

Static Electricity
X-Ray and
Electro-Vibration

Franklin B. Gottschalk, M. D.

Static Electricity X-Ray AND Electro-Vibration

THEIR THERAPEUTIC
APPLICATION

BY

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PREFACE.

THIS book contains a concise presentation of the most important modes of treating patients by means of static electricity, a knowledge of which the busy practitioner may acquire more permanently, through good illustrations than through the most elaborate descriptions. It also considers High Frequency Currents, X-ray, Photo-, Hot Air and Vibration Therapy. It has been written with the idea of bringing forth facts, and facts only, for a clear comprehension of the topic under discussion.

The author is a thorough believer in drugs, hygiene and diet, but believes that, by the application of the principles here laid down, results may be obtained which appear marvelous to one not familiar with their application. The combined effect of drugs, electricity, the electric light or hot air bath, and vibration seems at times almost magical in the instant relief brought to the patient.

INTRODUCTION.

THE rational tendency of modern therapeutics is to treat the whole patient, in accordance with the axiom that when one member is diseased the whole body suffers. In thus treating the whole patient we combat general as well as local maladies.

We have in static electricity the remedy par excellence for treating the patient as a whole or locally, and there is probably no one agent at the physician's command by which so much good can be accomplished as by a skilfully handled static machine.

The more intimately the physician becomes acquainted with the nature of static electricity and the physical laws, which govern it, the more readily will he comprehend its application.

Static electricity as generated by the modern machine is a current of extremely high voltage and a very low volume. It is by reason of this low volume (a few milliamperes) that the current may be passed through the tissues of the body without inflicting injury and with only a moment's discomfiture. It is probably the most

powerful stimulus to nerve and muscle that can safely be applied, to say nothing of the rapidity at which it imparts tonicity, lightness, buoyancy and firmness to soft, lax and enfeebled muscular tissues.

The physician well acquainted with his static machine soon finds that there are few physical ailments, except those of a surgical nature, which cannot be greatly relieved by one or another of the static modes of treatment intelligently applied.

In studying its action or in applying it in practice, we must remember that the principles underlying the use of static electricity are the same as those which govern the use of drugs, and that individual observation and experience must teach us what to expect. If static electricity would do in every case, what it has done in other cases, it would indeed be a panacea or cure-all; but it is nevertheless a fact that its proportion of failures is not greater than that of drugs deemed most reliable in their action.

Electricity in any form is now recognized as a mode of molecular motion akin to light and heat. Every application of electricity to the human body, whether general or local, is accompanied by transformation of electrical energy into some other form of energy, either physical or chemical.

Investigation and chemical analysis have demonstrated that static electricity increases metabolism by mechanical as well as chemical processes. Static electricity causes a contraction of protoplasm, thus causing a mechanical disturbance of the molecular arrangement, which results in a modification and augmentation of metabolism and a modification of the processes of nutrition.

Static electricity regulates the various forces of the body by re-establishing the disturbed equilibrium in the different organic functions; it accomplishes this by its action on nerve fibres, cells and centers.

Static electricity does not replace destroyed tissue, but by its action, induces muscular contractions, causing an onward flow of the blood stream. These contractions include the muscular coats of the vascular system. This increased circulatory activity, by carrying onward the various internal secretions, stimulates the internal glandular organs to an increased functional activity, assisting not only the secretory organs, but converting by-products into end-products by the increased oxidation, and eliminating toxic matter through the skin, kidneys and lungs, thus clearing the path for nature and allowing her to do her work more perfectly. With this increased excretion and elimination of

waste, nervous irritability is lessened and is soon followed by a relaxation of the entire nervous system.

"Pain is the cry of a nerve for better blood." One of the cardinal dogmas of biology is that the structure of every living being is passing through a continuous transformation during its whole term of existence. That these transformations may be of a healthy nature, it is necessary that there be a continuous flow of nutritive fluid. A temporary disturbance in the blood stream brings about a diseased condition, and it is absolutely necessary to remove this condition of stasis, before a healthy, normal condition can be restored. Static electricity, by causing muscular contraction of the vascular system, is best calculated to relieve temporarily at least the congestion and hyperemia; pressure being thus removed, pain is diminished and a healthy metabolism is induced, thus checking and modifying the course of the disease, and even rendering patients suffering from incurable diseases fairly comfortable.

During the period of convalescence from any disease, the body is practically below par and therefore in a condition to become the seat of morbid processes. During this period of vulnerability inherited predispositions are apt to manifest themselves. Though static elec-

tricity has no effect on germ life, it removes this lowered condition of vitality essential for germ growth, by inducing functional activities it assists in the absorption, and enhances the assimilation of whatever medicament has been administered. This is especially true in constitutional diseases such as syphilis, etc., where it not only aids absorption but hastens elimination as well.

Coincident with this increased activity we have increased appetite, restored digestion, renewed strength and vigor, creating a feeling of refreshment.

Theoretically, static electricity may be employed in some stage of every disease, but finds its ideal sphere in such conditions as the following:

Malnutrition; Anemia; Neurasthenia—Nervous Exhaustion; Hysteria; Muscular Pain; Rheumatism; Neuralgia; Lumbago; Sciatica; Coccygodynia; Headache; Paralysis; Chronic Synovitis; Reflex Pain; Pre-bacillary Stage of Tuberculosis.

ESSENTIALS.

To be successful in the use of static electricity it is absolutely necessary to know the machine and how to keep it in working order. The usefulness of the machine itself will be what the operator makes it and no more. Brilliant results can be anticipated only from the combination of an effective machine and a skilful operator.

As atmospheric changes affect the nature of static discharges, the machine should be placed in a dry room, and should be evenly and solidly fixed to give steady and regular motion.

The loss by leakage through accumulation of dust and moisture upon the surfaces of the insulated parts frequently interferes very markedly with the efficiency of the machine, as the electricity is conducted away as fast as it is excited. After a machine has been cleaned, it can be dried out perfectly in a few minutes by the use of a freezing mixture.

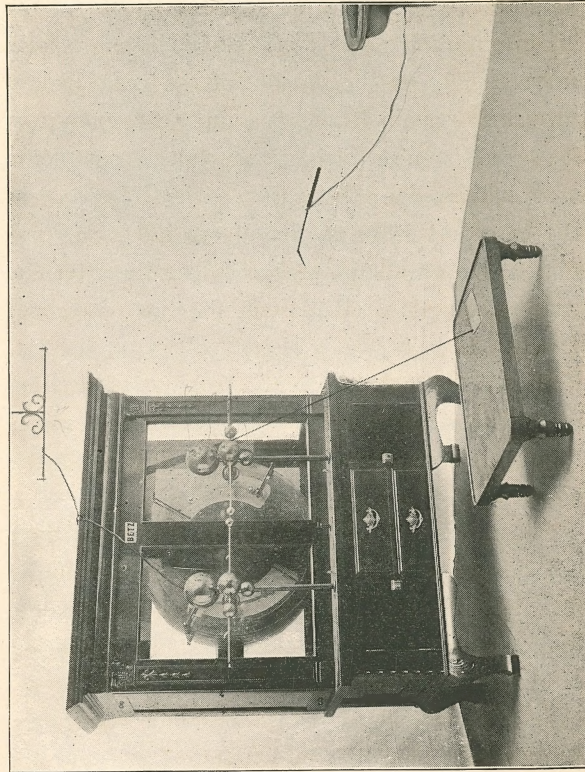
Take a glass, fruit jar, that holds several quarts, and which may be tightly sealed. Fill this jar with a mixture of about one-half cracked ice and one-half salt. Then seal, wipe thoroughly and set inside of the machine on a

plate, so that the condensed moisture on the outside of the jar may be caught by the dish. Then close the case tightly. If it is desired to dry the case quickly, run the machine slowly to set the air in circulation. A deposit of ice or frost will form rapidly on the outside of the jar. Permit the jar to remain in the case until the coating of ice becomes quite thick. Then take it out of the case and remove the coating of ice. Replace in the case and allow a second coating to accumulate. Never allow the jar to remain after the coating on the outside of the jar does not freeze. If moisture does not collect on the jar, it shows the machine is dry and if the machine refuses to work, it is a positive proof that something besides moisture is interfering with the working of the machine.

Several pounds of thoroughly baked calcium chloride, placed on trays within the case of the machine, with doors tightly secured, will absorb the moisture as it enters the case. The condition of the chloride will indicate the necessity of re-baking it (which should be done in a slow oven. It must not be boiled.).

Keep the machine well oiled.

Ground the poles, connect with gas, water or steam supply pipe, or drive two iron pipes into the ground until they reach moisture. Two groundings are necessary. Bring the copper



GROUNDING THE STATIC MACHINE BY WIRE ATTACHED TO UPPER PART OF CASE, WHICH CAN EASILY BE TRANSFERRED TO OPPOSITE POLE.

wire to within short distance of the machine along the wall and bend to terminate in a hook. Bring the other grounding for the electrode near the machine in the same way. Grounding the machine is the most important rudimentary principle in using static electricity. Always ground the electrode and prime conductor not in use.

The object in grounding is to create the lowest possible pressure at this pole, while the highest pressure is maintained at the other. Without this difference we cannot get a current of high voltage.

The platform is an essential part of the static treatment by insulation and in the application of the wave current, etc., or there would be no accumulation.

Place the platform about two feet from the machine. The current is led to the machine either by means of a shepherd's crook or an insulated cord. These may be connected by a chain with the copper plate, 15 by 16 inches, under the feet of the patient, or by placing a metal conductor in the hands of the patient.

If the patient is too near the negative prime conductor, when the platform is connected with the positive pole and a strong current of high resistance is present, it may prove disagreeable to the patient. Place the patient so that the active

prime conductor is opposite the head. This avoids irritation of the patient from woolen clothing with an opposite breeze.

Unless the current is very strong, the patient rarely need divest himself of metallic ornaments to avoid annoyance. The current has no effect on a watch; if very strong, celluloid hairpins, etc., should be removed.

The chair on the platform should be devoid of all metals, nails or ornaments, as they may prove very irritating and annoying to the patient.

In moving about platform the operator should keep out of sparking distance of the patient, as an unexpected spark may greatly lessen confidence of patient, or cause him to cease treatment, as many have found out to their regret.

