large cell to run the coil, sponge electrodes, cable conducting cords, and hard-rubber electrode box. This battery gives same intensity of galvanic current as the above, and a faradic current of sufficient strength to treat any case. It weighs only 24 pounds, and is perfectly portable.

I have both of these batteries, and they are good ones. I think

I like the hydrostat better than I do the drip-cup in these batteries, as the drip-cup will fill slowly unless closely watched, and will eat the zincs as far as the fluid reaches. But they are good enough for me, or any other practitioner, unless he can get better. Always buy the best, no matter who makes it.

---

## A Word of Caution.

You should always use caution when passing the galvanic current through the brain. The best way is to have the negative pole held in the hand of the patient, and with the positive pole (armed with a large electrode, covered with sponge or absorbent cotton,) held in your hand, start with a very mild current, and lightly touch the forehead, and withdraw it instantly.

Should the patient be one who is sensitive to the electric current, he may exclaim, "Oh, Doctor, I see flashes or sparks every time you touch my head." If so, the current is strong enough, perhaps too strong.

But if he does not see the flash, turn on a few more milliamperes, and increase it until he does see it. Give him at least fifteen milliamperes, and that will cause him to see flashes, unless there is something radically wrong.

Central galvanization is where you will send the current through the brain more than any other. Central galvanization consists in bringing the brain, sympathetic, spinal cord, and pneumogastric, under the influence of the galvanic current. Place the negative pole over the stomach, and the positive pole to some part of the head or neck.

In all cases of cerebral excitement the positive pole should be applied to the head, but great caution must be used. Remember, the head and face are more impressible than other parts of the body, particularly with the galvanic current. Always begin with a nearly imperceptible current and increase it slowly.

If the patient has it strong enough he will complain of a coppery taste in his mouth.

Galvanization is a powerful remedy, and, if it does no good, it will do positive harm if given too strong. (With the positive pole applied to the top of the head it reduces the blood in the brain.) If given too strong, or too long, it will produce dizziness; and then if continued the patient will become unconscious, and remain in a condition of syncope, from which you may find it hard to restore the proper circulation.

If you see the face growing pale, with long-drawn sighs, it is best to change the positive electrode to the stomach and the *negative* electrode to the top of the head for not more than two minutes.

Some persons cannot stand central galvanization at all, but you will find out the idiosyncracies of these people and be governed accordingly.

---

## Asphyxia.

You will meet, with asphyxiated patients at times, and your faradic battery comes in handy in these cases. There are several ways by which a patient may become asphyxiated. Among them may be enumerated:

- |              |   |                                  |
|--------------|---|----------------------------------|
| Over-dose of | { | Chloroform.                      |
|              | } | Opium in some of its many forms. |
| Exposure to  | { | Fumes of charcoal.               |
|              | } | Common street gas.               |
|              |   | Hanging.                         |
|              |   | Drowning.                        |

Whenever you are called in a case of this kind always take your faradic battery, and along with your electrodes be sure to take your wire-brush scourge.

Place one pole (it makes no difference which with this battery,) over the phrenic nerve in the neck, and the other over the diaphragm (seventh intercostal space). Give a strong current with rapid interruptions. Practice Hall's ready method if you like, particularly if the patient has been drowned. Keep it up for twenty minutes, and increase the current if there is no movement of any kind.

If there is a redness in the face keep it up for hours, if needs be.

In a case of asphyxia from gas, lay the patient in a draught. Let some one whip him with wet towels, and apply the battery as above until he draws a full breath.

A family living in my own block called me one morning in winter, about 5 o'clock, saying the nurse girl had blown out the gas before going to bed. They had just found her after six hours' exposure to the fumes of the gas. I went over, and if ever a patient looked as if dead and past all help it was that one.

She was seventeen years old, very stout and full-blooded. She was black in the face, and there was froth around the lips. I could distinguish a faint flutter at the apex of the heart. I stripped her and laid her on a bed in the hall-room. The battery did not appear to even contract her muscles. I applied the current strong, and if I ever worked to save a life I did that morning. I worked five hours, and brought her through. I am certain that nothing but the electric current acting on the diaphragm ever caused her to breathe again.

She has told me since that she could feel the current long before she could talk, and that a warm glow, unaccompanied by any pain, was what she felt, though I applied a strong current.

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## Poor Circulation.

You will often have a patient (nearly always a male) come to you and tell you that as soon as the weather begins to be cold, his fingers on one, or perhaps both hands, get cold and numb.

Upon examining the hand you will find it cold, the nails blue and showing impaired circulation. It is a bad disease, for if he has to work out of doors, he suffers more than one could believe.

There is no medicine that will touch his case. If it be a lady you will find some uterine trouble at the bottom of it all. The lower limbs will also be cold. Direct your attention to that portion of the anatomy, replace the organ and apply the galvanic battery, about twenty milliamperes for ten minutes every other day, and you will overcome the trouble.

But with a man it is a different matter altogether. Take your faradic battery and, using the wire-brush electrode, begin at the spine. Give it as strong as he can take it without flinching. Keep it up for half an hour, and end the seance by applying both poles to his hands.

By the time you are through he will be in a glow, and the hands will be warm. Renew the treatment every day for two weeks, and it will be a bad case that you do not bring out all right.

The coldness is due to a sluggish circulation, and nothing will quicken the latter sooner than the faradic current, which, if continued, will cure it.

W. K., aged 25, came to me with both hands as cold as those of a dead man. He was cold even in warm weather. Any one who shook him by the hand could not help feeling he was half dead. I began with a good strong current, and kept it up for a month. At the end of that time he was as warm-handed as most thin persons. What is peculiar in his case is that he weighs twenty pounds more now than he ever did before.

I have seen cases where but one finger would be cold, and one case in which but half a finger would get cold and pain the patient as if half frozen. I have never seen a case in which circulation did not improve after using the battery.

---

## Therapeutic Action of the Two Poles.

I have a letter before me from a physician living in the far West. He says: "I cannot remember which pole to use. For stricture, I know the *negative* pole is the one to insert in the canal to absorb the stricture, but the very next operation I have to do, unless it be electrolysis, I cannot decide which to use, and can find no work that gives me the desired information."

In answer to the above, I will say this. One must bear in mind these facts with others.

First—That there is a difference in the therapeutic action of the two poles as great as the chemical action.

Secondly—That oxygen is generated at the *positive* pole, and hydrogen at the *negative* pole.

Thirdly—That the *positive* pole attracts acids from the tissues, and that the *negative* pole attracts alkalis.

Fourthly—That the *positive* pole will coagulate, while the *negative* pole will liquify.

The inter-polar action of the *positive* pole is anodyne, sedative, denutritive, anti-hemorrhagic, and alterative.

The inter-polar action of the *negative* pole is congestive and stimulating, thus absorbing by increasing the supply of blood.

The polar action of the *positive* pole is styptic and caustic if high currents are employed.

The polar action of the *negative* pole is strongly electrolytic, and liquifying. The result will be chemical decomposition of the tissues when mild currents are employed.

If one will learn and remember these few points, with experience he will have no trouble to decide which pole to make the active one.

First, decide what you wish to do. Do you wish an electrolytic action? If so, use the *negative* pole. Should you wish to produce an anodyne or sedative action, apply the *positive* pole near the spot, and the inter-polar action will be the one desired.

When you come to the gynæcological work, then the beauty and power of electricity for good is fairly shown. But I do not intend to go into that, only to teach the new beginner such points as will come into his every-day work.

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## Ectopic Gestation.

It is not my intention in this work of trying to settle the vexed question of the treatment of ectopic gestation by electrolysis. That it can be done, and that the electric current is to be preferred to laparotomy, there is no question among some of our best gynæcologists. I shall leave that for other writers and advise the practitioner to try and settle the question for himself.

Remember, text-books do not contain all the information you should acquaint yourself with; they are but the foundation stones of knowledge in their particular branch; you must read, study, and experiment for yourself. The knowledge thus acquired will be of great value to you, and you can give it to others who have not gone so far in the science of electricity.

Educate yourself up to the highest point in electric science, and it will repay you. "But," says one, "there are so many electricians now." Very true, but so much the better; you can help each other, and "there is plenty of room at the top."

The field for the application of electrolysis is a large one. In all cases where you wish to act on subcutaneous tissues without injury to the skin, it is the only thing to use.

In all cases of soft, strumous tumors, electrolysis is the agent that will give the most perfect satisfaction.

In the treatment of utero-pharangeal tumors, enlarged, prostate, naso-pharangeal tumors, and strictures of any kind, except spasmodic, electrolysis stands to-day unrivalled as a remedial agent.

In the local absorption and destruction of tissues, it is equally good.

There are many others that will be mentioned as we come to them.

Remember, always use mild currents, or you may have a cautery action instead of electrolysis.

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## Hydatid Tumors.

Hydatid tumors (acephalocyst, signifying headless bladders) are mostly found in the liver, ovaries and uterus. They are met with in the mamma, brain, testicles, kidneys, lungs, and subcutaneous tissues. Gross reports one removed from the "deltoid muscle of a young student." They are all sizes, from the head of a pin to eight inches across.

They are made up of entozoon, that look not unlike a collection of small grapes. Gross describes the parasite as "studded on the

inner surface with numerous little bodies resembling diminutive fish-spawn, hardly as large as a grain of sand, of spherical shape, greyish in color, each consisting of a delicate cyst, filled with echinococci."

"Each echinococcus consists of a body and a head, the latter being encircled by a row of teeth naturally concealed in a narrow cleft, but capable of projecting itself. The teeth, or hooklets, are spinous, sharp, and perfectly characteristic."

I have met with several that were external, which I treated by electrolysis. The exploring needle and the microscope will decide the case for you. The hooklets tell the tale.

Miss Y., aged 18, German, had eaten raw beef, and was in the habit of eating pork. She had a large swelling on the right shoulder. Mr. K., her employer, sent for me. I took some of the fluid, drawn off with the exploring needle, and found I had a large multilocular, echinococcus tumor, and decided to operate by electrolysis.

I took my 36-cell Waite & Bartlett galvanic battery, and with five long, spear-shaped needles attached to the negative pole, with the positive pole held in the hand of patient, I started with five milliamperes, which I soon increased to twenty. Ten minutes was the first seance,

Five days later I found the tumor but half the size, and gave it the same dose as at the first sitting. I applied the battery five times, and the lump disappeared.

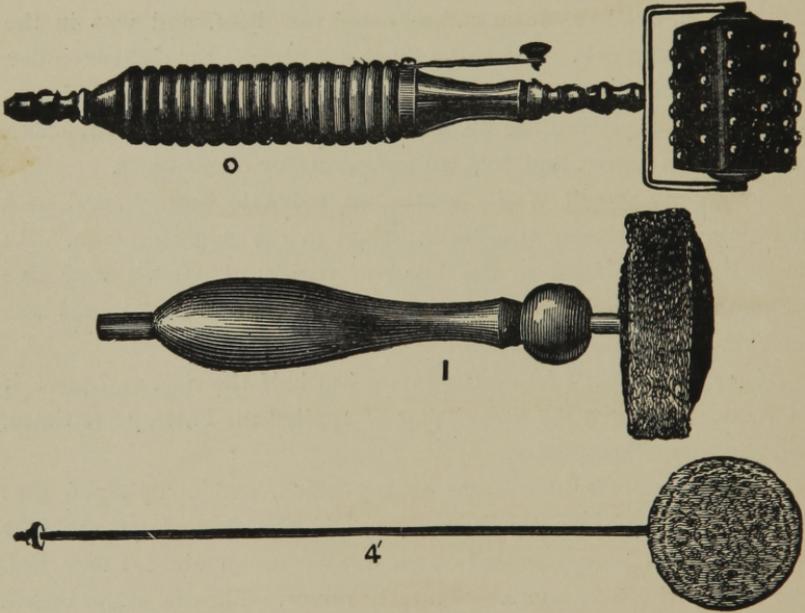
Two years later she came to my office, and complained that "another tumor had come in her breast." She showed me the scar where she had been operated on for a fatty tumor since I saw her. She had it with her, and it was a fatty tumor. The one in her breast was an hydatid without doubt. It was small, about the size of an egg. I used my office battery, and gave her the same treatment as I did the first time. She came twice.

Last year she came again with one in the other breast. It was about the same size as the last one. One seance sufficed to eradicate it. This is the only patient I ever knew of having more than one. They are easy to cure, and I have never seen one that would not go away under the electrolytic current. All those that come externally

should be treated the same way. Those that come in or on the liver I shall not speak of, as they are mostly aspirated, or treated otherwise.

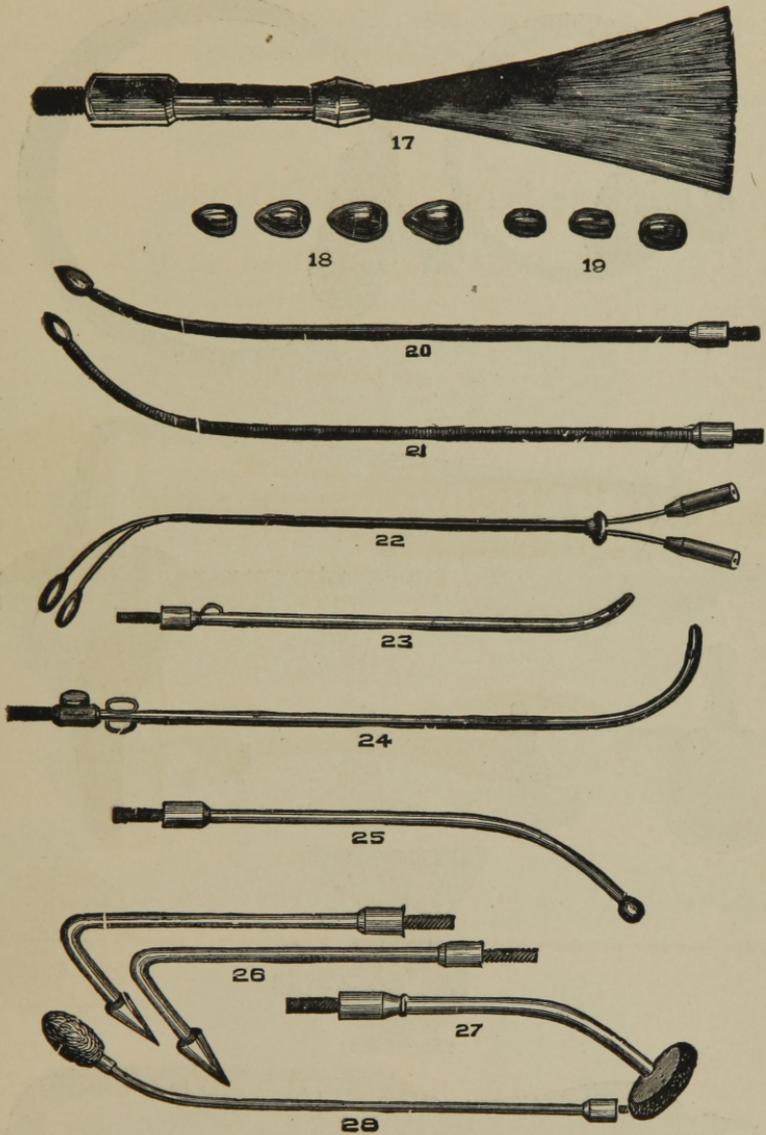
## Some First-Class Electrodes.

The cuts on this page were kindly furnished by McIntosh, of Chicago, Ill. Electrode No. 0 every electrician should have. It comes handy in several forms of treatment, and is good with the galvanic battery. I have also used it with the faradic.