When the current is interrupted by sparks in any part of the circuit, the brass plate under the feet may become disagreeable to a patient who wears shoes with thick soles or iron pegs in the soles. To avoid this the conductor may be held in the hands of the patient.

As the polarity of the machine may change from side to side while at rest or in taking a new charge without apparent cause, it is necessary to have some manner of determining which is which. With sliding poles about an inch apart, start the machine slowly and observe the pole from which it passes. This is the positive pole.

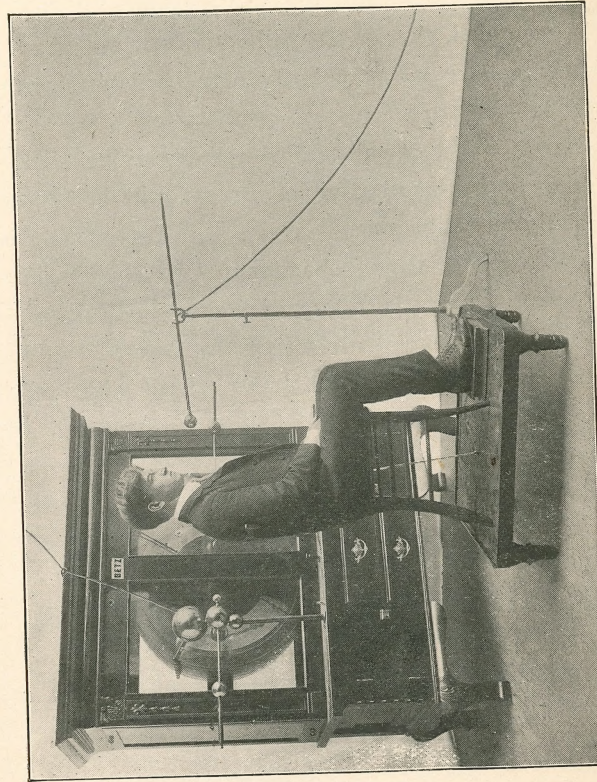
With a spark stream about five inches long, ground one electrode. If it is the positive pole the current will be conducted to the earth and the spark-stream will stop; if the negative pole is grounded, the stream will continue.

In a dark room, polarity may be determined by looking at the plates. Only a few stars are found on the metal comb on the positive side, while a heavy ultra-violet stream will be seen on the negative side.

When a machine changes polarity while in operation there is a loss of charge by leakage.

Polish the metal surface of the electrodes and ball on sliding rods, so that the current glides off as smoothly as though lubricated. A chamois skin is essential in keeping the electrode in good condition. Every irregularity interferes with a full flow of the current.

In static treatments we do not make contact with two poles, for if we do, then we either destroy the essential accumulation if the patient is on the platform, or we must use a Leyden jar current which is the same as the faradic, and like it, it has no electrolytic or osmotic action. On the contrary, charged with but one pole, the pull is not inward but outward to the grounded pole, on account of the attraction by opposite electricity.

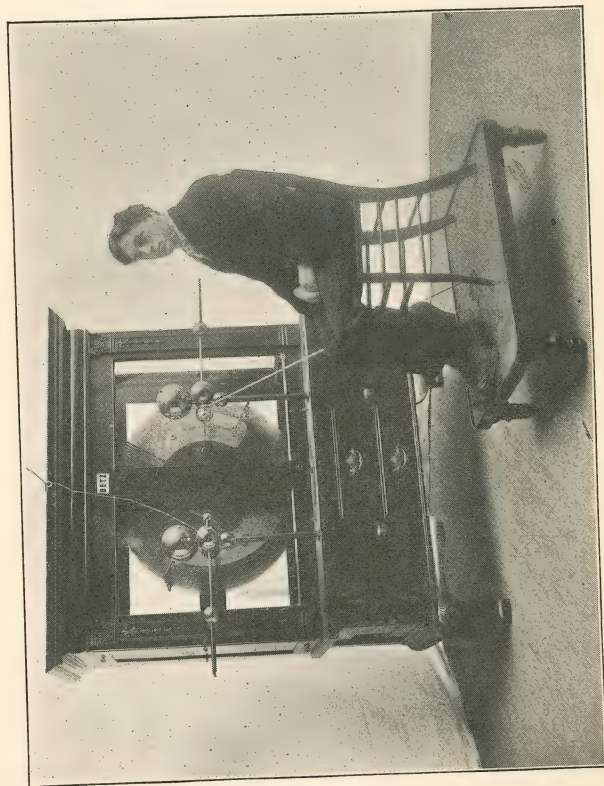


POTENTIAL ALTERNATION, SPARK-GAP CURRENT, PHYSIOLOGICAL EFFECTS
IDENTICAL WITH WAVE CURRENT.

To be a successful operator, it is necessary to know the sensation produced by the various modes of treatment, and how to differentiate between a tonic, a sedative, and a counterirritant or rubefacient effect. Rudimentary skill in static application is quickly acquired through self treatment, but skill can be acquired only by carefully studying the action of the current on different tissues and the varying resistance offered by different fabrics. Discriminate dose regulation by practice on yourself. The static current is not limited to one method of application, and as in drugs, the therapeutic results may be obtained in more ways than one.

The action of local static applications exerts a powerful influence far beyond the area on which it falls. The surface stimulation of sensory nerves, as has been demonstrated, is transported to central ganglia where it produces lasting effects.

You must be able to vary the speed of your machine or you cannot vary your dose regulation, which you must, as you would a dose of morphine or strychnine.



POSITIVE ELECTRIFICATION—ELECTRODE UNDER FOOT.

INSULATION.

Positive Insulation.—The current of electricity, being a mode of motion, is conducted through the air in contact with the skin, and disassociates its molecular structures, upon the same principle, as if a drop of oil were placed in a glass of water and stirred rapidly enough to break it up in minute particles. The more rapidly it is stirred, the finer the decomposition or disassociation of the structure. The large quantity of free oxygen or ozone thus developed is rapidly absorbed by the tissues. In consequence of this it has a wide range of usefulness as a tonic. We can appreciate this when we consider that all the various chemical activities occurring in the body are combinations of oxygen with food supply.

Patients enfeebled by recent illness, cases of anemia, neurasthenia and patients extremely susceptible to the weather on account of their debilitated condition, frequently improve very rapidly under this treatment. The effect is less marked as we approach the normal state. It is applicable to any age, from the infant to the extreme limit of old age.



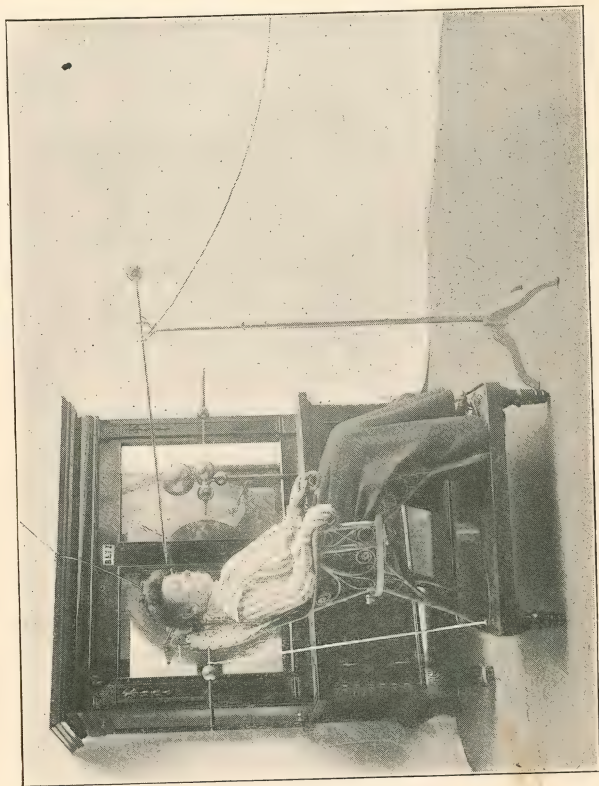
POSITIVE ELECTRIFICATION—ELECTRODE IN HAND.

Seat the patient on the platform and connect the positive prime conductor with the platform by means of a conducting rod or cord, and connect the patient's feet with the conductor by means of the chain and foot plate or by holding the conductor in the hand. Ground the negative pole. After the plates have been set in motion separate the poles as widely as possible.

Positive electrification is more energetic than negative, on account of its higher voltage, and is correspondingly more valuable as a therapeutic agent.

With positive insulation the negative breeze often proves very irritating, and may be moderated by diminishing the resistance, removing heavy woolen clothing, etc. It is not irritating through cotton material or on the bare skin.

Negative Insulation has no advantages over positive insulation, with the exception that the positive breeze is seldom irritating from without, and sparking seldom occurs, and for this reason it may be used with nervous and easily excited patients.



STATIONARY BREEZE TO FOREHEAD.

BREEZE.

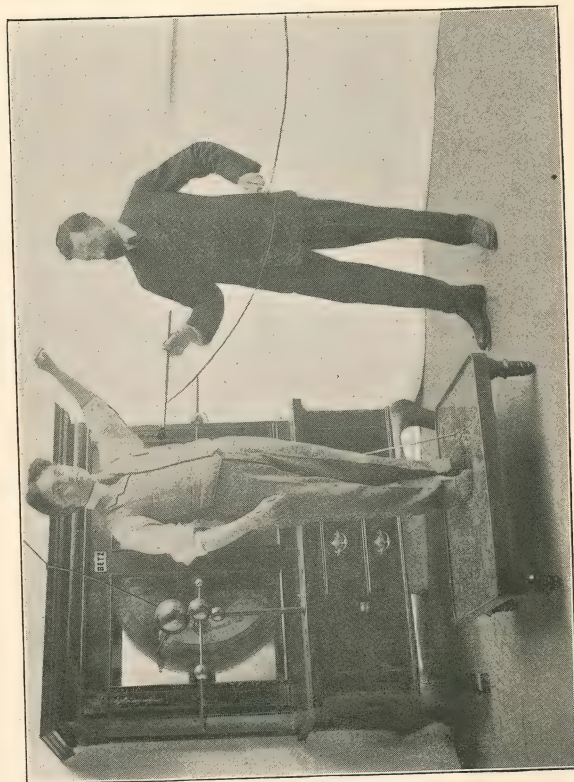
THE breeze of static electricity is a current of electrified air thrown from the point or points of an electrode to the body of the patient. The density of the current depends on the surface of the electrode and the number of metallic points implanted. The energy of the breeze depends on the speed of the revolving plates, the state of the air, the condition of the clothing and the manipulation of the electrode. The patient may be positively or negatively insulated; both the positive and negative breeze are bland and sedative when applied to the bare skin.

The breeze may be either movable or stationary. The movable breeze is usually the point or brush electrode in the hand of the operator, and may be moved back and forth with a slow or rapid motion over the region to be treated.

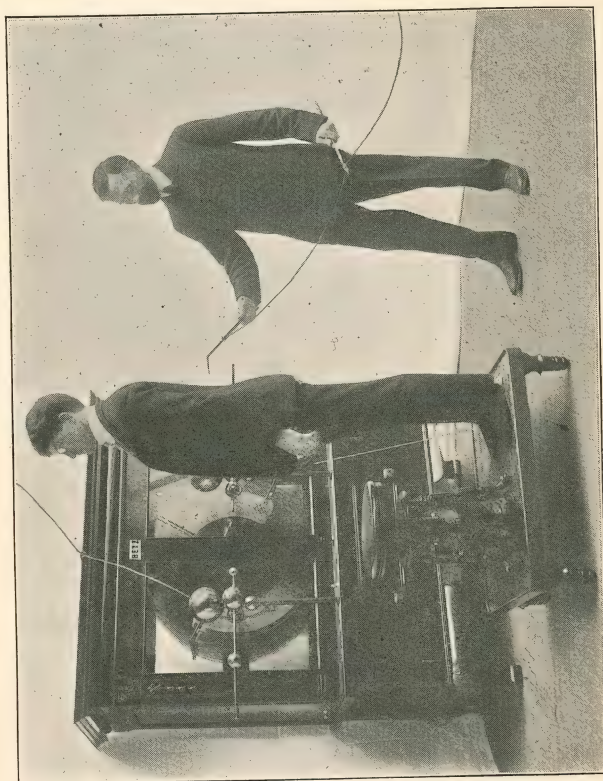
Through cotton, linen fabrics and on the bare skin the negative breeze is cool and sedative, but applied through woolen fabric it may be made a stimulant and counterirritant, reddening the skin and causing sensations of warmth which may last for some time, and may be made to blister in a few minutes, if this effect is desired.

Cold extremities, sluggish circulation, hepatic pain and pelvic pain frequently yield to this form of treatment. Irritant effects may be increased by increasing the motion of the plates and making an interruption between the prime conductor and the patient.

When the hair is thick, the negative head breeze may be unbearable. Metal ornaments and corset steels may cause burning or disagreeable sensations with the negative breeze.



NEGATIVE SPRAY IN PLEURISY OR INTERCOSTAL NEURALGIA.

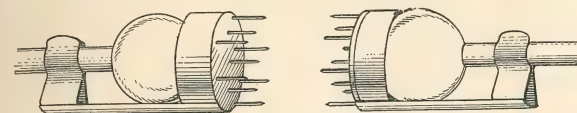


MOVABLE NEGATIVE SPRAY OVER KIDNEYS.

SPRAY.

THE static spray differs from the breeze only in the closer proximity of the electrode to the patient. It is more energetic in its action and therapeutic qualities than the breeze. It intensifies all the effects produced by the breeze. It is more sedative and calming when these effects are desired, and more irritating and rubefacient when the latter effects are indicated. When powerfully applied and concentrated with skill, it relieves a great variety of painful conditions.

Owing to its simplicity and mildness, profound and unique effects, this mode of treatment



THESE SHUNT TERMINALS PERMIT THE GIVING OF POSITIVE SPRAY WITH LITTLE DANGER OF SPARK.

deserves careful study, as operative technique plays an important part in the comfort of this application.

The positive breeze or spray, on account of its cooling, agreeable, as well as bland and sedative qualities, is very grateful to the patient and may

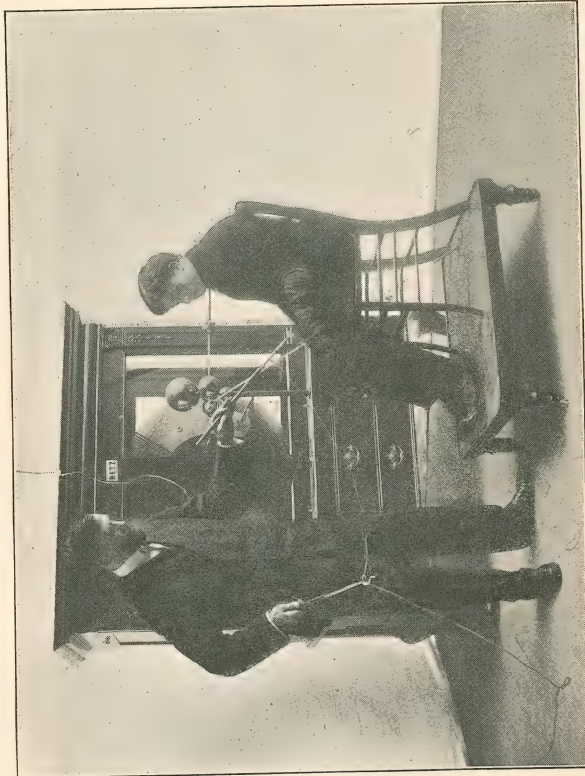
rapidly relieve such painful conditions as neuralgias, muscular rheumatism, hysteria, painful inflammatory conditions and nervous headaches. The headaches not reached by the static breeze are usually due to some active continuous cause such as anemia, neurasthenia, dyspepsia due to malnutrition, etc.

The sedative positive spray finds a large field of usefulness in,

1. Acute rheumatism,
2. Acute swelling of joints,
3. Lingering pains of subacute rheumatism,
4. Simple conjunctivitis,
5. Simple laryngitis,
6. Simple coryza and hay fever, where the antiphlogistic action dries up excretions of a serous or suppurating nature,
7. It removes heat and itching from superficial inflammations, eruptions and burns and
8. It relieves the itching mucous tissues of the mouth from which diseased teeth have been extracted.

The static negative spray may be used wherever a counterirritant is indicated, and is especially efficacious in—

1. Impaired sensation,
2. Chronic torpor of certain tissues,
3. Cold extremities,
4. Deranged circulation,



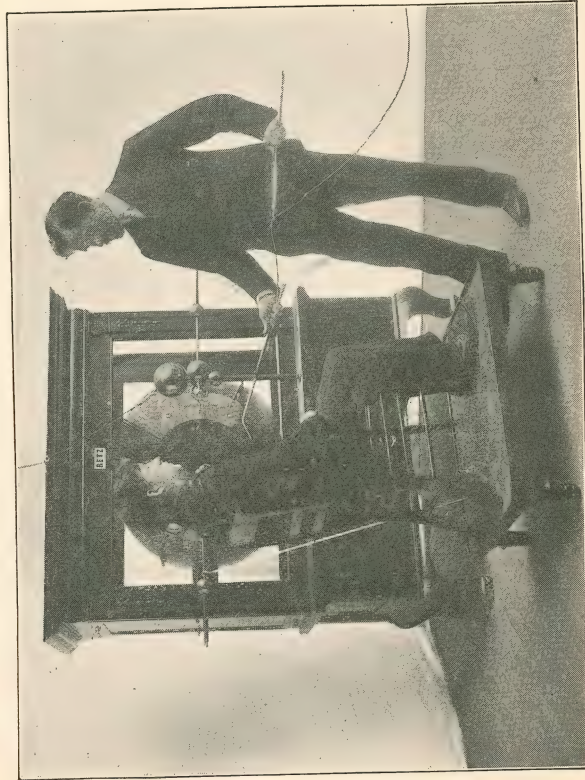
MOVABLE SPRAY IN RHEUMATISM.

5. Bronchitis,
6. Neuralgias,
7. Injuries,
8. Pleurisy,
9. Nausea, etc.

With the indifferent pole grounded, the patient may be either positively or negatively insulated, though it is well to bear in mind that the negative spray is more irritating than the positive. To obtain a counterirritant or rubefacient effect, the parts should be covered by woolen clothing or material of the same character. The irritating effect may be increased with the speed of the plates, by interrupting the spray or bringing the electrode so close to the body that fine needle-like sparks will mingle with the spray. The spray acts as a sedative only on those parts which it reaches *en masse* and without friction.

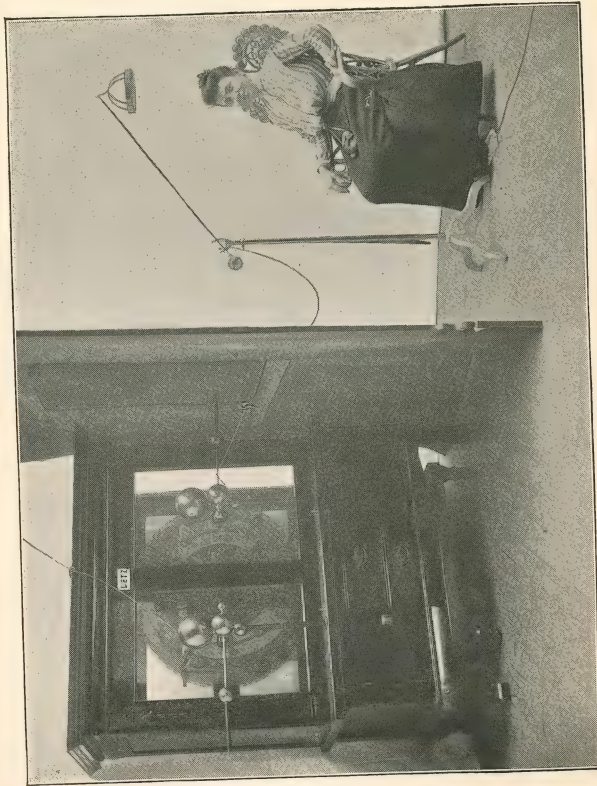
In giving the spray, study the point of your electrode, which will warn you when to avoid a spark, which might disturb the patient. In giving spray, avoid all projections, such as the various angles of the face, that might draw off a spark. Slowly move up to where the violet-pencil discharge pours full upon the point you wish to treat.