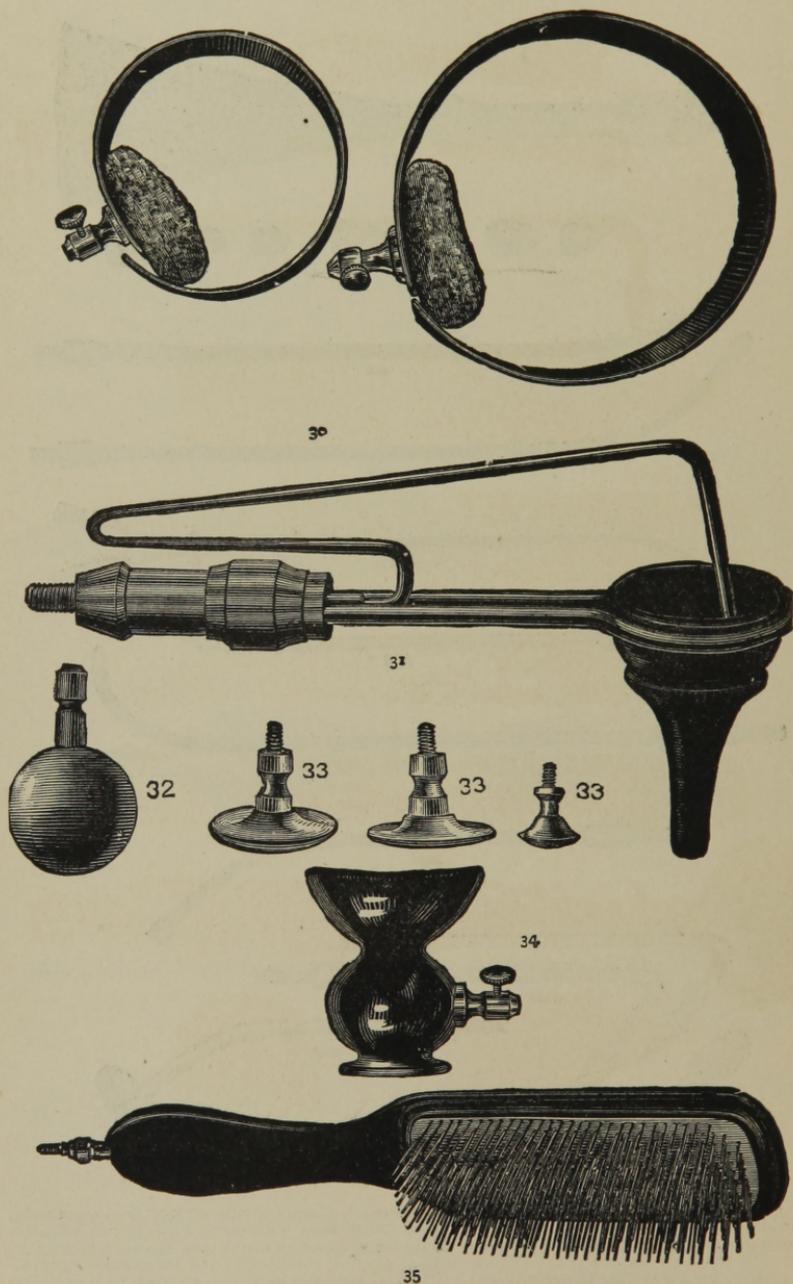


0—Wheel electrode of hard rubber, set with metallic points for muscular faradization; universal hard rubber handle, with current interrupter. 1—Universal handle, with sponge-covered disc. 4—Sponge-covered electrode with long handle, to be used under the clothing.

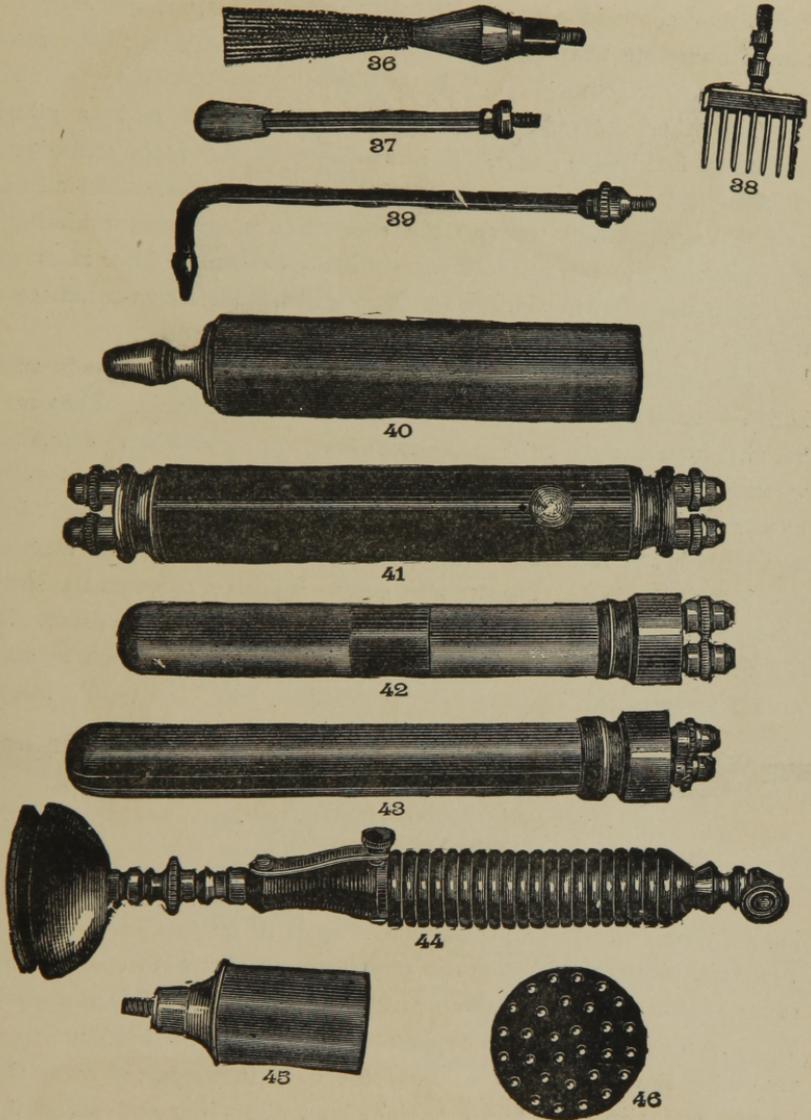
The cuts on page 160 were also furnished by McIntosh. The ear electrode (No. 31) on this page is a good one. The funnel is made of hard rubber, and the spring passing inside of it is armed with a very small sponge, which, after being wet with water and placed in position, can be pressed down to the desired point, where



17—Metallic brush; 18, 19—Olives; 20—Spiral flexible uterine or urethral electrode, insulated; 21—Uterine or urethral electrode, insulated with hard rubber; 22—Elastic electrode for conveying both currents to the uterus or urethra; 23, 24—Metallic catheter (silver); 25—Laryngeal electrode, nickel-plated, insulated; 26—Duchenne's metallic points, for muscular faradization; 27—Small sponge electrode, for external application to the larynx; 28—Laryngeal electrode with sponge tip.



30—Neck and arm electrode ; 31—Ear electrode ; 32—Ball electrode ; 33—Disc electrode, three sizes ; 34—Eye cup electrode, new style ; 35—Hair brush electrode. ]

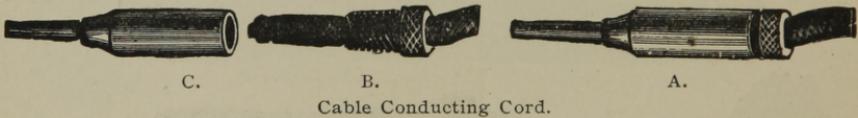


36—Metallic scourge, nickel plated; 37—Eye electrode; 38—Metallic points for faradization; 39—Dental electrode; 40—Metallic handle; 41—Pole changer; 42—Vaginal electrode, for both currents, insulated in the centre, nickel plated; 43—Vaginal electrode, for both currents, insulated in halves; 44—Sponge holder and current breaker; 45—Nickel plated sponge cup; 46—Disc electrode, with insulated points.

it will then come in contact with the inside of the ear, and connection is complete through the spring to the handle, thus to the conducting cord to battery.

The other electrodes speak for themselves. No. 34 is a glass one, to be filled with water. It is made to fit the inner and outer canthus of the eye, and is connected by contact with metal binding post and water inside through the cord that is fastened to binding post by means of screw as shown. It is a good one to have in cases of old persons with weak eyes. The glass being a non-conductor, the only contact with the eye is through the water.

The electrolysis needles on page 39 are some of those made and kept on hand ready for any one to use in electrolysis. They are heavily plated with gold to keep them from corroding. I prefer, when it is possible to use them, to have my needles insulated with hard rubber to within a short distance of the distal end. Then I insert them in the tumor, or whatever I operate upon, till the insulation is well inside, leaving the part where it passes through the skin covered, so it will not act on the cuticle. Then it leaves no scar. If it is uncovered at that point it will destroy the skin the same as the tissues underneath.



Cable Conducting Cord.

This cable-cord is made with spiral copper wires, each surrounding a strong thread; and these are twisted in an insulated bundle. The adjustable tip will save the physician much trouble, as he can easily remove it from a broken cord and replace it in a few moments. The above cut will help to explain it. To repair a cord, unscrew the tube B from the tip C, draw the cord through, cut away the broken end, slip back the covering, knot the wires and screw the tubes into the tip. This clamps the wires in the tip as seen in A, and makes a perfect connection.

The electro-magnet (see Fig. 11, page 30,) is an instrument for removing bits of iron or steel from the cornea and chambers of the eye. Every surgeon and oculist knows from experience how difficult

it is to remove particles of iron or steel filings and turnings from the cornea, even after they have been loosened, and the impossibility of extracting them from the posterior chamber of an eye with ordinary instruments. With the aid of this instrument these operations are easy and simple. To use the magnet the conducting cords are connected with the poles of a battery cell (a cell with zinc-carbon element is the best), and the small stylet brought near or in contact with the particle, which adheres to the magnet and is removed. If the particle of iron is imbedded in the cornea, it may be necessary to loosen it and then remove it with the magnet, which can be done without contact with the eye. If iron or steel has penetrated either chamber, it is then necessary to introduce the small stylet of the magnet, which attracts the particle, which is easily removed. The connections are made so that it can be connected to the cell of any faradic battery, but its magnetic force is greatly increased by adding several cells. This is the more easily done with our combined battery, as one or more cells can be connected at pleasure.

When connected with one of our cells the magnet will lift 300 grains; by adding 6 cells, 720 grains. The instrument is shown full size on page 30. It is furnished with long and short stylet and conducting cords.

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## Static Electricity.

The detail respecting the static machine is much greater than the other forms of electrical instruments, for the reason that static electricity can be applied in so many different ways, and each method has more or less beneficial action.

The sensations experienced by the patient during the application are so entirely different, and peculiar to each particular method, that one experienced in its action can readily tell, with his eyes closed, which method is being used.

There are six distinct ways in which the static current can be applied to patients. First.—By the

### **Indirect Spark.**

To administer static electricity by the indirect spark, set the

patient on the insulated stool, and connect the patient to the machine with a chain. One end of the chain should be fastened to the positive pole, and the other end should be attached to the insulated stool, using care not to let it ground, by its touching the floor. (If you wish to give *negative* insulation, attach the chain to the negative pole instead of the positive pole.) Now take another chain, and attach it to the negative pole, and ground it. This may be done by throwing it on the floor, or, better still, by throwing it over the gas fixtures. The Leyden jars are not used with this spark.

Spread the poles of the machine wide apart, and give the wheel a rapid motion. The first thing you will notice will be the patient's hair rising on end, and standing up like the "quills of a fretful porcupine." This is known as "static insulation."

Now, if you take an electrode with a large brass ball and a chain attached to it, and the other end is attached to the gasolier, and hold it by its wooden handle, bringing it in proximity to the patient, there will be a spark fly from the patient to the brass ball. The nearer the ball to the patient the faster will come the sparks. It leaps from the patient and thus escapes to the ground through the gas pipe, and completes its circuit.

The size of the spark will be governed by the size of the brass ball on the end of the electrode; the larger the ball the more volume to the spark, and it will be found somewhat painful, leaving a small spot not unlike a mosquito bite, which will go away soon after a slight rubbing. It is not very severe, and I have had patients who rather enjoyed it. But I never give the indirect spark to a patient the first seance, as it would make him timid, and he would think lightning had struck him. You need not remove the clothing, though it is better to remove the coat, as the longer the spark the more severe the pain. It will not injure the most costly fabric.

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### The Direct Spark.

To give the direct spark, seat the patient on the insulated stool, with one chain attached to the stool direct from the positive pole,

and the other pole attached to the electrode by the other chain, the ring electrode being employed to prevent the chain from touching the patient.

The length of the spark will be regulated by the distance of the poles from each other. The further apart the poles the more severe the spark.

Do not use the Leyden jars in this method.

The question has been asked "if it makes any difference which pole is attached to the electrode." It makes no difference. I am certain of this. I have experimented for hours with both; I have treated one patient with one pole, and another with the same trouble, of the same age, temperament and sex the same, and have had the same results in each and every case. I have tried it on myself, and can vouch for the truth that one pole is the same as the other.

---

### **Static Shock, or the Leyden Jar Spark.**

In giving this spark the Leyden jars are employed, and are connected on the outside by a brass rod. The patient sits on the insulated stool; one pole is attached to the stool, the other to the electrode held with the ring electrode to keep the chain from coming in contact with patient. The two poles are brought as close together as possible without contact, and separated as you desire to increase the spark.

I never give this spark, as I can see no advantage in it over others that I like better. It is not a pleasant method, and therefore is seldom used.

---

### **Static Insulation.**

I like this method the best of all. Follow directions given for applying the indirect spark. Charge the patient with either the positive or negative pole, as you like. Keep the poles as far apart as you can get them, and leave the Leyden jars off.

The sensation is pleasant to most patients, and they will feel a tingling in every nerve and muscle throughout the body. Do not

overdo it, for, like taking a Turkish bath, if reaction takes place while taking it, they will not feel so well as if taken off after fifteen minutes' insulation. Then they will feel refreshed, and you will have accomplished the desired end.

If a patient who has been on a yachting trip, and has to use a shoe horn to get his hat on, comes to you for aid, give him *static insulation*. It will make a new man of him, and the "Moet and Shan don" will fairly ooze out of his pores. He will go home feeling that you are the man for his money—every yachting trip at least.

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### The Static Breeze.

I quote from Dr. Ranney :

"This method of administration of static electricity consists in the withdrawal of a static charge from a patient by means of an *electrode of metal or wood, which is pointed*.

If the breeze be *indirectly* induced, this electrode is grounded by a chain attached to a gas-pipe, a water-faucet, or placed in contact with a wood floor when the other connections are not easily accessible. The patient is first insulated (in order to retain a charge), and is then connected with one of the poles of the machine by means of a chain, which he either holds or fastens to the platform upon which he sits. The electrode is then employed.

"When the breeze is *directly* induced, the insulated stool is connected with one pole of the machine, and the electrode with the other pole.

"If the electrode be a *metal one*, the electricity is drawn rapidly from the patient at the point which is nearest to the electrode, and a sensation resembling that of a breeze is experienced at the spot where the electricity escapes. Single or multiple points may be employed on the electrode."

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### The Electrical Head Bath.

When application to the head and scalp are deemed requisite, a metal cap studded with points is hung over the head of the patient by a chain, which is grounded. This cap is known as the "umbrella

electrode." It should not touch the patient's head or hair, when he is placed beneath it upon the insulated platform. The numerous points of the electrode draw off the electricity through the hair and scalp, which passes from the machine to the patient, and produce a sensation which is particularly pleasant. A "strong wind" is felt permeating the hair and encircling the head.

To convert a static machine into what, to all practical purposes, may be considered a "faradic" instrument, some slight modifications only are required.

The discovery of this method may justly be attributed to the investigations of Professor W. J. Morton, of New York; although Matteucci first devised an instrument which gave shocks by induction simultaneously with the discharge of a Leyden jar (see Figure 795 of Ganot's work on Physics, by Atkinson).

To produce this form of current, it is necessary to first *hang a pair of Leyden jars* upon the arms of the machine. The size of the jars employed modifies the strength of the current; hence it is necessary to have jars of different sizes as a part of a static outfit. You now attach the chains or, by preference, insulated wires, which serve to connect the machine with the patient, *upon the hooks that rest upon the outer coating of the jars*. Finally, you attach to the other end of each rheophore an electrode for use upon the body of the patient. The electrodes may be of metal without any covering, or ordinary sponge-covered electrodes may be employed (care being taken that the insulating handles are somewhat longer than usual).