As it is not necessary to use the platform when we connect the spray electrode with the machine, we are able to treat timid patients in

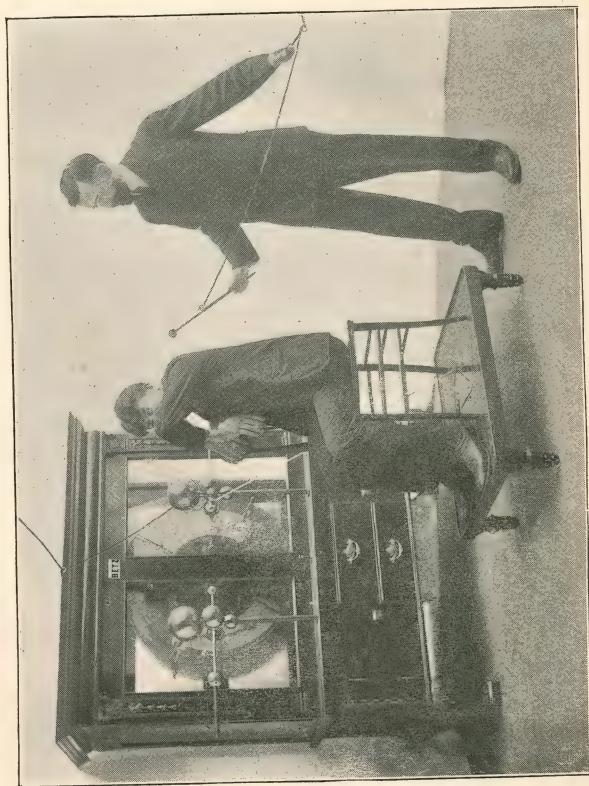


MOVABLE SPRAY OVER SOLAR PLEXUS.

another room. We can do this by placing a heavily insulated wire through the wall and connecting the cord from the machine to this. We connect our electrode cord to this wire which has a hook in our room. The current may be intensified by placing the patient on a metal plate connected with a gas-pipe, etc. It surpasses the platform because the whole force of the electrostatic charge is in this manner directed to the point of application.



HEAD BREEZE IN ROOM ADJOINING STATIC MACHINE.

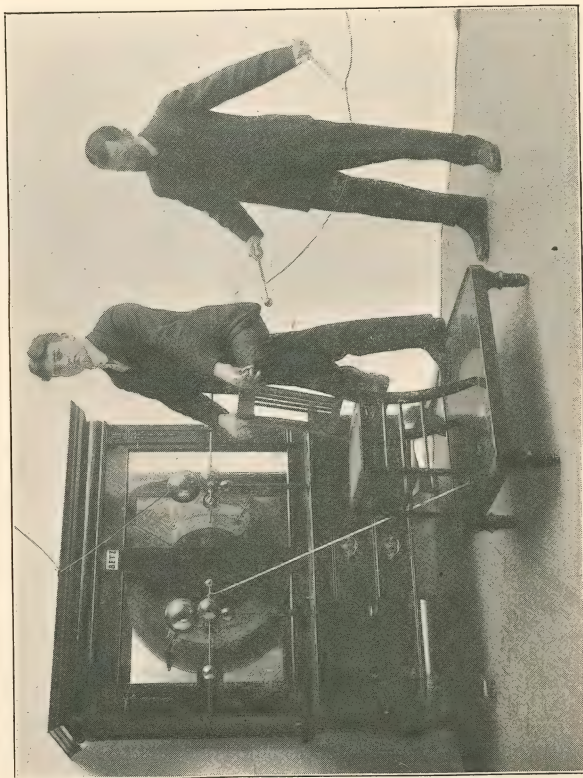


POSTURE IN TREATING NEURALGIA OF SHOULDER.

SPARK.

THE static spark is the most active and far-reaching of all static modes, and produces widespread and strong muscular contractions, increasing molecular changes and thus aiding both general and local nutrition. Sluggish and weak muscles are given renewed vigor; muscles and tendons long contracted are loosened and relaxed. Its action is especially beneficial in toning up the blood vessels, for it causes their muscular walls to contract and empty the stagnant venous blood into the general circulation, thus stimulating and regulating the functions of nerves, muscles and visceral organs. Under the influence of long percussive sparks, thickened and edematous tissues, acute or chronic indurations and exudations, are often resolved and soon absorbed, causing the tissues to take on a healthy aspect. The capacity of the lungs for oxygen, is increased by its effect on respiratory muscles and centers.

Place the patient on the insulated platform, the indifferent pole being grounded. Before starting the machine, pull the sliding poles far apart. As a rule it is not necessary to connect



POSTURE IN TREATING SCIATICA.

the patient with the prime conductor, as mere insulation of the current on the platform, is enough to give patient all the spark he can stand.

Use the grounded electrode for administration as the spark, direct from the machine, is used only in cases of marked anaesthesia. The spark is administered by throwing the metallic ball or point electrode with a quick movement to a point near the body, so that a disruptive discharge or spark takes place. The percussive discharge is a single discharge, thick, strong and clear cut. If the patient be negatively insulated, the spark is thicker, because the low voltage of the negative platform permits more current to accumulate on the positive electrode, before it breaks the tension. The positive spark is milder in sensory effect, and less penetrating than the negative spark.

The spark is varied in size by the electrode—exactly as large or small bottles hold varying quantities; so, varying sizes of electrodes hold greater or less quantities of electricity. The spark depends on the charge and capacity of electrode. The potential quantity of electricity is analogous to the quantity of material fluid. The electricity resides on the surface of the electrode, and it is absolutely essential that the electrode be polished and smooth, as the current tends to divide and fly off the minute projecting

points and edges. The size and length of the spark are indicated by the depth of the lesion and its chronicity.

A large ball electrode is rarely used, except in cases of impaired sensation.

Sparks should be administered with some sense of regularity as to time and rhythm, for the tissues soon learn to anticipate the next spark.

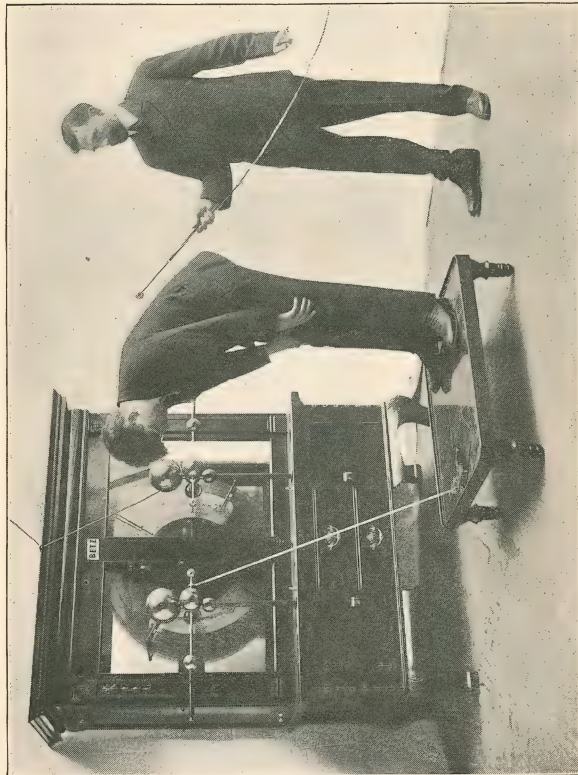
Sparks rapidly following one another, on the same spot, cause unnecessary pain, and should be administered with an interval of time and change of base. Sparks should be avoided on all bony prominences, as the back of the hand, the finger nails, the dorsum of the foot, etc.

Sparks on face, head and breast must not be applied unless the machine is in slow motion.

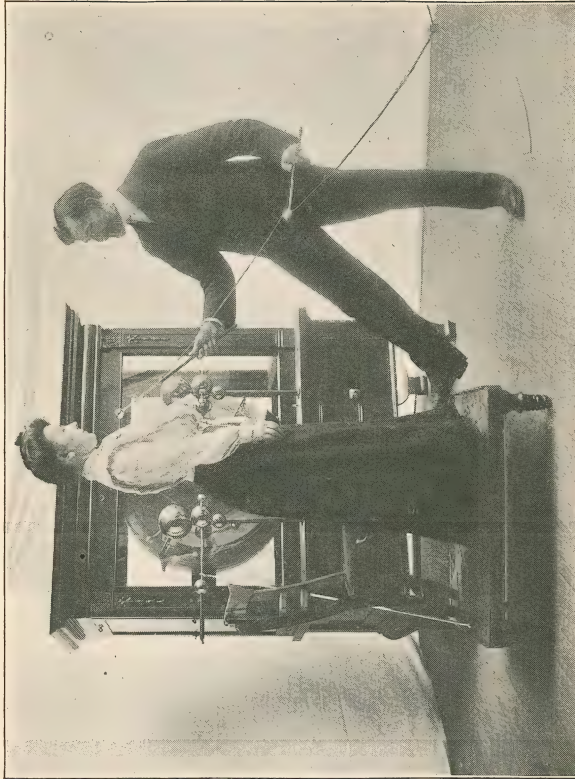
In cases of pleurisy, sparks in the surrounding tissues restore mobility and relieve pain.

In bronchitis, mild sparks promote expectoration and shorten the attack very markedly. In other affections of the lung, it increases the capacity of the lung for oxygen, by its effect on the respiratory muscles and centers.

In treating nerve affections, cause the muscles to be moved about and held in those positions that cause most pain, and then give the percussive spark.



POSTURE IN TREATING LUMBAGO.



WEAKENING CURRENT, OPERATOR'S FOOT ON PLATFORM.

In chronic inflammation of joints, thick percussive sparks into the joint are very effective.

In locomotor ataxia give spark to plantar region of the foot. The number of sparks needed will depend on the tissues. It should be continued until they respond and become warm. In administering sparks to the sole of the foot see that the shoe is dry, or it will form a spray instead of a spark. If the patient has on different thicknesses of clothing, draw off part of the current by means of the foot.

Moisture being a good conductor, perspiration or wet clothing will conduct the electricity away and interfere with the action of the best machine. Over wet garments place a good non-conductor; even a newspaper will answer the purpose.