Before the machine is set in motion, *its poles should be approximated closely*. This step is important; because the separation of the poles intensifies the current, as long as a spark will pass between them. There are two factors, therefore, in determining the strength of the static-induced current:

- (1) The size of the jars.
- (2) The extent of separation of the poles.

Dr. Morton has devised an ingenious electrode which allows of an application of this form of current to a patient without disturbing the poles of the machine; but it is not an essential part of a

static outfit, because an interruption of the current can be accomplished without it. It is known as the "Pistol Electrode."

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## Waite & Bartlett's Six Plate Static Machine.

This is the best static machine (see Fig. 1) I ever used, or ever saw. It is always ready for use, and is as near complete as one will find. Professor A. L. Ranney, M. D., as well posted on this machine perhaps as any one, has said some things about the principles of "static induction" better than I could, and I can do no better than to quote him verbatim.

"The application of the principles of static induction as demonstrated in the machine devised by Holtz, is difficult to fully explain without devoting more time to the general subject of electrical induction than is deemed wise. It may be roughly summarized, however, as follows:

"Anybody when electrified has the power, to a greater or less extent, of exerting (even through an intervening substance, which in this instance consists of a plate of glass,) a peculiar effect upon the electrical state of another body closely adjacent to it in position. It tends to draw from the opposed body that variety of electricity which it does not itself possess. Now, if an intervening substance happens to exist between the two bodies, the electricity drawn toward it by induction may be deposited upon the corresponding side of that substance; and a proportionate amount of electricity of the opposite variety is abstracted from the intervening body. Hence the intervening body becomes either positively or negatively electrified on one side as the case may be.

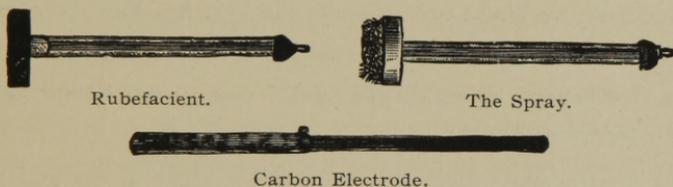
"In the induction machine, the intervening substance happens to be the revolving glass plate; and the opposed bodies are the two paper collectors and the two metal combs of the machine, which are separated by the revolving plate of glass.

"In all induction-machines, the charge is *practically constant when once established*—provided the mechanism be perfect and the plates kept absolutely dry. Under such conditions, it ought never

fail to produce its full effects when the wheels are set in revolution. This is a great desideratum in medicine.

“ In the original Holtz machine a charge was primarily effected by rubbing a piece of ebonite briskly with cat-skin until it became highly charged with negative electricity, and then applying it closely to one of the paper collectors on the stationary plate of the machine. By the ‘ law of induction ’ the comb opposed to this paper collector becomes electrically excited immediately. It at once deposits *positive electricity* on the side of the revolving plate nearest to the comb, and takes *negative electricity* away from the revolving plate. Thus the revolving plate becomes *positively electrified* to a very high degree at this point.

“ Now when the wheel is made to revolve to that point where it meets the other paper collector upon the stationary plate, induction again takes place. Negative electricity is deposited (1) by the collector on the opposite side of the revolving plate (the side nearest to



the paper collector), and (2) by the metal comb; at the same time positive electricity is taken from the adjacent side of the revolving plate by the collector, and also by the metal comb, from the opposite side of the revolving plate. This interchange of electricities charges the positive pole of the machine.

“ The revolving plate (now excessively charged with *negative electricity*) goes on to the next paper collector. Here a similar exchange of electrical conditions occurs. The negative electricity is taken from the revolving plate by both the paper collector and the metal comb, and positive electricity is given to the plate in exchange from both of these sources. Hence the negative pole becomes highly charged.

“ As long as the revolving wheels are kept in revolution, this interchange of electricities continues at each of the poles; hence the

accumulation at each pole soon becomes sufficiently great to allow of an escape from pole to pole in the form of a spark, or into the atmosphere as a 'luminous brush' easily seen in the dark."

Electrodes on page 169 belong to the static machine, and go with each instrument, as also do Nos. 22 and 23 on page 37, and 24, 25, 26, 27, 27A and 28 on page 38 of this book. There are others, but these will be found to embrace all a beginner will require, and will do for a long time.

Their several uses will be mentioned as we come to them in the treatment of certain diseases. This machine is shown (Fig. 1) running by electric motor—motive power, a storage battery. Of course it can be turned by hand. When one is alone with a patient a motor is very handy, but is not an absolute necessity.

Professor A. L. Ranney, M. D., has done more, I think, to bring the static machine to its present perfect condition than any other electrician in the world. It is through his untiring efforts that the machine made by Waite & Bartlett is the best machine ever offered to the profession.

The following is from his pen, and I can do no better than to give it *verbatim et literatim*:

"It is extremely difficult to formulate general deductions respecting any therapeutical agent. Such attempts necessarily tend to evoke criticism; because exceptions to every general statement may be brought forward as evidences of their unreliability. I am, however, inclined to offer the following general deductions respecting static electrical applications for the benefit of the reader; with the *proviso* that they may not apply to every case, and that they be not construed too literally:

"*First*.—My experience has not confirmed the view (heretofore advanced by some authors) that the *positive pole* of a static machine has a 'tonic,' and the *negative pole* a 'depressant' action.

"I have found, after repeated experimentation, that either pole seems to answer equally well upon most patients. I commonly employ in my office the positive pole, however, because it happens to be the most conveniently connected with the patient.

"*Second.*—As a curative agent, *I regard static electricity as of great value.*

"While galvanism must always hold a pre-eminent place in electrical therapeutics, because of the chemical effects so obtained, there are certain diseased conditions in which static electricity is unquestionably superior to faradism and galvanism.

"*Third.*—It has been shown in preceding pages that the *static induced current fulfills all the known indications of faradism.*

"It has moreover two great advantages over the faradic instrument, namely, that a constant polarity is obtained and a much greater electro-motive force. It is also less painful than the faradic current.

"*Fourth.*—*Static electricity possesses a decided advantage in some cases where faradization or galvanization have either given negative results or have apparently lost their remedial power after their use has been too long continued.*

"It is a common expedient with medical electricians to shift from one form of current to another from time to time whenever the progress of the case seems unsatisfactory. Under such circumstances Franklinism forms another link to the chain, and greatly aids us when faradism and galvanism have both proven inefficient.

"*Fifth.*—*I have found heavy static sparks to surpass any other form of electrical application for the relief of contracted muscles.*

"The sparks are withdrawn from the part so affected in rapid succession for about five minutes.

"Post-paralytic contracture, old deformities from preternaturally shortened muscles, and the various forms of obstinate and protracted tonic muscular spasm often yield like magic to the influence of heavy sparks.

"*Sixth.*—It is well known that *certain forms of pain often disappear at once after static applications.*

"The most marked type of pain so relieved is the so-called '*rheumatic muscular pain*,' or that observed in genuine *muscular rheumatism*. I have seen many such cases where one application of heavy sparks to the seat of pain for a few minutes has caused permanent relief.

“Again, *neuralgias* of a distressing kind are often dissipated after a few applications of heavy indirect static sparks for from five to ten minutes at a sitting.

“Finally, I know of no other agent which exerts so marked an effect of a happy kind upon the ‘*lightning pain*’ observed in locomotor ataxia, as does the heavy static sparks.

“*Seventh.*—The application of the spark, both by the direct and indirect methods *excites powerful muscular contractions.*

“This effect is often desired in the treatment of *hemiplegia* and *other forms of motor paralysis.*

“Some authors recommend the employment of ‘static shock’ for cases of paralysis of long standing; but, personally, I am inclined to regard this form of application as too severe for most patients.

“I have often obtained a complete restoration of muscular power in special nerve-trunks by static sparks alone after the ‘reaction of degeneration’ was fully developed and all faradic excitability had ceased.

“*Eighth.*—Cases which exhibit a marked *impairment of sensation* (whether of touch, pain, or temperature) are generally improved, in my experience, by the use of static sparks over the anæsthetic area more rapidly than by the faradic or galvanic currents.

“I have encountered several very striking cases which illustrate this point admirably, but lack of space precludes the insertion of their histories.

“*Ninth.*—Remarkable effects of static sparks upon that *form of baldness* known as the so-called ‘*ivory spots*’ or *alopecia areata*, have been observed by myself through the courtesy of my friend Dr. F. B. Carpenter, of New York. I have seen several of his cases where he has wrought a wonderful change in the appearance of the scalp after several months of treatment of the bald spots by the ‘direct’ spark. The growth of the hair, which had apparently been totally destroyed over the affected regions, is attributable probably to the rekindling of the circulatory and nutritive conditions of the affected area upon the scalp.

“*Tenth.*—As a *general tonic* and also as a *stimulant to depressed*

*nervous functions*, 'static insulation' seems to be particularly of service.

"I employ static electricity constantly by this method in *neurasthenia*, with marked benefit.

"I have observed also remarkable improvement in *disturbed visceral functions* (such for example, as dyspepsia, habitual constipation, diabetes, vertigo, asthma, etc..) after the use of static insulation for from ten to twenty minutes at a sitting.

"Many such cases have expressed to me the greatest delight at the beneficial effects which such an application invariably produced. For the past three years, I have used my static machine almost exclusively as a means of *improving the 'general nervous tone' of patients*, in preference to my faradic or galvanic apparatus. It is much more satisfactory to patients because of its ease of application, and as far I as have observed, equally effective as a tonic.

"*Eleventh.*—I am inclined to think that those authors who have written upon static electricity as a therapeutical agent in a luke-warm spirit, have probably been supplied with an apparatus which has been ineffective because it generated too slowly or imperfectly.

"The *size and number of the revolving plates* and their thorough *protection from atmospheric changes* are factors of the greatest importance.

"Many of the static machines sold to the profession are hardly more than mere toys. Any machine which gives a thin spark (even if a long one) lacks one essential factor to success as a therapeutical agent, namely, QUANTITY.

"*Twelfth.*—I have used static insulation and sparks with satisfaction in the treatment of chronic inflammatory and spasmodic diseases, such for example, as influenza, phthisis, bronchitis, asthma, laryngitis, neuritis, synovitis, etc.

"Three cases of chronic synovitis of the knee-joint of an intractable form recovered completely under my care within a month, under the daily administration of static sparks to the affected joint.

"Many cases of bronchitis and asthma have been greatly benefited by insulation and sparks to the chest.

"I have used static insulation (followed by the withdrawal of

sparks from the spine and abdomen) upon subjects afflicted with dyspepsia, flatulency, and constipation. In many instances this form of electrical treatment gave very marked relief.

“The influence of this agent upon visceral derangement is, however, a field for future investigation. It gives promise of happy results. As yet, my personal experience is too limited to justify me in formulating any positive conclusions respecting the method which is best employed in individual cases.

“*Thirteenth.*—Static electricity is of value in the treatment of hysterical states and other allied conditions.

“Charcot has long been an advocate of this therapeutical agent in such cases. My own experience teaches me that it is of great service as an aid to recovery; although I believe that in a very large proportion of these subjects reflex irritation from ‘eye-strain’ has to be combatted by the relief of anomalies in the eye or its muscles before a perfect restoration of health can be attained. I have discussed this field elsewhere (see *New York Medical Journal*, February, 1886, and April, 1887).

“Again, the application of ‘static insulation’ is far more agreeable than ‘general faradization’ or ‘general galvanization’; and, in my experience, it is fully as efficient in many cases in its remedial action as either of the methods referred to. The inconvenience to the patient of having to disrobe almost completely, and the distaste which many naturally exhibit to having a wet electrode or the operator’s wet hand rubbed over the skin for from ten to twenty minutes, is entirely obviated. With a sufficiently large insulated platform several patients can, if desired, be given a static bath in the physician’s consulting room in the same period of time as would be consumed in administering general faradization to one patient, and be spared the annoyances mentioned.

“I do not mean to infer that some cases do not require the use of faradic or galvanic treatment; nor would I be construed as casting any reflection upon the therapeutical value of the methods which were first suggested and employed by Drs. Beard and Rockwell of New York. The question at issue is simply one of convenience to the patient and the physician, provided that the indica-

tions of the case justify the trial of the the static bath as a substitute for 'general faradization' or 'general galvanization.'

"In the second place, I think it has been justly claimed for static electricity that some of its therapeutical effects are more certainly and rapidly obtained than by means of any other form of electrical application.

"As examples of such effects, I prominently mention: The improvement of muscular power and general sensibility in certain organic spinal diseases, and the stimulation of the skin in certain trophic neuroses.

"Respecting this statement, I take the liberty of again quoting certain paragraphs from the writings of my friend, Dr. Morton. He says:

"We may now ask the special question, 'Why, above and beyond other forms of electricity, does static electricity cure?' I will offer two explanations, and these are (*a*) first, simple mechanical disturbances, followed by a local alteration of nutrition; and (*b*) secondly, reflex action from irritation of the peripheral distribution of nerves.

"With regard to the first, when the electric discharge, in the form of a spark, takes place in a resisting medium like the various parts of the human body which are submitted to it, a very great mechanical disturbance in the tissue at the point of discharge must inevitably result. A piece of paper, for instance, held between the electrode and the skin is perforated by the spark. A parallel to the mechanical action referred to, though in a less localized and less powerful degree, is to be found in ordinary physical exercise or in massage. From this point of view, static electricity by the method of sparks has, in a special degree, owing to its high tension, great advantages. The spark strikes a sharp, incisive, and penetrating, through scarcely painful blow, and often repeated in a given region, creates, by simple disturbance, a great alteration in the nutrition of the part. This, at least, is the only way in which I can account for the almost instantaneous relief and cure, after a few applications, of a large class of pains seated in deep and superficial fasciæ, and due to subacute and chronic rheumatism. Neither blisters, other violent

counter irritation, nor medicine, will dissipate these pains, while, on the other hand, static electricity will subdue them at once.

“The contraction of muscles is also often due to the same mechanical effect of the spark, just as muscles of the thigh may be made to contract by a snap of the finger or sharp blow from a percussion hammer.

“With regard to the second explanation—that by reflex action following a peripheral irritation of the terminal sensory filaments and endings, a very intricate question is opened, which we can no more than glance at here.

“How can simple electrification by insulation and the drawing of sparks, it is asked, produce the decided effects that are claimed for it? Static electricity, it is said, owing to its high tension accumulates merely on the surface of the body, and does not penetrate into the deeper organs, while the spark is merely the briefest kind of current.

“Recent investigations on the irritative action of applications to the skin have thrown a new light upon this question, and show that, though previously unexplained, the effects of the great accumulation of electricity on the surface and the sharp blow of the spark were, in truth, effects based upon a true physiological principle, the principle named by Brown-Sequard, its recent expounder—‘the phenomena of inhibition.’ A few drops of chloroform applied to the neck of a guinea-pig produced, on some occasions, an epileptic attack; on others, the nerves and muscles became highly excitable to stimulation.

“But the most notable effect of irritating applications of chloroform, as well as other substances, was a general anæsthesia; reflex symptoms were inhibited and muscular excitability lost.

“An interesting element has entered into our physiological and therapeutical studies—that of the reflex phenomena of peripheral irritation. And we may at once place under this single heading a large number of facts long familiar.

“External irritant applications, in one form or another, have always formed an important element in medical treatment. And most of these applications have been used to relieve pain, or in some

way modify the general sensibility, either in contiguous or remote parts.

“Familiar examples are blisters, sinapisms, cupping, the actual cautery, ammonia, the moxa, aquæ and acupuncture, and in latter days the magnet, the tuning-fork, and hypodermic injections of water into the thoracic walls for the purpose of allaying the cough of phthisis. The latest novelty in this direction is the electric percutor of Baudet, consisting of a tuning-fork kept in vibration by electricity, and communicating to any desired nerve or part, by means of a slender rod, the mechanical vibrations originated in the fork.

“Charcot, after cautious experimentation, has given his adherence to the statement that metals (metallotherapy) do produce effects contiguous and remote when applied to the skin—that the magnet also produces similar effects, both upon general sensibility and muscular power. Vigouroux has pointed out that the vibrations of a tuning-fork, either alone or communicated to a sounding-board, provoke similar phenomena.”

Professor Ranney gives a case in his own practice. In speaking of the same subject he says :

“This is an error into which many are unwittingly led. I could report (if time would permit me to do so) the details of several cases where a failure to employ the proper current has proved most disastrous to patients. One instance of this character (which was happily aborted) impressed me so forcibly at the time, that it is possibly worth narrating.

“A patient, who had accidentally severed the musculo-spiral nerve by a pistol bullet, was sent to me some years since for diagnosis, and to confirm or reject an opinion which had been expressed by a physician of prominence, namely, that the only hope of cure lay in a surgical operation for the uniting of the severed ends of the nerve by sutures. This opinion, as I found, was based upon the fact that the *faradic* current had failed to produce any movement in the paralyzed muscles, and that several months had already elapsed since the accident—during which time the hand was steadily becoming more and more deformed by contracture of the flexor muscles of the hand and forearm.

“ My examination of the patient showed, however, that a *galvanic* current produced violent contractions of the paralyzed muscles when *passed through the injured nerve* (one pole being placed upon the sternum as a neutral point, and the other upon the musculo-spiral nerve); and the galvanic reactions of the nerve and its muscles furthermore indicated marked ‘degeneration’ as having developed in the nerve below the point where it had been divided. Thus the question of the advisability of an operation was decided positively in the negative. The nerve had already united.

“ In about eight months the injured nerve was completely restored by the use of the static spark, the contracture had disappeared, and to-day the patient can see no difference in the usefulness of his hands.”

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## Theory of the Holtz Machine.

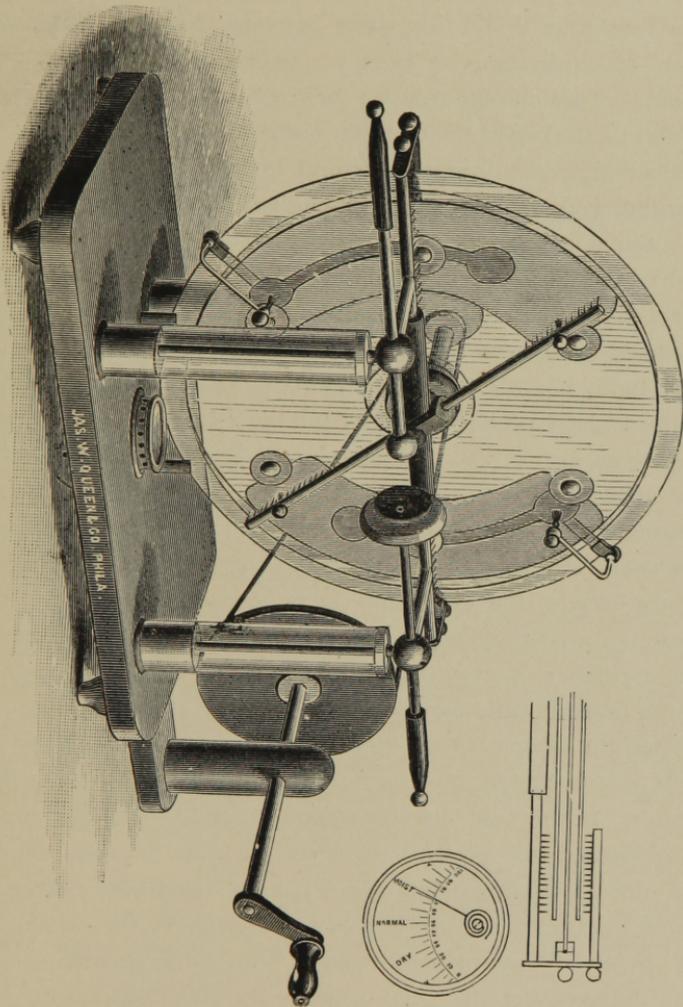
In discussing the action of these Holtz machines, we can best do so by first considering the orthodox and well-known form with two plates, as this part of the theory is practically unmodified by the use of the third plate, and afterwards showing the effect and use of the additional plate.

If the left-hand paper sector be charged with negative electricity, it draws positive from the diagonal comb upon the revolving plate, which is supposed to move in the direction of the hands of a watch. When the positive electricity on the plate reaches the right-hand brush, it draws negative electricity from the brush and leaves the paper sector connected with it charged with positive.

This positive electricity on the sector and the positive that is left on the plate, both draw negative from the horizontal comb, and leave the discharging rod connected with it charged with positive electricity.

The plate, now nearly neutral, passes under the diagonal comb, and from it receives a charge of negative electricity, drawn out by the positive on the sector, which at the same time repels positive electricity along the diagonal and out of the opposite comb upon the revolving plate.

The plate, now charged with negative electricity, passes under the left-hand brush, draws positive electricity from it, and thus increases the negative charge on the sector. The residue of nega-



Queen & Co.'s New Form of the Holtz Machine.

tive electricity on the plate, and the negative on the sector, both draw positive from the horizontal comb and leave the discharging rod connected with it charged with negative electricity.

The plate, now nearly neutral, passes to our starting point, and the process is repeated.

This would be an exact and complete explanation of the phenomena taking place were the Leyden jars, shown on base, not present, and the discharge would take place between the discharging rods in the form of brushes and without the peculiar, sharp report usually observed. This effect may be best observed by operating the machine in a darkened room or at night when the switch is open and the sliding rods separated several inches. From the negative discharging rod a brush of violet-colored light, diverging from a small circular space, extends nearly an inch towards the opposite rod, while the discharge is accompanied by a hissing sound. At first no effect is observed at the opposite electrode, but suddenly there is an outburst of a very peculiar and interesting kind. A brush of whitish light, slightly tinged with violet, flashes out to meet that from the negative electrode, and forming with it a kind of spheroidal figure an inch or two in diameter. Flashes of a redder, brighter light continually shoot to and fro through this large mass of light, presenting a very beautiful and fantastic sight. Sometimes, instead of this spheroidal appearance, there is a kind of bush-like discharge, the space between the electrodes being occupied by a sort of ball composed of a violet stem projected from the negative electrode and having a number of very bright, fine lines of intensely white light radiating from its end, about midway between the electrodes.

When the switch below, connecting the outside coatings of the Leyden jars, is closed, the discharge is of a considerably different character. In this case the right-hand electrode which, as we have seen, is charged with positive electricity, induces negative electricity in the outside coating, while the left-hand electrode, charged with negative electricity, induces positive electricity in the outside coating of its jar. These induced charges both aid in producing a much greater difference of potential between the two inside coatings connected respectively with the two electrodes, until finally it becomes too great to be resisted by the intervening thickness of air, and an instantaneous discharge takes place with a sharp report and intense flash; equilibrium being thus restored, the same process again takes place. By using a sheet of rubber and holding it between the

electrodes while they are gradually withdrawn from each other, the potential and length of spark may be still further increased.

Before starting the machine be sure that the points of the combs are not going to scratch the plates. Adjust the field plate, by means of the slotted rubbers, so that it is midway between and parallel to the revolving plates. Should the weather be very moist, place the machine for a few moments before the fire previous to using. Brush off any particles of lint or dust adhering to the plates with a dry cloth; never wipe the plates with a wet cloth. If, at any time, the machine refuses to work, examine the connections carefully and make sure that they are tight; in particular examine the Leyden jars and make certain that the wires attached to the inside rods touch the inside coatings; often this latter point is overlooked and the machine will not give any spark. The brushes must all touch the buttons as the plates revolve. Be sure that in attaching the small brushes to the rim of the fixed plate, they make good contact with the brass pieces to which they are fastened. Should any of the plates become cracked, no matter how slightly, it will always affect the performance of the machine, and a result can rarely be obtained; a new plate must be provided.

Of late years, the Holtz machine, in its various types, has come quite prominently and efficiently into use among medical practitioners. Although the application of electricity in medical therapeutics has not yet been placed upon a thoroughly scientific basis, and although many of its effects on the system are not understood, yet there is no doubt but that in many cases, particularly in nervous affections, great benefit has been derived from its use.

For a long time the Ruhmkorf coil, run by some form of battery, was the only apparatus thought to be at all suitable for medical use. With this there was very little range of application possible, as the current, under all circumstances, was an induced one of very high E. M. F. With the Holtz machine, however, this is not the case, and by a proper arrangement of the discharging rods and Leyden jars, a great variety of effects may be produced.

If the switch connecting the outside coatings of the Leyden jars be opened, and connection is made from a person's hands to the two

binding posts in the base of the machine, a shock can be obtained of the same frequency as the sparks which pass between the discharging rods; and the intensity of which may be regulated by bringing the discharging rods to a greater or less distance from each other. With not much over a sixteenth of an inch between the points, the discharge is so rapid that the impulses can hardly be distinguished from each other, and a very smooth, even effect is produced, while, with one-half or three-quarters of an inch space, the strongest man could hardly endure the shock. These "shocking" effects, properly graduated and properly administered, have been found to be of great value in many cases of paralysis, spinal difficulties, and some skin diseases.

Another form of treatment which has recently become very popular among physicians is the electric bath or electric wind and its modifications. In the electric bath the patient is seated upon a metallic chair, which is connected with an electrode of the machine, the other one being connected with the ground. The patient, becoming gradually charged, is said to experience a very soothing and pleasing sensation as the electricity passes off from his hair and skin into the air, while the action upon the skin and its pores is very healthful. The electric wind, as it is called, is administered in much the same way, the electrode before attached to the chair now being attached to a pointed rod in a plate bearing a number of such rods, and directed upon the patient's face or body wherever desired; the electricity, escaping from the points, causes a stream of air to be gently projected with very refreshing results. By using a rod terminating in a ball instead of a knob, the electricity may be caused to escape in sparks, producing more sudden shocks and locally exciting the muscles.

Effects of the kind just described can only be administered by static machines, and there are few physicians now, using electricity in their practice, who would consider their equipment entirely complete without a good machine of this kind.

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## Corns and Bunions.

Should a good-paying, lady patient present herself at your office and tell you she wanted to go to a ball, but she had a bunion that pained her so much she feared to make the attempt, you would no doubt do anything in your power to aid her.

Now, when a lady is dressed and ready for the street, it is no small matter for her to take off her shoe, and to replace and button It is almost an impossibility.

Even if it were but little trouble, what could you do for her in so short a time ?

Without the aid of a good static machine, nothing ! True, you might, by means of a bunion plaster, bridge it over for one evening. But let her alone for that ; she knows all the tricks of the trade, and has one on already, you may rest assured.

Let her take a seat on the insulated stool. Take your wooden-ball electrode. Stop ! Don't remove the lady's shoe. You can operate just as well with it on, and this is one of the beauties of the machine. Now draw a fine spray current directly from the static sore bunion. Keep it up for fifteen minutes.

She will then be able to walk with the perfect grace of old-time girlhood before fashionable shoes made her a cripple. She will dance all night, and come back next day your friend for life.

Four or five sittings will cure her bunion without pain or the inconvenience of taking off her shoe. Can it be done in any other way ? I think not. Must you refuse to cure this patient simply because, perhaps, you cannot explain *how* the electric spark effects a cure ?

Mrs. B., a society lady, said to me one day while I was calling on another member of her family : "If you doctors were any good you would cure my bunion, so that I could go to Mrs. ——'s reception to-morrow evening."

Laughingly I replied : "Come over to my office to-day or to-morrow during office hours, and I will guarantee you shall be able to attend the reception without pain."

"I will give you fifty dollars if you do, but I won't let you cut it," said she.

She came, and I simply did as I have above directed. In four sittings the bunion was a thing of the past, and I received my money without a murmur.

Corns may be cured in like manner, though where they stick out like a horn I take them off with a knife as low as I can without bleeding, and then I follow the foregoing directions.

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## Neuralgia of the Coccyx.

The coccyx is at times the seat of a very painful and lasting neuralgia. Nothing you can give appears to touch the case, and it will last for months. Seat the patient on the insulated stool, and with the wooden-ball electrode, draw sparks for fifteen minutes. Repeat for five days, and you will bid good-bye to the neuralgia. It is the only thing I ever found that would give permanent relief. The galvanic current will accomplish it, after a month's work, by placing the positive pole to the coccyx, with fifteen milliamperes' current for half an hour each seance.

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## Papillary Tumor of the Gums.

When you meet with a warty tumor of the gums, with hyperplasia of the papillæ of the mucous membrane, where the papillæ is soft and extends out from one-half to one inch, take it off with the cautery battery, with a knife shaped like a curette. It may return, but if it does, repeat the operation, and cauterize it as freely as possible, going as deep as you think it extends. I never have had to repeat the operation the third time, and only two cases required the second application.

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## Vascular Tumors of the Mouth.

You will often meet with tumors which, at first sight, may be taken for *nævus*; they form nearly always on the gum.

They attain the size of a cherry at times, but always have a narrow pedicle. They are highly vascular, hence the name. Children often say, "See how my tooth bleeds when I suck it."

They are fibro-cellular, with a mass of blood-vessels. Sometimes they hang over, and become fastened between the teeth, if the latter be far enough apart, and become very sore, and bleed till the patient or friends become alarmed and seek advice.

The only sure and safe treatment is the cautery battery. Use the knife best adapted to the case. Take care that the hot wire does not touch the teeth, as it would be liable to crack the enamel. Anyway, the pain would be terrible. It is so quickly done, that if the knife or loop is in position, as soon as it is heated (and that is as quick as you could wink) the operation is over.

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## Cutting the Frenum.

When the tongue is tied down, it is a simple operation to cut the frenum with a pair of blunt-pointed scissors. Yet I have seen cases where it would have been safer and better to have used the cautery knife to prevent dangerous bleeding. Should there be a *nævus*, or vascular tumor, on the frenum it is better to remove it and cut the frenum at the same time, using the cautery knife. In this way hemorrhage is prevented.

Most operations of the tongue can be performed with the electro-cautery without danger of hemorrhage. It is a safe way, and is no more painful than the knife.

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## Papillary Tumor of the Tongue.

Papillary tumors of the tongue are frequently met with, and while they are not, as a rule, painful, they are very vascular, and cause a great deal of unpleasantness.

Persons thus afflicted are constantly moving their tongue, and feeling the tumor to see if it is growing. They fall into the hands of cancer-quacks readily, and when it is taken off, either by ligature, knife, or Vienna paste, they believe they have been cured of cancer, and the testimonials from them would fill a large volume.

When you have a case of this kind take your cautery battery, and, with a fine wire, pass the loop around the pedicle, turn on the heat, and in less than a minute it is destroyed forever. This will not make you a cancer doctor, but will demonstrate the fact that you can cure a papillary tumor of the tongue for less than a tenth part of what the patient would pay a quack.

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## Tumor of the Coccyx.

A small tumor of a cystic nature, situated on the coccyx, containing hair, is often met with. It has been mistaken for a fistula. At first it is hard and indolent. After a while it becomes inflamed, and suppurates, leaving an ugly ulcer with a foetid discharge, that will not heal, do what you will.

Take your cautery battery, arm the electrode with a long, slim knife, (of course a cautery knife means one made from platinum, and double, for the return of the current, or it would not heat), heat it just to a white heat, and slit the tumor open from the lower margin to the top.

This will admit of a free discharge of all its contents. The burning of the edges will prevent its healing too soon. It may be necessary to cauterize the whole internal surface. When it does heal, it will be the last of a very disagreeable companion.

## Cataphoresis.

The driving through the skin of medicinal solutions by the aid of electricity is called cataphoresis. It is a form of imbibition. It has been but little practised as yet, but the time is not far off when many diseases of the skin will be treated by this method.

Take any of the anti-parasitides for instance. They may be of more use, and more prompt in their action when driven to the spot by the galvanic current. The following diseases may be treated and cured more quickly by cataphoresis :

*Acne.*—First, the pustules should be opened to give free egress to the pus. Then gelatole unguent of sulphur may be spread over the entire surface. Instead of leaving it outside to look bad and smell unpleasant, take the galvanic battery, and with ten milliamperes, pass the negative pole over the diseased parts, and drive it in through the skin.