In patients with sluggish circulation, the sparks are frequently followed by a mottled appearance of the skin, which may persist for two or four hours.



FRICTION SPARK TO SPINE.

FRICTION SPARK.

THE friction spark may be used during humid weather when the direct spark will not work. The patient may be positively or negatively insulated, and the active pole may be used either direct or grounded. Place the electrode before starting the machine and separate the sliding poles gradually until the desired effects are produced.

The metallic ball electrode is as a rule preferable to the roller electrode whose movements are restricted, and which does not slide freely in all directions as does the ball or blunt electrode, neither does it fit into the angles and depressions where you may wish to use it.

The electrode is rubbed over the surface of the clothing, or the electrode may be covered with flannel and then rubbed over the bare skin. The discharge consists of a number of fine, minute sparks, varying from one-fourth to one-eighth inch according to the thickness of the clothing. The positive spark is always milder than the negative, because it is given with negative insulation.

In treating the spine or a larger surface, go over the tissues rapidly, and when treating a

small surface, pause at short intervals, as the parts are very painful.

Friction sparks have marked counterirritant and rubefacient effects, and may be used whenever counterirritation is indicated.

Friction sparks given from a rapidly moving wooden ball electrode over the affected surface frequently give prompt relief in rheumatism after about ten minutes.

The influence of friction extends far beyond the reddened skin, and reflex pains are often subdued by vigorous friction with the large brass ball over the region to which the pain is referred.

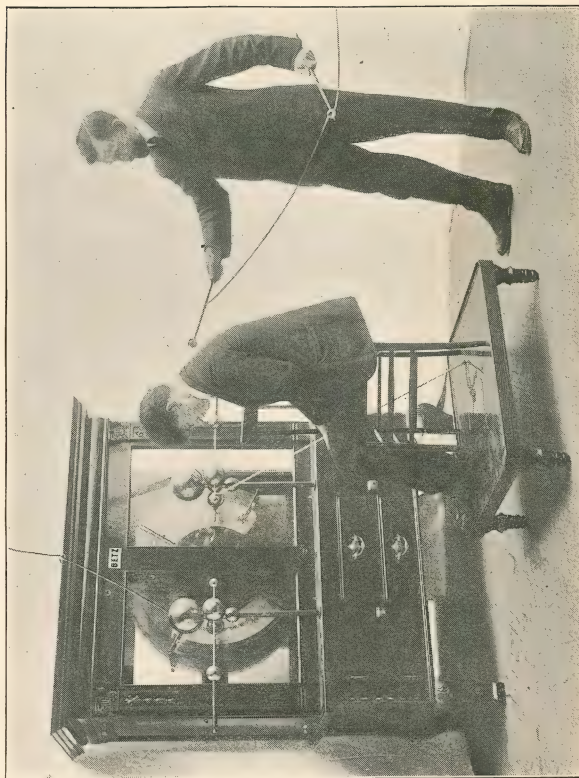
In paralysis, anesthesia, altered conditions of sensation, hepatic and ovarian pains, sparks are used with a great deal of satisfaction.

During the menopause, sharp counterirritation by friction over the cervical spine, as well as around the pelvis gives a great deal of relief.

Friction sparks are a splendid stimulant to the capillary circulation of the skin, and as the fine sparks perforate the cuticle (just as a piece of cardboard is penetrated by being placed between discharging rods) they hasten the absorption of any medicament it is desirable to employ.



FRICION SPARK TO HASTEN ABSORPTION OF LOCAL MEDICAMENT.



POSTURE IN TREATING UPPER SPINE.

COUNTERIRRITATION.

As a counterirritant, static electricity cannot be surpassed by any drug, (all effects from slight warmth to vesication may be had); and the same principle that applies to drugs applies equally well to static electricity.

Investigation teaches that painful sensations travel along paths of least resistance on their way out (explaining reflex pains), and thus create a most direct route for the inward transmission of counter-electrical impressions that serve to annul pain.

Counterirritations of peripheral endings of sensory nerves are transported to the central nerve ganglia and are thus capable of producing organic changes; this shows how friction sparks operate in arresting cord disease. If, however, this relief does not go beyond primary palliation, the exciting cause has not been reached by the current and must be reached by some other means.



LEYDEN JAR CURRENT IN CHRONIC LARYNGITIS.

LEYDEN JAR CURRENTS.

LEYDEN jar currents are used in the same manner and with the same electrodes as the faradic current. The difference between the effect of Leyden jar currents and the faradic currents on nerve and muscle is very little.

There is scarcely a pain due to traumatism, sprain, congestion or neuritis that is not benefited by the Leyden jar treatment. Its use is found chiefly in chronic cases, as in—

- Rheumatism,
- Rheumatic arthritis, small joints,
- Gonorrheal rheumatism,
- Gout,
- Sciatica,
- Chronic pharyngitis,
- Chronic laryngitis,
- Pains of various kinds,
- Circumscribed burns,
- Poliomyelitis—restores muscular tone and warmth to entire limb and prevents arrest of bone growth,
- Edema of extremities,
- Biliary lithiasis,
- Occupation neuroses,

Chorea,

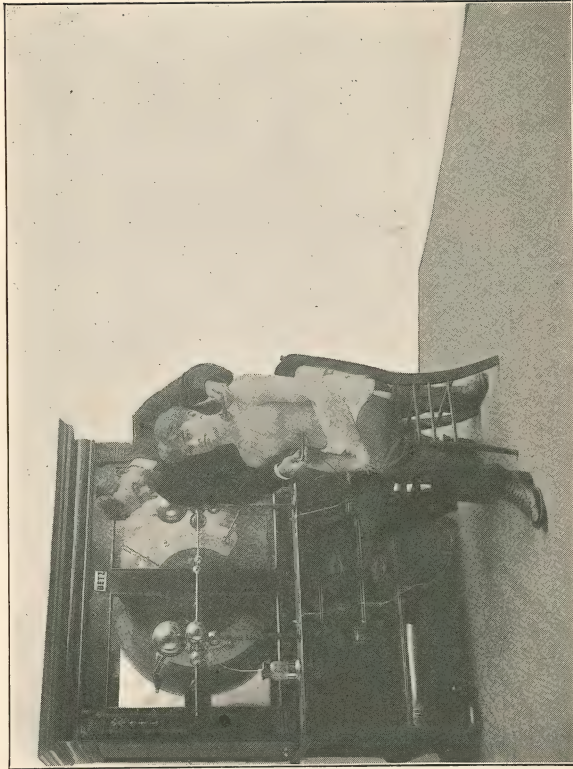
Locomotor ataxia—removes lightning pains and promotes feeling of well-being.

With the sliding poles closed and the machine in motion, gradually draw apart the poles after applying the electrodes. The passage of the spark between the discharge rods is accompanied by a painless contraction of the muscles in the region covered by the electrode. Use a sponge electrode moistened in a solution of bicarbonate of soda; the sponge must not be too large as it destroys the efficiency of the current density, requiring too large a spark-gap, thus sacrificing rapidity and smoothness.

The Leyden jar current is regulated by the speed of the plates and the distance between the sliding poles. Though various sized jars may be used, we can so adjust the distance between the poles as to make the largest jars produce practically the same effect as the smallest jars.

If the current causes pain over a hairy spot, lubricate it with vaseline or soap and water.

There is no contrast of pole action as in galvanic electricity, though the positive pole has a higher voltage and a sharper bite on an abraded surface.



LEYDEN JAR CURRENT OVER SOLAR PLEXUS AND PNEUMOGASTRIC NERVE.



BRUSH DISCHARGE IN CONJUNCTIVITIS.

BRUSH DISCHARGE.

PLACE patient on an insulated platform with the opposite pole grounded, and with the sliding rods widely separated before the machine is started. A wooden (soft maple or white wood) ball or point electrode is used on the grounded pole, as it delivers a fine discharge without any disruptive qualities as sparks. The current seems to be more effective during the summer months or when the electrodes have become heated. Electrodes that become carbonized must be renewed. The effect of the brush discharge on a wet surface or on wet clothing is entirely lost. Cotton or linen impairs its action, while woolen clothing over the surface to be treated favors strong effects.

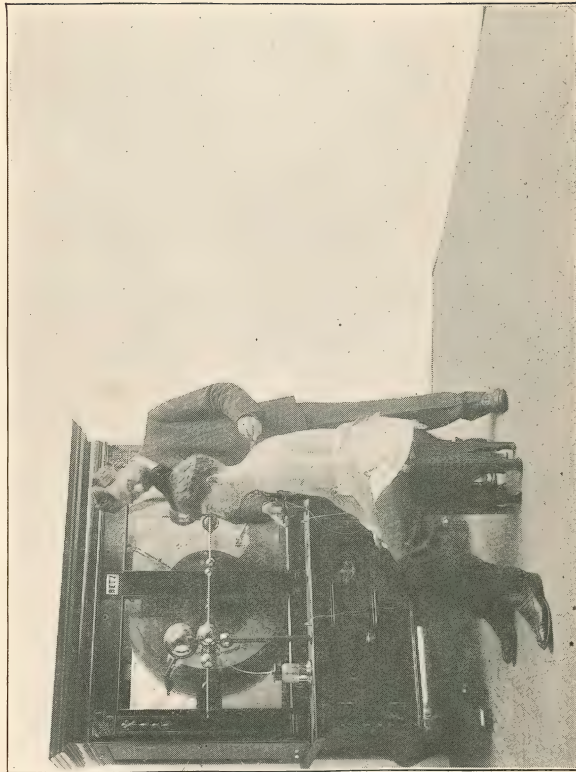
The intensity, volume and effect of this discharge varies with the speed, capacity of the machine, nature and size of the electrode, character of the patient's clothing and the atmospheric conditions.

When applied for a long period the effect is at first rubefacient, and later vesicant, finally producing painful blisters. Open surfaces must be avoided as most of the current will enter the raw spot and cause pain.

This discharge lessens local hyperemia and congestion by contracting the arterioles, thereby relieving pain and diminishing swelling to a marked degree. Metabolism is increased in the end organs, and healthy restorative action is induced.