Then if you dust the whole surface with a light coat of starch, it will not be noticed any more than the ordinary face powder.

*Comedone.*—This is a skin disease known as acne punctata, or black-head. It is characterized by the appearance of black points at the center of a small whitish or yellowish elevation.

It is truly a disease of the sebaceous glands, and the ducts are filled with an accumulation of sebum and epithelial cells. Take your galvanic battery, arm the positive pole with an electrode made for the purpose. Let it be a tube, round and smooth, a trifle larger than an old-fashioned watch key. Let the patient hold the negative pole in the hand, and apply the tube, held perpendicularly, over the comedone, and, with five to ten milliamperes, press it until it comes out. Have a fenestra in the tube, so you can see through it.

Now dress the face as in acne, and treat the stomach. This will make a quick and perfect cure.

I have treated a face in the afternoon, and the lady went to a ball in the evening, and found no fault with "those horrid pimples."

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## Hyperidrosis (Excessive Sweating).

Excessive sweating is due to some functional disturbance of the sweat glands. It may be either acute or chronic.

There is always more or less local hyperæmia and erythema-intertrigo accompanying it.

Wash the parts with a solution of bichloride of mercury (1-2000). Use a sponge. If it be the feet or hands, wash them in dilute carbolic acid, and let it dry. But if other parts, drive the mercury solution in by cataphoresis, but not more than an eighth of a grain at a sitting.

*Tinea Favosa*.—This is a highly contagious disease. It is due to the presence of a parasite. Its usual seat is the scalp, though it may attack any hair follicles, the epidermis or the nails.

After the hair is removed, or cut short enough, dress the parts with any of the parasitocides you like best. Thymol, tar, or salicylic acid is to be preferred, and, by means of cataphoresis, drive it well in so the parasites may be killed the first dose if possible. Remember, it is not cured as long as any scutula, or round, red, scaly spots can be found.

*Psoriasis*.—This is a chronic disease, and has a multitude of names. It is called dry tetter, bakers' itch, grocers' itch, lepra vulg., alphas, scaly tetter, and dry scale. It is not contagious, but it is transmissible.

In the local treatment, chrysarobin is without doubt the most efficacious. Fox, the best living authority on skin diseases, employs it. The only objection to its use is that constitutional symptoms manifest themselves when carried on too long.

I prefer an unguent made of pyrogallic acid, and to drive it in by cataphoresis. Stimulate the surface once a week by applying the faradic current mildly over the whole surface.

These are a few cases in which cataphoresis has been tried with good results. There are many more, and, as I said before, the time is near when it will be used every day where a direct action of the drug is desired immediately.

## Pernicious Intermittent Fever, Etc.

As pernicious intermittent fever is always attended with unusual gravity and danger, and its treatment is far from being a success, it is well to know what can be done with electricity. For several years after I began practice, it was my fortune to be located in a malarial district. I had many cases of this form of fever, mostly in children.

This fever has received several names, such as congestive chills, Walcheren fever, African fever, Hungarian fever, jungle and lake fever. I lost some patients by it, but when I followed Merrill's treatment,—viz., chloroform in full doses. I had better success. Knowing the peculiar action of electricity on fevers, and its action on congested parts, I decided to apply the galvanic current on my next case of pernicious fever.

I did so, and was so well pleased with it that I applied it in every case I have had since. The death rate on my books is less than before.

If I can see the little sufferer before it is too late for *any* treatment, I have little fear that I cannot reduce the congestion in a few minutes. Of course when the congested face comes back to its natural color, and the patient can breathe easily, the danger is past for that day, and no one will let it occur two days later if possible to prevent it, and that can be done in almost every case.

The proper way to apply electricity in these cases is first to have a good galvanic battery. Have the nurse strip the child, and, after moistening the sponge-covered electrodes, place the *positive* pole at the back of the neck, and move the negative pole up and down the spine. Be careful, and do not give more than twenty milliamperes; begin with about five. Remember, the patient is but a child. (I am now speaking of children, though it holds good for older patients.) After one minute or so, pass the positive pole along the neck, to the ear, then up to the temples and back again.

Soon the dark, congested look will begin to give way, and the heavy, stertorous breathing will become less so, and full breath take its place. Keep up the current, but do not increase it after the

symptoms begin to improve. Do not make a mistake, and place the *negative* pole to the head. Remember you want to increase, or restore the circulation, and not to coagulate the blood. Dr. H., gives stronger currents than I, but I have as good results as he, and prefer the milder current.

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## Chilblains.

With chilblains you get an erythematous inflammation of the feet, and, unless cured, it may degenerate into painful, indolent, ulcerations. We meet many cases where, every winter, the patient suffers untold agony, and in spite of all the treatment his sufferings return the next cold spell.

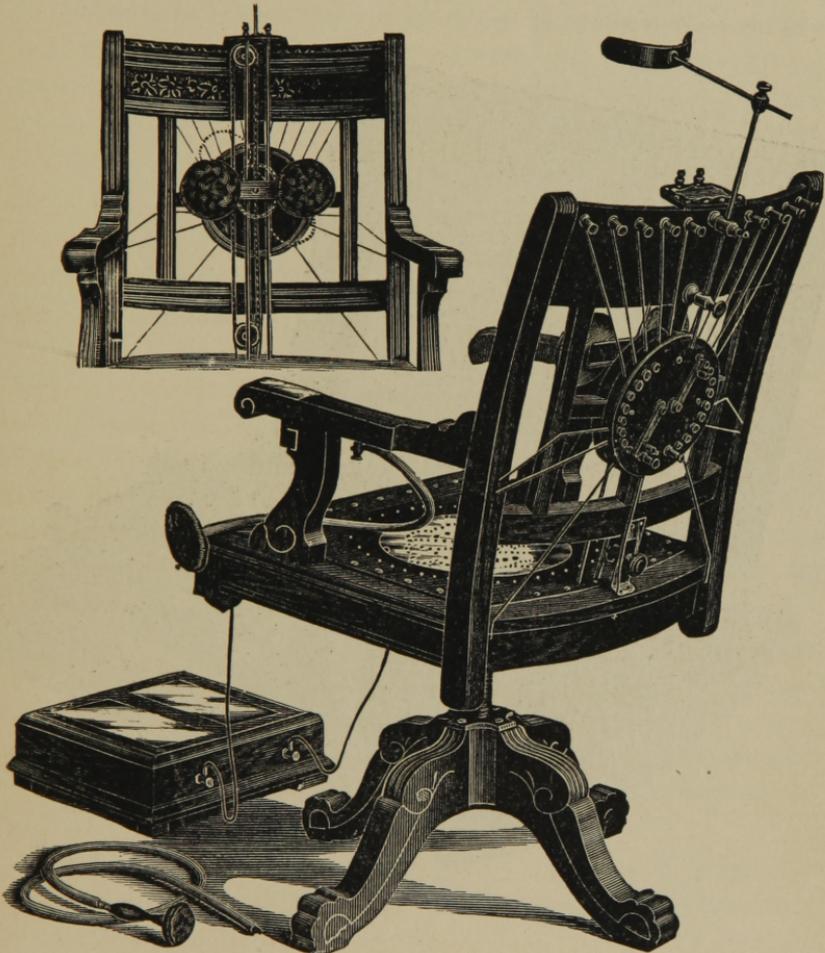
When a patient comes to you with chilblains, take your galvanic battery, arm the positive pole with a large sponge or cotton-covered electrode, and place the other pole in his hand. Apply the positive pole over the tender parts, and begin with a mild current of ten milliamperes, and, as the smarting, burning heat passes off, increase it to twenty-five or more, (you will always have to be governed by the patient's ability to stand it,) and keep it up for twenty-five minutes.

The patient will go to bed and sleep sweetly all night. The next evening he will find the feet less sensitive, less painful, and with very little itching. (Keep this same treatment up for a week, and you will have no more trouble with that case.) I have tried it on many cases, a few of which were very severe, and I have never known one that was not cured if the directions were followed.

Case 1.—M——, in my own family, aged 35, had suffered for many years with chilblains caused by exposure while at school when a child. She would sit for hours in the most acute agony, and rub the foot where the frost had touched it, until the whole skin came off. She had tried every doctor in New York whom she thought could give her relief, with little or no help. Some six years ago, I tried the galvanic current on her feet. It worked like magic; the burning and itching left in a few moments, and she had a good night's rest. I re-

peated the dose every night for ten days, and since that time she has never once spoken of painful chilblains.

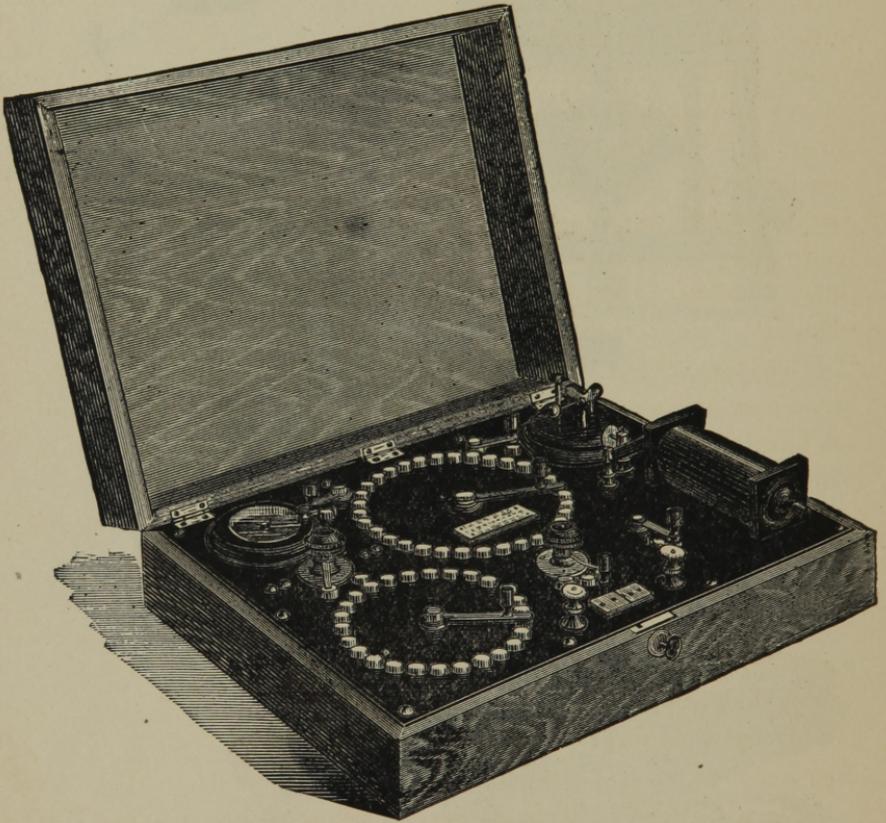
Case 2.—George A., aged 21, followed the life of a sailor. A few years ago he was cast away, and nearly frozen to death. He



McIntosh Electric Chair.

recovered, but his feet were so badly frost-bitten that every winter he would be laid up for two months or more. I applied the galvanic current, the positive pole to the foot and the negative pole to the hand, for twenty minutes each evening just before bed-time, and cured him.

It acts like tannic acid on the tender flesh. It hardens the skin, and renders it tough, yet pliable. Sometimes I apply one pole on one side of the foot, and the other pole on the other side. I have tried the *negative* pole, but it does not stop the burning sensation, and the redness keeps up, while the itching is worse, if possible.



McIntosh Table.

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## Scabies.

HOW TO TREAT IT WHEN TAKEN EARLY.

This is a most important disease, and should be well understood. Mistakes in diagnosing should not be made, as it leads to so much

unpleasantness. It is a disease of extreme frequency, and, when properly and quickly diagnosed, may be cured easily. It is so highly contagious that one child having it may infect a whole school.

The persistency of the disease is due to the continual hatching of the ova deposited. When I have a patient with the itching, I look, with an electric light and a good glass, for the acarus and the little furrow in which the ova are deposited. (I then take my galvanic battery, arm the *negative* pole with the electrode I use for *nævus*, and set it so the needles project about two lines.) The positive pole I place in the hand of the patient, and then apply the needles to the spot on which I find the ova. I give about ten milliamperes, and continue the current for five minutes. If the spot is covered by the electrode that is enough. If it is not, or there is more than one, I treat each one. That is all that will need to be done.

The current has killed the mother and destroyed the ova. The male does not burrow, but lies close by under some scale and will be killed. The local irritation will quickly subside, and the child can go to school every day, and no one will ever know it has had that loathsome disease. No unguents being used, there is no bad odor from it, which always gives it away.

Of course if it is all over the body, around the genitals and anus, the electric current could not be used. The parts would be too sensitive, and there would be danger of missing a part of the acarus. It would spread in spite of treatment. It is worth while to resort to electricity when there are but a few spots, and these confined to the hands.

Mary C., aged eight, going to public school, came to me saying she had "been among nettles." I knew better, as it was too late in the fall, and it did not look like the well-known uticaria. With the electric light and a strong glass, I could make out the furrow the female had made. I applied the *negative* pole, armed with the wine-mark electrode (see cut on page 68), and gave ten milliamperes for five minutes, changing it to another spot on the same hand (there was none on the other hand), and giving that the same.

I saw the child the next day and the day after. I had no more trouble. I found out there were several cases in the school. The other patients were kept home and treated the old way, and some of them were absent for two months.

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## Faradic Batteries.

I have used nearly every good faradic battery in the market. They are all good, though some of them are better than others. Many contain a strong fluid, and while in the office this makes little or no trouble, but if carried around they will splash against the elements, and keep up a continual wear. Then the changing of fluids is often far from pleasant, particularly if it gets on the hands.

The best, and I think the most convenient, faradic battery is the Barrett chloride of silver battery. (See figure 8, page 26.) I have owned one for a year, and it is as good to-day as the day I bought it, and I use it every day. It is a dry battery, and I often pack it in my trunk, and feel safe. I know it cannot spill and ruin my other instruments. The cut will give an idea of its size, and beauty. It gives a smooth current, which can be increased to more than any one can take. It is always ready for use, and is no more trouble to carry around than a small book.

It is an elegantly finished, compact instrument. The metal parts are of the best material possible; carefully adjusted and handsomely nickel-plated. It has two hermetically-sealed cells, either one or both of which can be used as required; a Du-Bois-Raymond System Induction Coil, with inter-changeable fine and coarse wire winding for secondary current on the outer bobbin; wire horse-shoe, for bringing primary current into circuit; plain and interrupting handles, with best quality sponge electrodes and conducting cords, etc.

It is put up in a handsome hard wood box, with patent self-locking handle, which securely fastens the lid as soon as it is shut and an attempt made to lift it.

Both cells must be in proper place in the box at all times. " This

side up," "in" or "out of circuit," will serve as a guide, according as one or both are to be used at a time. Pressing the cell case to right will loosen lower contact so that it can be lifted out. Adjusting upper contact to the spring, and using same pressure to right will permit the setting of lower contacts, and fasten the cell case in place.

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## Labor Pains.

When the pains of labor have died out before delivery, I know of nothing better than the faradic current to renew and maintain them. Many give ergot, some give quinia sulph., but I prefer the faradic current to anything. It is sure, easy, and what is more, perfectly harmless.

Any good battery will do, but most of them have this to condemn them—they are too large to carry around, and the fluid is liable to be spilled and injure the carpet, or perhaps the carriage while in transit. I once knew a doctor to spoil a suit of clothes by spilling the fluid.

The only perfect battery for this particular purpose that I know of is the Barrett battery.

I have one made for obstetrical work. It contains but one cell, and is so small that I can put it in my grip with other instruments, or carry it in my over-coat pocket. It is always ready, and a moment's notice is all that is required to have it in full operation. It never fails on account of proper adjustment.

When I go to a bedside I make sure the time has arrived, and the patient is in labor. As soon as I know this, I quietly wet the sponge electrodes, and set the little battery close at hand, where I can get it without causing my patient any alarm.