The nature of this electrical discharge decomposes the atmosphere, developing ozone in so close a proximity to the skin or diseased tissue as to render the site of application distinctly aseptic by oxidizing organic life. It is owing to this property of the current that lupus, eczema, herpes, acne and scabies are wonderfully relieved and cured by its action. Swellings associated with fractured bones, sprains and abscesses rapidly disappear. It has a wide field of usefulness in cases of gastralgia, neuralgias of a superficial nature, coccygodynia, pruritus, and myalgias.

Ozone sprays heal granulations, and deodorizes fetid odor in sores.



LEYDEN JAR CURRENT IN BRONCHITIS.



WAVE CURRENT, ELECTRODE UNDER FEET.

WAVE CURRENT.

THIS is the most useful of the electro-static modes of treatment. Its superiority lies in the fact that it is a one-pole current of high or low potential, great or small frequency, is under perfect control, is painless during administration and potent for great good. The patient being insulated, he is repeatedly charged and discharged from the surface of contact with the electrode, obtaining a local as well as a constitutional effect of general electrization peculiar to one pole. The tonic effect is in proportion to the length of the spark-gap.

It lessens hyperemia and congestion, and relieves local pain by relaxing muscular spasm. It is very effective as a stimulant to general metabolism and a regulator of disordered nutrition exchange, and the so-called neuro-vascular gymnastics frequently bring about results superior to those of general massage, because it reaches parts out of reach by ordinary manual manipulation.

Place the sliding poles in contact, ground the positive pole and connect the patient to the other pole. In utilizing this current, strips of flexible.



LOCALIZATION BY INDIRECT APPLICATION OF SPARK.

metal (block tin, etc.) or moist electrodes are applied to the affected parts, beneath the clothing, and are connected to the machine by means of a flexible cord. Connection with the patient may be made at several places at the same time. The metal may be fastened to the cord by means of a spring clip or cuff holder. If the strip of metal is applied to the spine it is well to place the patient on a chair with an extra high back. A pillow at his back will keep the metal in snug position. The muscular contractions or pain over the inflamed area will determine the relative size of the metal electrodes and the spark-gap.

The current should not be felt more at one place than at another. It may be necessary to moisten the surface when contact is first made to avoid stinging sensations. After treatment has continued, the spark-gap may be lengthened. This may be repeated several times during the treatment, which usually lasts from 20 to 30 minutes. The question is not how weak, but how strong the current can be administered without pain, to get the requisite local and internal effect on tissues or organs.

If there is a long spark-gap do not come near the platform with anything that may draw off the current and give the patient a shock.

In giving the general wave current, remove the shoes before putting the feet on the plate or



WAVE CURRENT TO SPINE, CONVALESCENT PATIENT ON IMPROVISED INSULATED PLATFORM.

insulate the feet by an excess of resistance by means of a magazine or other paper so that intolerable sparks do not annoy patient's feet.

In sciatic rheumatism we find that intense vibrations are required and the spark-gap must be opened to the limit of the patient's capacity. Place one electrode over the site of the nerve exit and another over the ankle. When the electrode touches the motor points it is extremely painful. The spark-gap must be opened gradually.

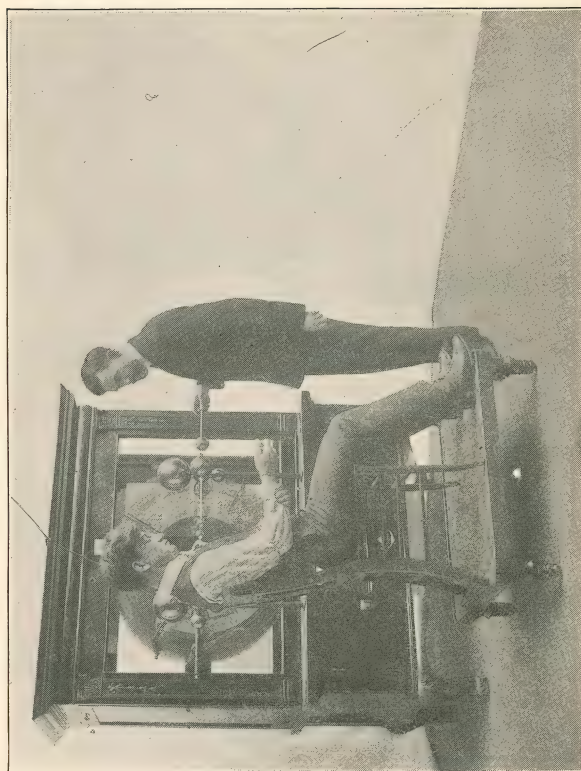
In neuralgia and neuritis of whatever nature place the electrode over the congested and hyperemic spots, and especially over the motor points of the nerves.

In ovarian neuritis place the electrode immediately over the painful spot, on the abdomen and over the centers in spine.

In paralysis apply the metallic electrode to the spine and treat for about forty-five minutes with a large spark-gap.

In asthma place the metallic plate over the spine and chest in front. Make the spark-gap from four to eight inches, with a seance of thirty minutes.

The wave-current treatment is very active and efficient in cases of gastralgia, angina pectoris, liver and kidney affections, pelvic neuritis, coccygodynia, irritable spine, etc.



WAVE CURRENT, IN EXERCISE OF WRIST, AFTER FRACTURE.

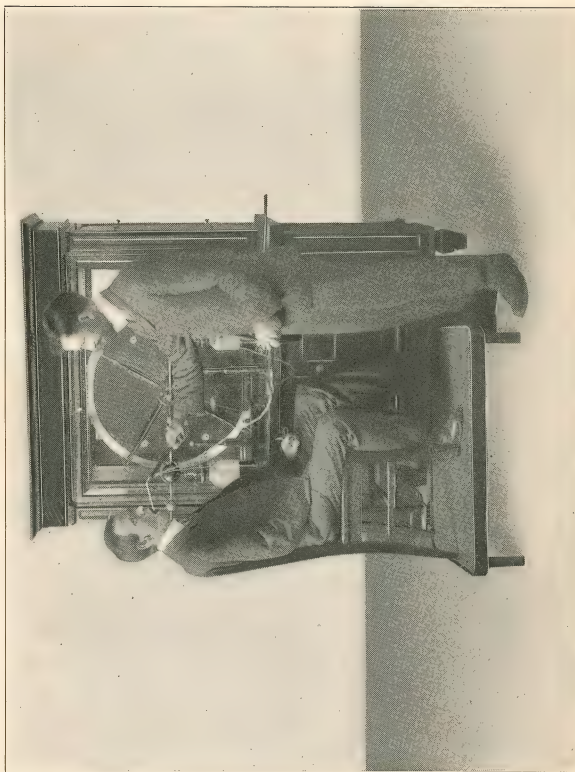
A swelling action may be brought about by placing the ball electrode over the muscle we wish to exercise, and by drawing the sliding rod just beyond full dosage and returning it quickly. This applies to the muscles of the hand, leg, thigh, arm, chest. This treatment applied by means of an electrode over the perineum, stimulates the secretion, circulation, nutrition and the nerve energy is powerfully stimulated.

By modifying our technique we may get all the vaso-constrictor effects of a rapidly interrupted fine coil current. The muscles can be slowly or rapidly contracted, this effect being regulated by the distance between the sliding poles and the speed of the plates, manipulation of the electrode and duration of contact.

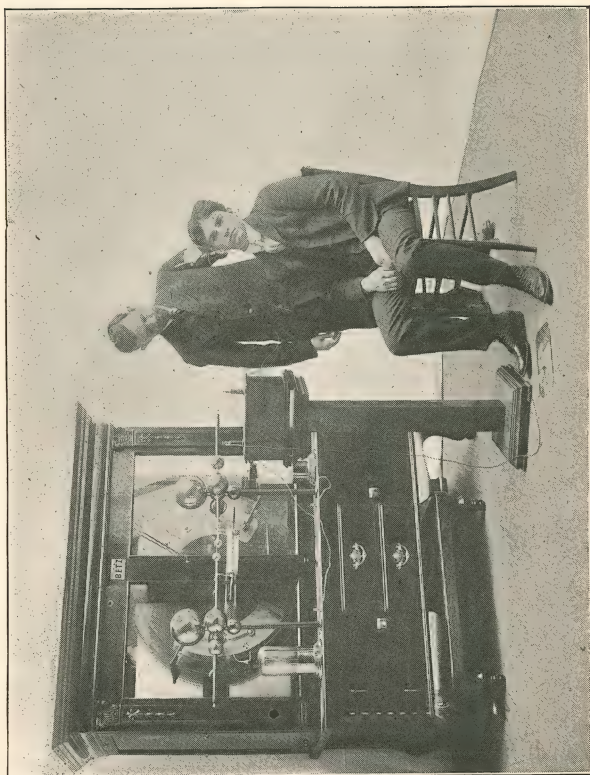
By applying a very small electrode over the eye, with a small spark-gap and the machine in slow motion, we obtain a wonderful tonic effect for tired eyes, blepharospasm and especially in that condition accompanying kidney affections, where glasses fail to give any relief. A half-minute's treatment frequently gives relief for twenty-four hours.

The application of this current can be localized to any part, great or small. The slowly repeated powerful interruptions are exceedingly stimulating, while the more rapid the interruptions, the finer and more sedative is the effect. It answers

well for many of the local indications for sparks, while it seems to lack little of their power to rapidly remove localized or deep-seated pains, in fibrous tissues. It is a comfortable method which will produce identical results in many cases to which sparks can not be applied.



POSITIVE SPRAY, ULCERATED SURFACE IN MOUTH.



TREATING ENLARGED GLANDS BY HIGH-FREQUENCY CURRENT.

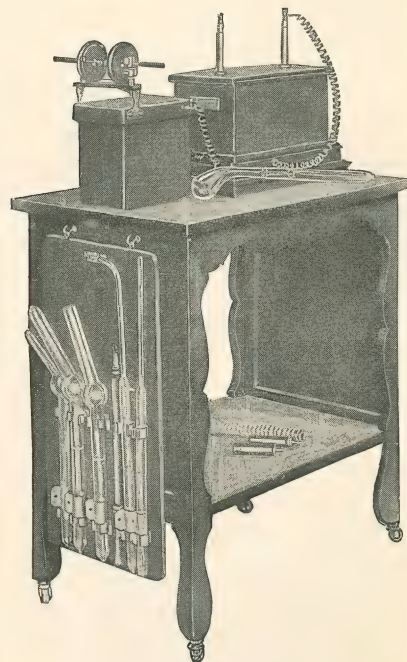
HIGH FREQUENCY CURRENTS.