If the pains die out, after waiting till I think they should return, instead of giving her a dose of drugs, I quietly open the battery, and, after telling her what I am about to do, I place one electrode just under the umbilicus, and the other over the point of the right hip. I give a medium strong current for five minutes, and, if the pains do

not return, I place the electrode on the other hip, and move the other softly over the abdomen.

I send the current through the uterus. I have seen those who kept the electrodes together. The current then passes from one to the other, and as no nerves cross the abdomen, but run to the linea alba, the womb does not contract at all. I never fail when the current passes through the uterus. As soon as the patient tells me, "O! a pain is coming," I stop the battery, and have no more trouble.

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## Treatment of Cancer by Voltaic Electricity.

Probably no disease that flesh is heir to has called forth every effort of our brainy men with so little success following their united efforts as the one disease, cancer—unless it be leprosy.

The utter failure of every known method of treatment enhances the laudable desire of every good physician to find some sure remedy for this opprobrium of our art.

S. W. Gross passed the best years of his life in establishing the principles of extirpation early in the first stages. In some cases it proved to be successful, but in a majority of cases it only postponed the terrible end.

Dr. Inglis Parsons has been, and is still, trying some experiments with electricity which bid fair to be of as much, if not more, benefit than any other treatment so far given. He believes he has found the only correct method of curing cancer. His experiments go to show that the constant current exerts no decomposition in the inter-polar region, but, when the current is suddenly interrupted, marked signs of disturbance follow, which *he* attributes to destruction of tissue. If this be true, it certainly looks very much as though he is making a step in the right direction. Dr. W. R. D. Blackwood, of Philadelphia, has reported two successful cases treated in this manner.

Future experiments will be watched with interest both at home and abroad. The one great danger of such strong currents as he has used (as high as 600 milliamperes), might be gangrene, but he

claims that in cancer the free supply of nutrient vessels renders the avoidance of interruptions unnecessary.

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## Twitching of the Eye-Lid.

You will often have elderly persons call on you complaining of a nervous twitching of the eye-lid. I have never found anything to relieve this nervous trouble as quickly as electricity. I use the galvanic battery for this. The chloride of silver battery I like the best (even at the office, where I could use my office battery). The electrode for the eye should be of glass.

They are for sale by all dealers in batteries. They are connected to the conductor by a screw, the metal going through the bottom or side of the glass, and forming a connection with the water in the electrode. The latter is made to fit the inner and outer canthus. Filled with water, it makes a pleasant contact with the eye. I use from two to six cells, according to the patient's ability to take electricity. The negative pole should be attached to the glass, and the positive pole may be held in the hand, or applied to the nucha. Ten minutes is long enough for an application, and it should be repeated every other day for a week, then once a week for a month. It may be all right sooner, but never promise to cure anything by electricity in a certain time. It is best to school the patient to the length of time it takes, and he will not give it up before it has had time to cure.

Mrs. C., aged 74, came to me with her eyes so sore she dare not go in the street for fear some one would think she was winking at them. I prepared to give her the battery. To my surprise, she was all in a tremble. Said she: "I dare not take that large battery. Doctor —— has been giving me the battery for two months, and his is only a little five-dollar battery, and it hurt me so I had to give it up. Yours would kill me."

I saw what is seen every day—that some one had been giving her electricity who knew nothing at all about it. He had given her the wrong current, and as strong as she could bear it. [Always

wrong; never give pain.] I quieted her fears, and applied the electrode. Soon she complained that she "could not feel it," and doubted if she received any current.

However she came in all sixteen times, and has never had any trouble since then (three years). I *have* armed both poles with a glass electrode, and applied one to each eye, alternating them every few minutes. But I do not like the latter plan as well as the former.

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## Ring-Worm.

Ring-worm can be cured at one seance. I arm the positive pole with the electrode I use for moles, nævus, etc. Let the patient hold the negative pole in the hand, and place the needle points on the ring-worm. Let the points protrude about the thickness of the skin. Start off with three milliamperes, and increase to five. Five minutes will be long enough for each ring. Dress with cocoa-butter, and that will be the last of the case.

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## Writer's Cramp.

This will call for more attention. I have found, from the slight experience of seven cases, that the *positive* pole should be applied to the hand and arm afflicted. I attach this pole to a large electrode and apply it to the nucha. I start with fifteen milliamperes, and increase to seventy-five if the patient takes it kindly.

The faradic current is of little, if any, use in this disease. It is of too deep a nature, and the galvanic current is the only one that will do good. It must be remembered that it will take time, and it is the better way to have the patient come every third day, and, at the same time, stop all work that taxes the brain. Fifteen minutes is not too long to give the current, unless the face becomes flushed while taking it. If so, reverse the poles for a few minutes, and postpone further operations till the next time.

Mr. S. J. sent for me to visit him at his office in Wall Street, New York. I found him at his work, but he had a tired look, and I found he had a slight attack of writer's spasm.

I found he had been hard at work, and the kind of work that sends business men to an early grave, viz., brain work. He was not a bad case so far, but I said to him, "Put on the brakes, S., or I will not answer for your life." He promised to do so. I saw him every three days for a month, and the cramp left him, and he appeared to be gaining every day. I left him, after urging him to take a trip South for the winter.

This he promised to do, but some railroad matters took him West instead. He was away one year. When he came home his hand was as strong as ever, and he has never had the slightest trouble since.

The galvanic current is the one to use in these cases, and as I said before, the *negative* pole should be applied to the hand, and the positive pole, armed with a large electrode, applied to the base of the brain, or near it.

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## Intercostal Neuralgia.

Intercostal neuralgia is one of the many diseases flesh is heir to that cause the patient to "borrow trouble, and think he has some deadly disease fastened to him. If it should happen to be the left side, and pretty high, it is set down by the patient and his mother (if he has one) as heart disease.

I have had them come to me, with a frightened look on their faces, harding daring to take a full breath for fear the heart would stop. This is a case where your galvanic battery comes in as the only speedy help.

When you have a case of this kind, your trained ear will instantly tell you the heart is all right, and that it is a case of intercostal neuralgia, or one of pleurodynia, it makes little difference which, as the treatment is much the same, so far as the electric current goes.

Take your galvanic battery, arm the *positive* pole with a large electrode, as large as the hand, and moisten well in warm water. Place it over the seat of pain, and place the negative pole in the patient's hand. Begin with a mild current, say five milliamperes, and gradually increase up to fifty. I use one-hundred, and take the electrode in my left hand and apply my right hand to the side. I give it a good rubbing, and work the muscles at the same time. Ten minutes will send the pain away, and the patient will go home pleased to find the heart all right, and that he (or she, as the case may be,) is good for many years of life yet.

It is better to have the patient return the same evening or the next day, and to keep it up for at least a week, if he wants to be cured.

Mr. B., aged 24, a morocco dresser by trade—a business that kept him wet the whole day—came to me with a severe pain just below the heart. He was holding his hand firmly over the seat of pain, and I had all I could do to hear what he said. He told me his father, brother, and one sister had died from heart disease, and he had feared it all his life, and now it had come on, and he was afraid he would die at once.

I found his heart all right, and applied the galvanic current to the side. He went home feeling better than he had for months, as I had assured him his heart was not the offender, and the pain had gone. He came in all five times, and had no more heart trouble. I have tried the faradic current in similar cases, and gave no relief; then changed to the galvanic, with the best results always.

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## Convulsions of Children.

Was there ever a physician who, at some period of his practice, has not been sent for to "Come at once, as Mrs. Smith's or Mrs. Brown's baby has got a fit." I will venture to assert there is no such physician living.

On reaching the house, all the old ladies in town will be there, and each one, from her goodness of heart, is insisting this or that be

tried. If not with you, send for your galvanic battery. Take the child out of the tub of water (there is where you will find it,) wipe it dry, and cover it with warm flannel blankets. Apply the *negative* pole to the head, or neck rather, and slowly move the *positive* pole over the lower limbs and up over the chest. Do not give more than three cells (the milliamperere meter you cannot well take with you, so you must give what you know will do no harm).

Keep it up for five minutes, and the little sufferer will soon come out of the alarming spasm. The turged blood-vessels will be emptied of their fluid, and the tired brain given that sweet repose so necessary to save its life.

Remember, always begin with not more than two or three cells, and perhaps increase to five. Apply the *negative* pole to the nucha, and the *positive* pole to the lower parts of the body.

I always take the *positive* pole in my left hand, and apply my right hand to the child. In this way I can tell how strong I am giving it, and the hand makes the very best electrode. I believe I have never had a patient (a child) in spasms that did not yield to the galvanic current in five minutes.

A lady living in my street sent her nurse over for me. "Oh, doctor, run, for little Mary has a fit and has been in it for an hour." I took my galvanic battery (being forewarned I armed myself), and I found the little miss black in the face. I saw she had been too long in the water already, and took her out, dried her and put her between the blankets. I applied the *negative* pole to the back of the neck immediately, and with my hand, as a *positive* electrode, rubbed the little body well from the chin down. Inside of five minutes the color changed, the breath came regularly, and she was out of danger, and I had no further trouble. I could give several cases in which the result was the same. I have had others, where I could not get my battery, that did not do so well, and one died.

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## Asphyxia of the New-Born Babe.

I always take my small faradic battery with me in obstetrical cases. If I have a patient who has been in labor for some time, and

the pains die out, instead of giving ergot, quinine or other drugs, I apply the faradic current, as mentioned elsewhere.

But that is not all it is good for in the lying-in chamber. Many times the child will be found asphxiated from some cause. I have been able to start the breathing of an asphyxiated child, after everything else had been tried and failed.

Mrs. S. gave birth to three boys. I attended her, and as soon as the first child was delivered to the nurse, I left it with her, and paid all attention to the mother. Ten minutes later, the second child was born. The cord was wound around the neck at least three times. I saw it was black in the face, and thought it was dead. I gave it to the nurse, and finding there was another I remained at the side of the mother.

About ten minutes later the third and last baby came. It was the only one that made the slightest noise. I attended to the mother. I was then informed that "two of the children were dead." I immediately placed them in warm water, alternating from hot to cold, but without success. I then applied the faradic current pretty strong. It made the little muscles contract, and inside of three minutes, the first child born gave a gasp, and began to assert his rights in true boy-like manner with a yell.

The second one was the hardest case I ever met. I am certain I should not have brought it out of the asphxiated condition but for the little battery. I gave it the full strength of the primary current, and while Hall's ready method was kept up, steadily I increased the current. At last I was rewarded by seeing it gasp, and soon the dark color changed, the blood became oxygenated, and the baby was saved.

Dr. W. sent for me one night, with word to bring my battery. When I reached the room, the child had been born for some time, and he had given it up as dead. However, as soon as I came, he held the limp and, to all appearances, dead baby in the warm water while I applied the poles of the faradic battery. One I placed over the back of the neck, while the other was placed over the diaphragm and thorax. It was but a short time ere a gasp was heard, then short, quick breathing. Another life due to the electric

current I have had several, that I am sure I should have lost but for it.

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## Stammering.

I have treated several cases of stammering by the following method, and in nearly every case it has cured the patient. There may be other and better ways, but it is the only treatment that has been at all satisfactory in my hands.

Miss R., aged 16, came to me saying, "Doctor, I have no hopes of being cured or even helped; I have been treated for the last ten years, with no good result whatever." She was the worst case I ever met with. I sat her face to the light, with teeth firmly closed. I took my 36-cell galvanic battery, began with 15 milliamperes, and slowly increased to 25. (I am always governed by the patient. Some will not be able to take large doses of electricity; all stammering people are very nervous.)

One sponge-electrode I placed over the ramus of the jaw bone, and the negative pole I placed over the other, sending the current through the masseter muscle. These were held by a clamp made for the purpose. I then picked up a book and began to read slowly, she repeating after me, word for word, for fifteen minutes.

At this time the patient became very tired, and I allowed her to rest, and removed the electrodes. I then passed the current through the nerve of phonation for ten minutes, reading with the teeth firmly closed. I advised her to read one hour each day with mouth, or rather the teeth, closed, and if speaking to strangers to do the same, and to return in one week.

When she came again, she was very happy; said she "C-c-could t-talk real w-well," and so she could. I kept up the treatment for two months, and to-day (one year since), she can converse as well as any one.

When in Europe a few years ago, I saw a case treated by reading with the teeth firmly closed, but no electricity. I decided to treat my next case without electricity.

Robert Mason, aged seven, and a bad case, was taken for the

trial. I treated him faithfully for three months. There was a decided improvement, but far from satisfactory. I then began with four cells and increased to six.

In two months from the first electric current he was cured. I have never seen but one patient that the above treatment did not benefit from the start, and that is a young lady under treatment at the present time. In her case, for the first month I could see little, if any, improvement. Now she is nearly cured, and has received no other treatment, aside from correcting a little menstrual trouble.

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## Diphtheria.

I use the electric cautery for the removal of the membrane with the best results. I use a wire loop about one inch long, of No. 30 wire; this is rolled or hammered till it is thin. The electrode has a switch easily managed with the finger. The instrument is introduced to the spot to be cauterized, and by pressing the switch the platinum wire is instantly white hot. With a light, quick motion it is drawn over the membrane. This is repeated several times, till the whole surface has been covered. In a few minutes the membrane gives way and comes off like strips of wet buck-skin, and in no case yet have I known it to re-form. It is not a severe operation, care being used not to burn too deep.

The battery used should be one easily governed in regard to the amount of heat needed.

If the heat is not great enough, by turning the switch on front of box to the next button, another cell is thrown in circuit, and so on, till the whole is in use.

The battery should be one with a E. M. F. of about two volts., a current of four or five milliamperes and an internal resistance of 5-100 ohms. This will not only give a nice cautery for light work like the above, but will light a small incandescent lamp for diagnosing, is easily managed, ever ready, and does not require an assistant to agitate the fluid. Any battery will do that gives the the required heat.



The small cut on the preceding page represents the form of electrode and wire.

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## Paracentesis of the Chest by Electricity.

The operation of tapping the chest is comparatively a safe one, and although performed by the older surgeons, it was Dr. Bowditch, of Boston, who placed it in its true light some twenty years since. The instruments used in this operation are of the most simple kind, a scapel and a long slim trocar, with a stop-cock to prevent the entrance of air into the serous sac.

There has been much outcry about the risk of the entrance of air, and no doubt there is a risk, yet I believe all danger may be avoided. I use the aspirator, and that run by an electric motor. The motor is small, being 2x3x4 inches; to this the pump is attached which is run about 120 strokes per minute. The reservoir is a one-gallon glass jar, a long rubber tube with glass inset, and a long, slim hypodermic needle with two stop-cocks.

When ready, I start the motor, (I use a small battery of eight volts,) and as soon as a vacuum is produced I push the needle in just over the seventh rib if I can, over the sixth if I must, using care to avoid the intercostal artery. What have I gained? Simply this, I have both hands to do anything necessary with. I have a suction that keeps the needle free, and regurgitation of air into the sac is impossible.

If the jar fills, empty and fill again; with the two stop-cocks no air can enter while doing so. In this way every ounce of fluid can be taken out. By the old way it cannot, and often the operation has to be repeated three and four times. When the needle is withdrawn the aperture is much smaller than from the trocar.

In aspirating for any fluid I much prefer the electric motor, as it keeps up a steady motion, and there is no risk of the air entering. Then it saves a great deal of hard work, as any one can tell who has worked the aspirator by hand.

## Galvanism in Pelvic Pains.

In the employment of electricity it is well to remember that, unlike other treatment, one has something more than a surface effect. When the two poles of an electric battery are applied, the body becomes a conductor, and the current passes from one pole through the diseased part to the other pole, and back to the machine.

For instance, in treating an ovary the current passes through the ovary, though the poles do not touch it, consequently the ovary must get the benefit just the same as though the electrode came in actual contact with it.

If this be true—and I believe it is—we have a remedy in electricity with which we can make local applications to the most deeply-seated organs in the body.

There can be no doubt of one thing, viz., that the current will follow a nerve precisely as the electric current follows the wire from station to station. For this reason I always apply the poles so that the current will follow the nerve-trunk running through, or as near to, the afflicted part as possible.