At the present time two classes of apparatus are in use for the production of high potential currents, the static machine and the various modifications of the induction coil used in X-ray work, the voltage and frequency of alternations of which are still further augmented by means of the Leyden jars or Franklin plate condensers, that connect the secondary windings of the Tesla coil or the Oudin resonator. The origin of the currents seems to be the external armature of the condensor, but they are dependent in a measure upon the current which charges the internal armature of the condensor.

The organism treated with the high frequency current receives, or at least becomes charged with, a current of 100,000 volts, the alternations (first positive, then negative) of which would be the fabulous number of one billion or even higher per second.

The dose ranges from 150 milliamperes to 3,000 milliamperes. With high frequency such a dosage is not at all dangerous if judiciously applied, while it would be extremely dangerous if lowered to 100 alternations, the usual rate.

In producing muscular contractions a current of from 20 to 30 excitations per second is necessary. As the number of alternations increases, the muscles become tetanized up to a rate of



TESLA COIL AND FRANKLINIC CONDENSER.

vibration of from 2,500 to 5,000 alternations per second. After this point has been reached, tetany becomes less and less marked until no appreciable sensation is experienced.

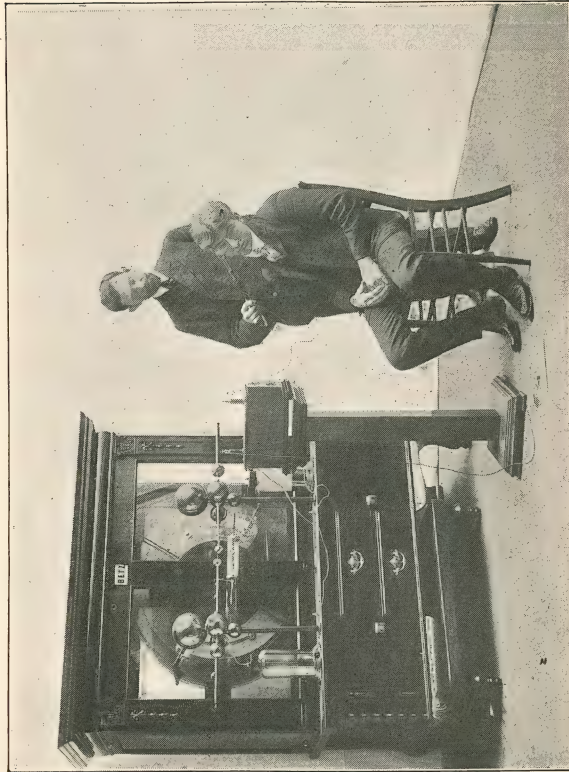
With such an enormous voltage, air ceases to be an insulator and the current passes with or without conducting wires. Contact with a single terminal will suffice to complete the circuit, as the body itself becomes a terminal, the current passing from it to the other terminal.

Glass bulbs when connected with a thin wire to one terminal, or simply placed near it, will glow with a bluish light, thus showing that the current will pass through space without a wire conductor.

The enormous frequency of this current has led many to deny its power to penetrate the integument; and to place it side by side with the static current, which does not permeate but flows over the conductor.

It is possible that the sensory and motor nerves are so organized as to respond only to vibrations of a determined frequency, as does the optic nerve, the terminations of which respond only to undulations between 497 billions (red) and 728 billions (violet) per second. Whatever the true order of things may be, it remains a fact that the effects of the current are felt deep in the body, and have a very powerful influence over nutrition in a variety of ways.

The vaso-motor system is greatly influenced, raising the blood pressure and increasing elimination. Respiratory movements are aug-



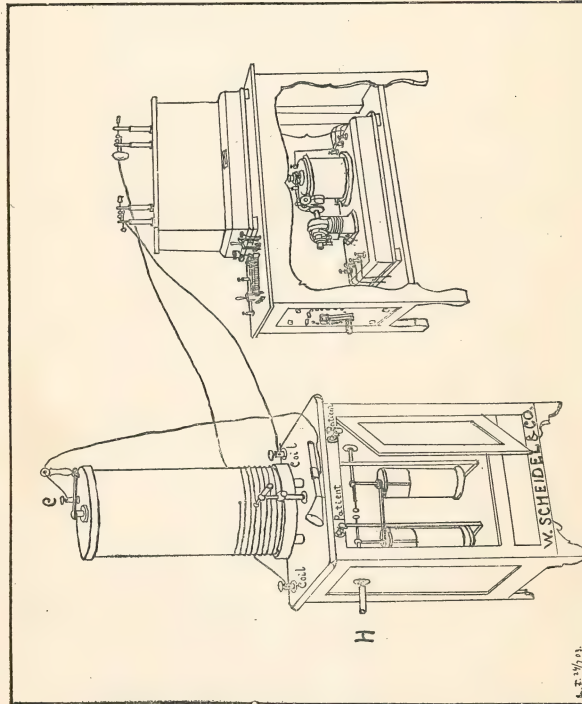
HIGH-FREQUENCY CURRENT IN MASTOIDITIS.

mented, and careful measurement shows an increased absorption of oxygen and increased elimination of carbonic acid gas, varying from 15 to 30 per cent.

In consequence of the large quantities of ozone generated this current has great bactericidal power. It is a question if the ultra-violet rays in the vacuum tubes have any antiseptic properties, as they probably lose their effectiveness by the time they are filtered through glass.

These currents will frequently ease the severest pains after a few minutes' application, and are very effective in the various neuralgias. The curative power of the high frequency currents in healing ulcers of the rectum, anal fissures and hemorrhoids has been remarkable. It not only allays the irritation, restores tone to relaxed fibres of blood vessels, muscles and nerves, but restores the power of the impaired sphincter, and removes the product of morbid nutrition. (If the cause of trouble is still actively present, the relief, of course, will only be temporary.)

These currents are effective in the various inflammatory conditions, such as epididymitis, tonsillitis, beginning otitis media, and even mastoiditis. Marked relief is frequently obtained after one treatment, where, before the intro-



OUDIN RESONATOR ATTACHED TO X-RAY COIL.

duction of these currents, operation was our only resort.

It is indicated in all diseases due to errors of nutrition, as obesity, diabetes, nephritis, gout, rheumatism, etc. The best results in chronic cases are obtained by giving the treatment not only over the kidneys and liver, but over the whole body, and prolonging the treatment to a full hour.

In tuberculosis of the lungs the patient usually begins to breathe more freely after a local application over the chest of a shower from the vacuum tube about one-half inch long. Here also the best results follow treatments lasting 30 to 60 minutes daily for a long time.

The high frequency currents are applied.

First: By auto-conduction, when the patient is enclosed by a solenoid of copper wire, the ends of which are connected with the terminals of a high frequency coil. Electric currents are thus induced in the body. When placed in the solenoid absolutely no sensation is experienced, not even the slightest muscular contraction; but on placing a rabbit within a solenoid traversed by high frequency currents, the vessels of the ear become rapidly dilated, shortly followed by a contraction equally energetic. Upon man the effects are similar and the skin soon becomes reddened and covered with perspiration. There is no increase

in the body temperature, as excess of heat is lost by radiation and evaporation.

Second: Through general electrification by means of an electrical couch, especially prepared for the treatment, and known as a couch for auto-condensation.

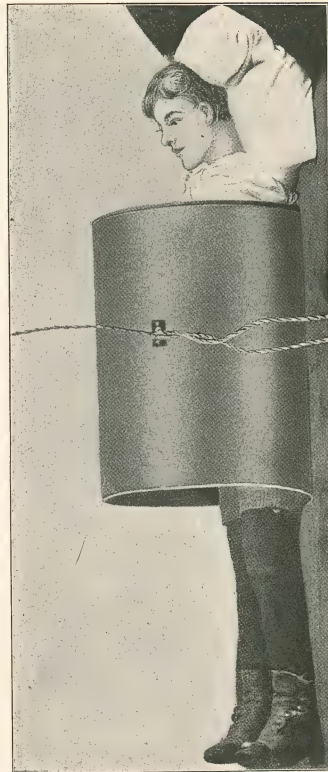
Third: By direct local contact with the electrodes. The latter may be applied in bi-polar or mono-polar form.

With properly shaped vacuum glass electrodes, this method may be used in the treatment of the cavities as the mouth, rectum, vagina, nose, etc. The efficiency of the current may be increased by connecting the patient to the other terminal through the agency of a foot plate. When using the latter method, the feet should be bare.

In this method, the connection taken from the top of the resonator will produce the most marked effects when used with the body electrode. A sliding contact, travels over the solenoid, regulates the voltage taken from the resonator. Various metallic, vacuum or glass electrodes containing a wire, graphite powder, or metal filings can be used with this apparatus.

AN ALTERNATING CURRENT SOLENOID.

WHEREVER facilities exist for obtaining an alternating electric light current, this apparatus



PATIENT IN SOLENOID.

can be used. (The direct commercial current cannot be used unless changed by a transformer.)

The apparatus consists of an induction coil, made to be worn around the body. The solenoid produces effects, resembling the physiological action derived from a high-frequency auto-conduction solenoid. A small incandescent lamp held in the center of the solenoid, will glow without contact with any circuit. As no technical skill is required to operate the apparatus, it can be placed in the patient's home and there employed under the physician's direction.

That electricity favors rapid growth in plants has been known for some time, but only recently it has been discovered that animal metabolism may be augmented by electricity, which is satisfactorily demonstrated by the fact that guinea pigs and rabbits placed in an electrical solenoid will grow twenty per cent. faster, and be more robust than animals of the same litter not so exposed. The author can say from personal experience that it has a similar effect on children of backward growth, both physically and mentally.

An extremely bright and active infant was seized with a bowel disorder, followed by marasmus, which condition lasted some four months. During this period the child not only wasted

away physically, but lost all interest in its surroundings. When improvement took place, it was comparatively rapid as to the physical condition, but after nine months the mental condition had improved very little, the child not even recognizing its mother. At this time we began the use of the solenoid, putting the child to sleep in it, for about one and a half to two hours daily. Improvement was slow at first, but at the end of six months, the child takes a marked interest in its surroundings and enjoys being played with.