I find galvanism to be the best remedy for the relief of pain in all tubal diseases, from whatever cause, and that it is safe and advisable to give it in all cases except where specific inflammation is the cause, or when there is no question but what there is pus present. Should there be pus, galvanism is contra-indicated.

I have employed the galvanic current in dysmenorrhœa, and in all pains resulting from metritis, or hyperplastic enlargement, or the result of fibrous tumors, or any tumor that is non-malignant. Exudates in the pelvic cavity always cause more or less pain, and nothing I know of will give relief so quickly as galvanism, always bearing in mind to look out for acute inflammatory action, and for the presence of pus cavities.

When the pelvic cavity is so filled with old exudation that it is impossible to move the uterus, or to introduce the finger, and the pain is very severe, nothing will reduce the congested condition so

quickly or safely, and leave the patient in the best possible condition, as the galvanic current.

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## Galvano-Cautery.

The advantages of the galvanic cautery over other methods of operations are many and decided. Among the most important I will mention :

First.—You avoid severe and often dangerous hemorrhage. If well performed, there will be little or no hemorrhage. I have cut off the external mammary artery without hemorrhage, but I always tie it for fear of secondary hemorrhage.

Second.—You get accurate localization of action and can see what you are doing without sponging all the while to keep the parts free from blood.

Third.—You give but little pain compared with other methods, and the danger is almost nothing.

Fourth.—You can use it in deep cavities where it is almost impossible to get with a knife, and with ligature. You will not get secondary hemorrhage as often as with any other methods. The wound will never heal by first intention, but it always heals kindly. Beard and Rockwell, in their excellent work, have summed up these special cases where cautery should be employed :

“Cauterization of ulcers, chancres, etc.; cauterization in all such diseases as follicular pharyngitis, trachoma, ect.; cauterization of all malignant or fungoid tumors; cauterization of the bases of malignant tumors, and of the surrounding tissues, after their removal by the knife; cauterization of all erectile tumors, varicosities, etc.; to cause coagulation; in the removal of hemorrhoidal tumors; use as a moxa in spinal difficulties, neuralgias, etc.; cauterization with a view to subsequent tissue contraction, as for cure of enlarged tonsils, prolapsus uteri, cystocele, rectocele, etc.; in the treatment of various fistulæ and sinuses; in the removal of benign tumors, malignant tumors, etc.; in any cavities of the body, to avoid hemorrhage; amputation of tongue, cervix uteri, and penis; for purposes of ignipuncture; and all operations of the kind mentioned wherever found on the body.”

The galvano-cautery battery is entirely different from any other. In the use of the galvanic cautery the current of electricity is not applied to the patient, or the part to be operated upon.

The current (a very strong one) is utilized to heat the instrument—either a wire or knife—which is employed in the operation.

One conducting cord is connected with the zinc element of the battery, and the other end of the cord is attached to one arm of the electrode. The other cord is attached to the carbon element, and to the other arm of the same electrode. If a wire is used, one end is fastened to one side of the electrode, and passes through a small tube, around the tumor to be removed, back to the other side of the electrode, thus forming a perfect circuit save a small space, which is filled by pressing a spring or slide when the operator is ready for the heat.

The wire must be platinum for two reasons. First, nothing would stand the great heat except platinum; Secondly, platinum is a poor conductor of electricity, and the great resistance offered by the platinum wire results in the evolution of an intense heat.

Care must be used to regulate the heat of the wire, or it will grow cold, or too hot, and fuse the wire. The wire should be just at a white heat. Not so hot as to be in danger of fusing it, nor yet too cold. The cautery may be used in all operations where you wish to cauterize or destroy the parts. It may be used in the removal of tumors and malignant growths.

When it is possible to surround the part with a loop, and have it fast and not slide off, it is better to use the loop. There are many shaped knives made for certain operations, some of which are shown on page 41, and others on page 213.

It is necessary to keep your battery in good condition, with fresh fluid and zincs well amalgamated, if you want it to respond every time.

When you have an operation to perform, fill the cells half full with fresh fluid, and hang the elements on the crane over them ready to plunge when ready. If you use the loop, adjust it to the tumor, drawing it tight around the parts, and after seeing that everything is ready, let your assistant plunge the elements. The wire

will remain cold until you close the circuit with your thumb. Instantly you get a white heat. Should it not be hot enough, let the helper rock it in the cradle made for it on the sides.

It is a good plan to count "one, two," "one, two," and let your assistant rock it as you count. If it gets too hot, count slower. Should it keep too hot, lessen the number of cells. As you draw the loop smaller you will have to lessen the cells, or fuse the wire.

If it becomes necessary to stop the operation, even for only a minute or two, you had better lift the elements from the fluid until you are ready to go on. As soon as you are through, let the battery be emptied and the fluid thrown away. It will not pay to attempt another operation with the same fluid. As it costs but little, you had better throw it out, wash the cells and zincs, and pack away for the next time.

Of course I speak of the fluid or Piffard battery, as that is the best fluid battery I know of.

I prefer the storage battery to it for several reasons. It is cleaner, and you do not need another person to plunge and agitate it. You can grade your heat before you begin, and when ready to close the circuit, you know what to expect, and it will keep up without any agitating.

When operating with the loop, let the traction be slow and steady. This is done by means of a rack on the electrode (see figure on page 212), so as to cauterize the whole surface thoroughly. Then you will have little or no hemorrhage, and the stump will look a potato that has been cut with a dull knife. Never be in haste. Take your time; "be sure you are right, then go ahead."

After the operation, when the patient comes out from the effect of the anesthetic, dress the wound as you would a burn. The wounds made from cautery always heal nicely.

To use the loop and dome wires on the Piffard battery, connect the screws marked I, with the surface beneath them, and turn the screws marked Q *away* from the surface beneath them; attach one conducting cord to the electrode, and the other end to post marked 1, 2, 3, 4, 5, 6, according to the heat desired.

To use the cautery knives and points, turn the screws marked I,

away, and those marked Q connect with surface underneath them.

Should the heat be too great, raise the two screws marked Q farthest from the front, and if still too hot, raise the other two screws marked Q.

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## Cauterization of Dog-Bites.

Ninety-nine out of every one hundred if bitten by a dog, will run to the nearest doctor to have the wound cauterized. Does it do any good? I don't know. It satisfies the patient (or the mother, if a child is bitten). Then, if some one is allowed to kill the dog, no further trouble is anticipated.

Strange it is so many believe—even when they *know* the dog is perfectly well—that, if in twenty years after, the dog lives and has hydrophobia, the person will surely get the same disease, because the dog once bit them, even though the dog was healthy at the time. How much better it would be to let the dog live, and keep him secured, till they found out for certain if he had, or did not have, hydrophobia.

If the dog is mad when he bites, if the poison is in the saliva on his teeth when he bites, no killing of the dog would help, in the slightest degree, the injured person. On the contrary, if the dog was well when he bit the person, and the same day should be himself bitten by a dog with hydrophobia, and go mad in nine days after, it would in nowise affect the person bitten before. But you may talk this till the "cows come home," and the laity will never believe it as a rule.

I have little faith in cauterization in such cases. True, if the wound could be properly and thoroughly cauterized at once, the poison might be killed. I am inclined to believe it would.

But when you remember the blood all passes through the heart twice every minute or thereabouts, is it not likely that the poisoned blood has entered into the circulation long before the patient reaches the doctor's office? If so, what good will all the cauterization ever known do? Echo answers, what good!

But if cautery is to be the order of the times, it is better to use the best. Generally the first thing to do, and all that is done, is to take a stick of "lapis infernalis," and bore down into the wound more or less. It hurts, and looks as though it would burn out anything, but in fact it only burns just where it touches, and no deeper, and that is not deep.

If you have a case to cauterize, take you cautery battery, and with a properly shaped point—or, if the wound be large, take a dome wire, and heat to a white heat—and thrust it down until it touches every part of the lacerated wound. This looks like heroic treatment, but it is less painful than the caustic spoken of, which is nearly always used. It is done as quickly as motion can be made, and by the time the patient thinks of giving his howl, it is over. Then you can get the point to a white heat much sooner than you can get the caustic ready. With a storage battery, you can have it all over before the sufferer has had time to tell his story. The wound will discharge for a few days, and, when healed, will never trouble him again.

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## The Piffard Galvano-Cautery Battery.

This galvano-cautery battery (see fig. 12, page 32,) is a very complete and reliable instrument, at once powerful, portable, compact, and so free from complications and easy of management, that any physician can understand it and operate with it. It is adapted to meet all operations usually performed with this class of instruments. This battery is a wonder and delight to all who see it, and has successfully withstood the most critical tests.

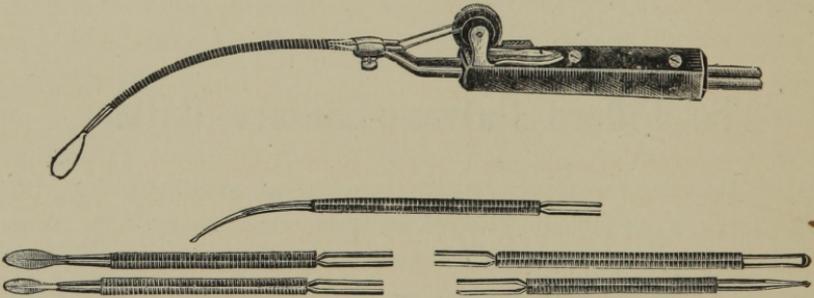
In its construction the makers have aimed to utilize each element to its fullest extent, and have overcome all the inconveniences attending the use and management of those large, unportable and troublesome instruments which have been manufactured here, and many of which have been imported into this country. The parts can be easily replaced, and the surgeon living at a distance can duplicate them and adjust them without difficulty.

The electrodes are of easy management, and in connection with the battery form a complete and convenient apparatus.

The box contains six cells of vulcanite and a platform of hard rubber, to which are fastened the zinc and carbon plates. On the top of the platform are seven conducting posts, six connecting screws and a handle (used in connection with the long arm) for holding the elements when not in use, and by which they are lowered down into, or taken from, the cells; the pivot arms on the sides of platform with their supports on sides of box form the agitator.

By means of the connecting screws the cells may be connected so that either a current of quantity or intensity may be obtained, the former being used to heat the heavy knives and points, and the latter to heat the ecraseur.

The combination of a galvanic battery with a faradic machine (or, rather, their being contained in the same case) enables the physician to use either form of current at will, and in this respect they are desirable especially for office practice or for the specialist.

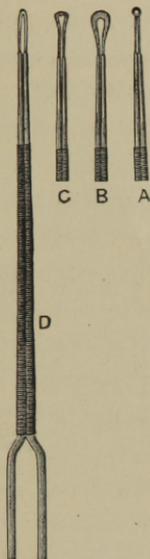


Electrodes for the Piffard Battery.

## The Galvano-Faradic Cautery Battery.

This battery (See Fig. 12A, page 33,) is intended for eye, ear, nose, throat and other minor cautery work. It is small and compact, can be carried about with the fluid in the cell without danger of spilling, and will fully meet the requirements of the specialist. The cut on page 33 shows the elements (one large zinc and twelve carbons) suspended over the jar containing the fluid, the other jar serving

as a drip-cup for the elements when not in use. The heat may be regulated by immersion.



Cautery (Nasal) Electrodes. A, bulb-pointed ; B, knife ; C, curette ; D, point.

On page 41 is shown a group of galvano-cautery electrodes, Figs, 29 and 30.

The electrodes, while made for the Galvano-Faradic Co.'s cautery battery can be used with the St. Clair battery, or a storage battery. The cautery battery on page 33 is a good and cheap one, suited to those living away from electric centres, if I may be allowed the expression, who cannot afford to buy a large battery. It will do many small operations, and will be worth the money many times over to those who have use for a small battery.

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## Electro-Cautery.

### AMPUTATION OF THE CLITORIS.

A few years ago, I was called to see Miss B., a young lady of 21 years, and a member of one of the first families of New York. She was

pale, nervous, with dark rings under her eyes, and her lips were of a leaden hue.

Her story was a sad one, and one seldom met with. She had everything money could buy, was well educated, and had at one time been much admired. She first menstruated at the age of 18, and from that date began her trouble.

She had been compelled to remain at home, to deny herself the pleasure of riding horse-back, or even driving in a carriage. She could not walk in the parks, could not dance, in fact could do nothing that caused a movement of the limbs.

In doing any of these things her sensations became so painfully acute she must sit down, or she would fall down in a state of orgasm. I made a careful examination of the case, and found the clitoris very long and highly sensitive. In fact, in walking, riding, or any exercise, titillation of the clitoris was as unavoidable as in copulation.

At my request, Dr. James Wood was called to see the case, and he agreed with me that amputation was the only thing that would do her any good. She had taken bromides till the stomach could stand no more.

The organ was very large, and fearing severe hemorrhage from the main artery (a branch from the internal pudic), I used the galvano-cautery. I used the cautery knife, and not the loop. Her recovery was good, and she improved from the first. She had no more trouble, and would only say (when spoken to about it), "O, I am all right now; I am not afraid to trust myself anywhere now." In less than one year she weighed 170 pounds. She married about a year later, and I delivered her of a fine little girl. She has two more now, and is a happy mother.

Mr. H. (her husband) says she appears to have little, if any, passion, though she is ever ready to please him, yet does not appear to know when orgasm takes place—but that it does, there can be no doubt.

#### AMPUTATION OF THE CERVIX.

I was called in to see Mrs. P., aged 45. I found her with the neck of the uterus enormously elongated, so much so it protruded

beyond the labia majora. The hypertrophy was the most complete I ever saw. She had been in this condition for some time (the patient being unable to do her work, that of a dressmaker), and her youngest child was then 12 years old.

I decided to operate, and ten days later, in company with Dr. E. H. M. Sell, of New York, performed the operation. We decided to use the platina wire, but the hypertrophy was so extended we had some fears the wire would not hold to finish the operation.

However, the anesthetic was given, the organ pulled down, the loop adjusted, and the battery started with four cells. I soon had to switch in two more cells, and everything went along swimmingly till about half through, when away went the wire.

We had expected this, and had other electrodes all ready, and in a moment continued the amputation with another and heavier wire (No. 38). It took ten minutes to burn through, but we were well pleased with the operation. The stump looked like a raw potato cut with a dull knife. There was but very little hemorrhage. The patient made a splendid recovery. The piece taken off was exhibited before the Pathological Society of New York, and no one present ever saw one so large or so hard before.

Now comes the (to me) interesting and wonderful part of this case, in fact the only thing that tempts me to give it here. Eight months after, I found the patient with symptoms of pregnancy. This was hard to believe, and I watched and waited till I could hear the placental souffle before I reported to Dr. Sell, whom I well knew would be so much interested in the patient as to want to see her, which he did.

Well, in 286 days from her last menstruation I was sent for, and delivered her of a fine eleven-pound daughter. There was nothing peculiar about the labor, the position was L. O. A., and I delivered without forceps. Placenta came in ten minutes, and the patient made a good recovery. The child lived a few days, and died from some of the diseases flesh is heir to. The lady is living and in good health. Dr. Sell has the amputated uterine neck.

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## Chronic Ulcers.

It is unnecessary to describe a chronic ulcer. They are met with on every hand. In every town and hamlet they tell you of Mr. Smith, or Brown, who has had a chronic ulcer (or "fever sore," as it is called by the laity,) for twenty years. Chronic ulcers often exist for months and years, at times exhibiting too much action and again too little.

If granulations do occasionally form, they are seldom healthy, and if so, do not long remain so, but languish for the want of proper support. It appears to me few practitioners look upon the chronic ulcer in its true light, that they do not understand its pathology, and a chronic ulcer of the leg is seldom cured (in a country practice), notwithstanding the patient has been under treatment for years.

I will only speak of ulcers that do not extend beyond the subcutaneous cellular tissue.

My treatment is as follows, and I have never yet failed: Mr. Y., of Brooklyn, came to me with an ulcer of twenty years' standing. The edges were deep, partially undermined, with a foul, unhealthy bottom, studded with fungus granulations.

The ulcer was about five inches long by four wide. I dressed it with a poultice of cow's horn scraped with fine glass. This, in twenty-four hours, cleaned out the fungus granulations. With the hot platina wire instead of the knife, I burned through the hard edges; then with a small brush applied tinct. ferri chloridi. The latter was applied once a day, more or less, as needed. Iron and quinine internally in full doses. In three months the leg was entirely well. The iron forms a crust over the whole, which is left till it begins to come off itself.

I know this is contrary to our text books and looks like empirical treatment, but in *each case* tried (seventeen in all) every leg healed, and but one has re-opened. I always used the officinal sol. of acid nitrate of mercury, until by accident the iron was used and the ulcer healed. By using the cautery it is a less bloody operation, and the burning acts like a charm on the induration.

## Electricity.

Electricity is a valuable agent in gynæcology, and one which deserves to be much more frequently resorted to than is now the case.

Its application in gynæcological practice requires a special knowledge of the use of electricity.

The remedy, if properly used, cannot do harm. But it will do harm if not properly used, if given too strong, or if the wrong pole is used.

It is of special service in chronic conditions, and no pain is experienced if the galvanic current is employed.

The faradic current is indicated in deficient development and want of tone in the pelvic organs.

The galvanic current is to be used to promote absorption of adventitious products and to allay pain.

This method of treatment requires much perseverance.

It is contra-indicated in acute inflammatory conditions.

The pathological conditions in which electricity proves useful are those in which other treatments fail, or cannot be borne by the patient.

In organic diseases a permanent cure or a restoration of the diseased organs to perfect health cannot be expected; but very marked relief, and that without danger, may often be afforded by means of electricity.

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## Advice to All Beginners.

There is one thing I wish to impress upon the mind of every beginner who may read this book. In the first place, this book is intended for the beginner and those who live where they cannot get the information they require. There are many who have written to me, to ask "what kind of a battery had I better advise my patients to get?"

The practice of putting a battery of *any* kind into the hands of

a patient, and telling him that he can apply it "just as well" as you can yourself, is one to be fought down first, last, and *always*. If electricity is good for anything it is worth the careful attention and study of the physician as much as any other potent remedy. To put a strong battery in the hands of a patient, to be used haphazard without his knowing anything about the disease he is supposed to treat, and less about the instrument it is proposed to treat it with, is to do him a great injury; perhaps it will lessen his confidence in the ability of his physician, and *destroy* his confidence in electricity if he fails to cure himself, which he *will* do, ninety-nine times out of a hundred. It is all wrong. When a doctor tells his patient, "you can do just as well with it as I can," he no doubt tells the truth. If he understood the case, and knew how it should be treated; which current to use, how strong, how long, how often to give it, certainly he knows too much to entrust it to the laity to apply, and he would not say, "Buy a battery and apply the current yourself."

Electricity must be confined to the medical profession, and they must understand it thoroughly to make it a useful agent. Then, and not until then, will it become popular and fully appreciated.

To succeed in electricity, the physician must give it his personal attention in each and every case. Patience is requisite and necessary to success in its use, and it is well to have the patient understand that it takes time, and unless he is willing to follow it up, it will be of no use to begin it.

But, for your own sake, do not make a double-edged knife, to cut both ways, and injure both the patient and yourself by telling him to doctor himself, as he can do it as well, or better than you can. It don't pay.

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### "Damnant Quod Non Intelligunt."

Many physicians who use only a small faradic battery, and that only once a month perhaps, claim that electricity will do no good, because they have tried their battery a few times and have left it with the family to be applied—by some one of them—to the patient.

No matter what the trouble is, their battery did not produce the desired action, and that settles it.

The time has come when an intelligent physician cannot afford to condemn all forms of electrical treatment of a case simply because he has failed to obtain satisfactory results with his battery, be it faradic, or galvanic, even though he may have employed it properly.

There are many cases where one current will not give the result desired, and even another current may fail, when if still another had been employed, he would have been surprised and delighted with the result.

Five years ago, Mr. O. brought his son to me to be treated for paralysis of the left arm. I found the child when four years of age (he was six at this time) had fallen down stairs, and having a violin in his hand, had broken it, and a sliver as large as the finger had gone through the arm. It had evidently divided a nerve. The arm had been left to hang by the side for months, and the flexor muscles were contracted very much. He had little or no use of the hand, and the arm was a dead weight.

Dr. W. had treated it with a faradic battery for a long time and at last advised his parents to buy one and give it every day. They did so, and with no good result whatever.

I tried the faradic current, and could get no movement of the paralyzed muscles whatever. I then took my galvanic battery and could get contractions without trouble. With the galvanic battery and the static spark, I brought the arm in three months so he could comb his hair with it. In six months it was as good as the other. The muscles filled out, the contractions gave way, and to-day he is one of the best violin players for his age I ever saw.

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## How to Teach Electricity.

I have always been in favor of electricity being taught in our medical schools. Why not? It is as much (and even more) a true science to-day as medicine is, or even likely to be. It is, or *should*

be, a part of every practitioner's outfit and treatment. There are many cases where it helps to cure and is an aid to medicament, and there are many other cases where it *alone* is a safe treatment, and the only one that will do the work with any hopes of success.

<sup>90</sup> But for electricity to be of any use to the practitioner it must be thoroughly understood. Its use must be taught by competent teachers, and good instruments employed. It should be a part of every curriculum. Every medical college should have a chair for teaching electro-therapeutics, the same as the chair for surgery, or any other branch. Then, and not until then, will every graduate have a chance to learn the proper use of this wonderful and, as yet, almost embryotic power.

In my opinion the college that takes the initial step will not only add to its own popularity, but will be followed by every good medical college in the country.

I would suggest a professor who is well up in electricity, and well posted in electrical treatment in every form, who knows (so far as is known to-day,) the current to be used in each particular case, in the chair at a good income. I would have the latest and best electrical machines of all kinds. He should lecture an hour three days a week, as do the other chairs. Lectures should be largely clinical, and the construction and use of all apparatus ought to be shown.

Electrolysis, treatment of stricture, fibroid tumors, and the removal of hair from the face, together with birth-marks, *nævus*, etc., would be taught by actual demonstration. Each motion would be learned and, when once seen, would not be forgotten. The out-door poor at Bellevue Medical College would supply patients for several schools. Then, when the student graduated, he could go home, hang out his shingle, and feel able to cope with anything that came along. He would be in advance of old practitioners for he has been taught electricity, the latest, the best. He would know what batteries to buy, and their use. He would be as well posted on electricity as any other branch he had been taught at school.

*Now* he goes home, and happens to read in some live medical journal that Dr. — has just performed a wonderful operation by

the electric current on a patient who had been given up, others not daring to cut for fear of hemorrhage. The galvano-cautery saved his patient's life. What does the young graduate know about it just from reading? *Nothing*. He has purchased a small faradic battery, and immediately writes to Dr. —, and asks "Can I perform that operation on one of my patients with my battery?"

Who is to blame? I say his teachers. He paid his money like a man, worked hard, and learned all they taught him, and finds out, after beginning practice, that one of the best and safest methods of treatment known was left out of his education. He has neither time nor money to go to college again to learn what he should have been taught at the same time he was taught the dose of ipecac. The chances are nine out of ten he will never learn. If he does, it is hard, up-hill work.

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## Electrical Humbugs.

"The wonders which can be actually performed by electrical agents are so marvellous that it is no wonder that the public in general have unlimited faith in the powers of this force. In the presence of the telegraph, the telephone, the electric light and a dozen other successful applications, he would be a bold man who would pronounce against the possibility of any achievement. This fact does not, however, prevent us from deciding against certain obvious humbugs and swindles which are to-day too common. Electricity has its laws, as well as gravitation, and the man who proposes a scheme to which they are obviously opposed is either a fool or a knave. Some of the swindles which are now before the public are exceedingly barefaced, and yet they are wonderfully successful in drawing the money out of the pockets of the people, and the most emphatic testimonials from 'respectable' clergymen. One man sells a hair brush for which is claimed all the virtues under heaven—all due to electricity. To convince the gullible portion of the public that the brush has great electrical power, those who sell it exhibit its action on a magnet, and as the brush is

apparently made of non-magnetic material, the effect is supposed to be due to the electricity which is somehow stored in the brush. The fact is, however, that there is a small steel magnet concealed in the the back of the brush, and it is to this that the action is due.

“Others present to the public what they call magnetic or electrical garments under various names. What adjectives are too strong to characterize the fraudulent claims made for those articles? That electricity is a most valuable remedial agent, when properly directed and judiciously applied, there can be no doubt. But these men know nothing either of electricity or medicine; all they want is money, and they make up for the lack of knowledge by the most unblushing assurance and the most lying claims. The articles which they sell violate the most elementary principles of natural science, and our young readers are cautioned to beware of them. The most astonishing thing is that their advertisements are admitted into professedly scientific and even into some medical papers, thus lending to them a quasi endorsement which no respectable paper should give even in its advertising columns.”—*Young Scientist*.

## Glossary.

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*Amalgamation.* The act of forming an amalgam, or effecting the combination of a metal with mercury. To cover the zinc plate of a voltaic cell with a thin layer of amalgam (quicksilver), in order to avoid *local action*.

*Ampere.* The practical unit of an electric current. As the ohm is the practical unit of resistance, and the volt the practical unit of electro-motive force, the ampere, or the practical unit of current, is the current that would flow against unit resistance, under unit pressure or electro-motive force.

Houston, in his dictionary of terms, etc., makes it clear in this way: "Take the analogy of water flowing through a pipe under the pressure of a column of water. That which causes the flow is the pressure, or head; that which resists the flow is the friction of the pipe, which will vary with a number of circumstances. The rate of flow may be represented by so many cubic inches of water per second. The ampere, which is the unit rate of flow per second, may therefore be represented as follows:

$$C = \frac{E}{R}, \text{ as announced by Ohm's law.}''$$

The expression signifies that C, the current in amperes, is equal to E, the electro-motive force in volts, divided by R, the resistance in ohms.

We measure the flow of liquids as so many cubic-feet inches, or cubic feet per second—that is, in units of quantity. We measure the rate of flow of electricity as so much electricity per

second, The electrical unit of quantity is called the Coulomb. An ampere per second through a resistance of one ohm is one coulomb.

*Anode.* The conductor, or plate, of a decomposition cell connected with the positive pole or terminal of a battery, or other electric source.

*Battery Primary.* The combination of a number of primary cells so as to form a single battery. The term is used to distinguish it from a secondary or storage battery.

*Battery Secondary.* The combination of a number of storage cells so as to form a single electric source.

*Battery Voltaic.* The combination, as a single source, of a number of separate voltaic cells.

*Binding Posts, or Binding Screws.* Devices for connecting the terminal pole cords or electrodes to the battery. They should be made of brass.

*Capillarity.* Disturbing effects of the proper action of a voltaic cell caused by capillary action.

The effects will be seen and known by the creeping, or efflorescence, of the salts, and by the oxidation of contacts and consequent introduction of increased resistance into the battery circuit. The liquid enters the capillary spaces between the contact surfaces, and oxidizes them.

*Commutator.* A device for changing the direction of the current.

*Conductors.* Substances which will permit the passage of an electric current through them.

*Continuous Current.* Term applied to the galvanic current in opposition to the electro-magnetic.

*Coulomb.* The unit of electrical quantity. That is, the quantity of electricity that would pass in one second in a circuit whose resistance is one ohm under an E. M. F. of one volt.

*Creeping.* The formation of salts on the sides of the porous cup of a voltaic cell on the wall of the vessel containing the electrolyte. This may be obviated by paraffining the walls outside or above the liquid, or covering the liquid with neutral oil.

*Cautery-Galvano.* The application of platinum wires of various shapes, heated to a white heat by the electric current, and used instead of a knife. Cautery is applicable in cases where the knife would be inadmissible, owing to the situation of the parts or their surroundings.

*Circuit.* Literally to go around. Beginning at one pole, and through

the conductors for carrying the current through whatever apparatus may be placed in the line, and back again to the other pole.

*Electrode.* The terminals of an electric source at either end of the conductors. The positive electrode is sometimes called the Anode, and the negative electrode the Kathode (in the cells). There are many forms of applying electrodes made to suit the purpose for which they are used.

*Electrolysis.* Chemical decomposition, effected by means of the electric current.

*E. M. F.* Electro-motive Force. The force that causes electricity to move.

*Electropon Fluid.* A battery fluid, consisting of one pound of bi-chromate of potash dissolved in ten pounds of water to which two and one-half pounds of commercial sulphuric acid have been added. (See formula for battery fluid.)

*Electro-puncture.* The application of electrolysis to the treatment of aneurisms or any diseased growths.

*Electroscope.* An apparatus for showing the presence of an electric charge, or for determining its sign, whether positive or negative, but not for measuring the value of the charge.

*Faradic Current.* The induced current. The term is applied both to the galvano-electric and magneto-electric currents, since they were both discovered by Faraday, called also secondary, interrupted, induced, inductive, to and fro, indirect, electro-magnetic and magneto-electric; the term Faradic is more used.

*Galvanometer.* An apparatus for measuring the strength of an electric current by the deflection of a magnetic needle.

*Hair, removal of.* The permanent removal of hair from the face by the electrolytic destruction of the hair follicles.

*Induction Coils.* Superimposed coils of insulated wire employed for the production of currents by electro-magnetic induction.

*Insulated Stool.* A stool provided with insulated legs, on which a patient may sit in order to receive an electric charge.

*Interrupter.* Any device for interrupting or breaking the electric circuit.

*Joule.* The unit of electric energy or work. (The volt coulomb).

*Law of Ohm.* The fundamental law for determining the current strength in any circuit. The strength of the current in any

circuit is directly proportional to the electro-motive force, and inversely proportional to the resistance of the circuit. Thus:

$$C = \frac{E}{R} \text{ or } E = C R.$$

*Law of Volta.* A law for the differences of electric potential produced by the contact of dissimilar metals or other substances.

*Lodestone.* Magnetic iron ore.

*Motor, Electric.* A device for transforming electric power into mechanical power.

*Ozone.* A peculiar modification of oxygen, which possesses more powerful oxydizing properties than ordinary oxygen. The peculiar smell observed when a torrent of sparks passes between the terminals of a Holtz machine, or a Ruhmkorff (Ritchie) coil, is caused by the ozone thus formed.

*Pole Changer.* A switch or key for changing or reversing the current from an electric battery.

*Potential.* The power of doing electric work. Electric level.

*Rheostat.* An instrument for adjusting the resistance—*i. e.*, to a fixed value.

*Rheotome.* A term used instead of interrupter.

*Rheotrope.* Now obsolete. Commutator, or current reverser is a better term.

*Ruhmkorff Coil.* Induction coil, or spark coil. Actually invented by Ritchie, of Boston, Mass.

*Static Electricity.* Electricity produced by friction, or induction by rotative multipliers. The term static electricity is properly employed in the sense of a static charge, but not as static electricity, since that would indicate a particular kind of electricity, and, as is now generally recognized, electricity, from no matter what source it is derived, is one and the same thing. (Houston.)

*Storage of Electricity.* This is a term improperly used. It is impossible to store electricity. As much so as it would be for a clock spring to store time or sound. The spring stores muscular energy, *i. e.*, renders the muscular kinetic energy potential, which again becoming kinetic, causes the works of the clock to move and strike.

In the same way in a so-called storage battery, the energy of an electric current is caused to produce electrolytic decom-

position of such a nature as to independently produce a current on the removal of the electrolyzing current. (Houston).

*Switch.* An arm or lever for reversing the current, or to introduce more or less cells. When in the form of a plug, the current is cut off when the plug is out.

*Thermo-Electricity.* Electricity produced by differences of temperature at the junction of dissimilar metals.

*Therm.* A heat unit recently proposed by the British Association.

*Thermostat.* An instrument for automatically indicating the existence of a given temperature by the closing of an electric circuit through the expansion of a solid or liquid. (Used in electric fire alarms).

*Volt.* The practical unit of electro-motive force. Such an electro-motive force as would charge a condenser of the capacity of one farad with a quantity of electricity equal to one coulomb.

*Volt-ammeter.* A variety of galvanometer capable of directly measuring both the difference of potential and the amperes.

*Watt.* The volt ampere, or unit of electric work.

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