X-RAYS.

THERE is no longer any doubt that a well-built static machine, equipped with a first-class motor of sufficient power to get rapid revolution of the plates is very satisfactory for developing the X-rays. To use the X-rays intelligently it is not only necessary to understand how to keep your static machine in running order, but to know a few points in regard to the X-ray tube.

The X-rays emanate from a mode of motion imparted to rarified air in the tube, the tube being exhausted to about one two-thousandth of an atmosphere in order to leave the structures of air more free to move. A thin substance may be stirred more readily than a thick substance with the same energy, and as the mode of motion imparted to the structures of the air must be a very high mode of motion in order to produce X-rays, it is necessary that the tube be properly exhausted, as a great deal depends on the vacuum in the tube.

The higher the mode of motion imparted to the molecular structures of the air, the more penetrating the X-ray effects become, whereas the lower the mode of motion, the less penetrat-

ing it is. If there is too much air in the tube, sufficient motion cannot be produced to generate X-rays, and if there is not enough air in the tube, there will be nothing to transmit the current used for excitation through it; consequently the degree of vacuum at which the tube is operated is limited to a certain scope. If the tube has too much air there will be no X-rays and we have a low or soft tube.

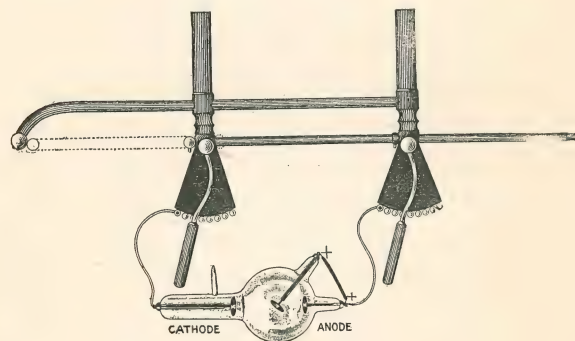
High tubes light up with difficulty, because there is too little air in them and the current has a tendency to pass around instead of through the tube.

The degree of vacuum in a tube may be measured by the length of spark which it will back up. A penetrometer is being adopted by many.

With the X-ray tube connected, separate the rods slowly until the resistance between the gap is greater than that through the tube. In a low tube the gap may be an inch, in a high tube seven or eight inches. The light in the tube may be regulated by the speed of the plates or by means of an adjustable spark-gap series, by means of which the degree of penetration of a high or low tube may be increased or decreased as desired.

This apparatus consists of two rows of brass balls mounted a short distance apart on an in-

sulated support. The balls are about one-fourth of an inch in diameter and the interval separating them is about one-eighth of an inch. In operation the discharge passes as a spark from ball to ball through an air gap. By varying the number of spark-gaps, the adjustment is secured.



POLE CHANGER AND TUBE REGULATOR.

If it is desired to lower the vacuum in a high tube it may be accomplished by baking it in an oven at the temperature of baking bread, for fifteen or twenty minutes. Tubes with regulating apparatus are apt to be spoiled by baking.

Every day is bringing forth new uses for the X-rays in all branches of medicine; and the time is coming when no physical examination will be complete without the aid and confirmation of the fluoroscope. Many examinations of normal as well as abnormal chests, etc., are required to be-

come an expert in this line. In making X-ray examinations the examiner will find it to his advantage to make all examinations under as nearly the same conditions as possible in regard to the position of patient, distance from the tube, light of room, etc. The fluoroscope is of more service and practical value in X-ray work than skiagrams. The detail is not so fully defined or perfect as photographic plates; consequently when we desire to obtain minute detail as for instance diseased bone tissue, renal calculi, gallstones, etc., a skiagram is preferable.

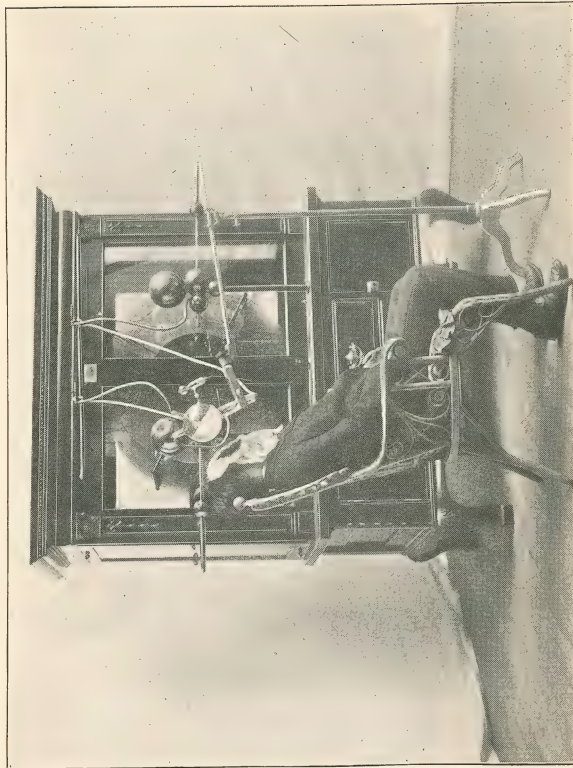
For the developing of X-ray plates the following developer will be found particularly servicable in hot weather when over-development is likely to occur.

Glycin developer particularly servicable in hot weather when over-development is likely to occur.

Glycin	15.08
Potassium carbonate	50.0
Sodium Sulphite (powdered) ..	50.0
Water	1000.0 cc.

If the development is too rapid use a few drops of a 10 per cent potassium bromide solution.

This can be used repeatedly and keeps very well.



TREATING LUPUS WITH X-RAYS.

A great deal depends on the condition of the operator's eyes. Eyes submitted to the sunlight require considerable time to become sufficiently sensitive to be of service in interpreting the shadow cast upon the fluoroscopic screen. The most successful diagnostician with the X-rays makes it a practice to employ the X-rays at night, as the condition of the eyes is more favorable to the X-rays after dark. It may be mentioned that fluoroscopes deteriorate very rapidly when exposed to heat.

In examination of the chest we find the diseased lung substance, cavities and emphysema indicated by clear, bright spots, while a darkened area indicates inflamed or diseased lung substance. Pleuritic effusions are readily noted by the displacement of the lung and often the heart. In empyema the resistance to light is greater than in surrounding parts and the area filled with pus is almost or quite dark. Misplacement and enlargement of the heart are readily noted and given their proper significance.

Modern surgery without the X-rays is an unimaginable proposition to-day, for it is indispensable in locating foreign bodies, stones in kidney, gall-stones, aneurisms, fractures and dislocations. As a curative agent it lays claim to having revolutionized the treatment of a number

of diseases, and is successfully used in a large number of cases of—

- Carcinomas,
- Rodent ulcers,
- Leukemia,
- Pseudo-Leukemia,
- Hodgkin's disease,
- Tuberculosis of larynx,
- Tubercular sinus,
- Neuralgia,
- Rheumatism—subacute in joints,
- Lupus (healed without scarring),
- Keloids,
- Psoriasis,
- Eczema, where it is necessary to stimulate the tissues and produce absorption of inflammatory product,
- Superficial parasitic diseases as, sycosis, favus, alopecia areata,
- Acne (inveterate),
- Dermatitis of itching nature,
- Destruction and absorption of tissue of low vitality,
- Pain in malignant growths and tubercular joints,
- Its effect in deep-seated tissues has been questioned, but we find many observers who report undoubted relief from deep-seated pain at the time of or following treatment.

The author has seen the pain in a case of chronic appendicitis in a very thin person disappear after four seances of ten minutes each, using a high tube. He believes the absorption of X-rays by the pathological tissues quite possible.

The X-ray is one of the most certain, definite and effective remedies to relieve pain, and the anodyne effects of the raying, are not produced by local anesthesia, and do not benumb, but change the disordered sensation into orderly and normal sensations. The application is painless and thus a great advantage.

Though the use of the X-rays is in a comparatively early stage of development, it is no longer an empirical method of treatment, for we know its action better than we know the action of some reliable, useful drugs and have data which give us a fair grasp as to its possibilities.

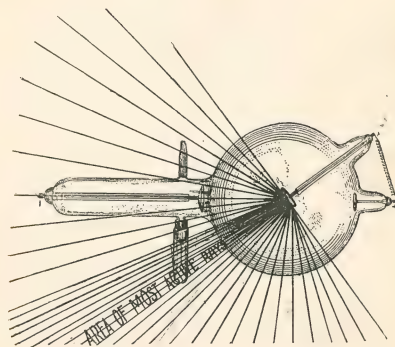
Investigations in the laboratory show that the X-rays do not affect bacteria as grown on artificial media. Even though this be the case, clinical evidence shows the checking influence of bacterial growth in suppurating ulcers, as well as other septic processes of a superficial nature. This is shown by its action in skin diseases where prolonged local application of antiseptics has failed to bring about a cure.

This simply proves that the X-rays have a stimulating effect upon the metabolism of the

skin, causing an activity which brings about this important germicidal process, renders the tissues better able to take care of new invasions of organisms and brings about the absorption of the inflammatory processes.

The light of the X-rays is analogous to sunlight, and, like it most readily attacks the epithelial layers of the skin, which protect the subcutaneous tissues against its action.

The stimulation of the light brings about a reaction, which causes an intracellular disarrangement of the relatively unstable cells of the



diseased tissue, hastening its degeneration and absorption, just as concentrated sunlight destroys plant cells and shrivels their protoplasm. Examples of rapid growth and destructions are found in the gourd, while the palm, more stable and older, stands the same exposure readily.

The dangerous possibilities of X-ray burns must be borne in mind. The reaction is practically identical with that produced by sunlight and the burns vary in degree from a dry dermatitis to the burns which destroy the skin and underlying tissues to such an extent as to make excision necessary and compel a resort to skin grafting. Neither should it be forgotten that the constant irritation of the X-rays may cause the development of an epithelioma of the operator's hand which may necessitate its amputation.

An X-ray burn is treated very much as any other burn without destruction of connective tissue or as a deep-seated, sluggish ulcer that shows little tendency to heal. The burn is almost always intensely painful and we must keep this in view when prescribing a dressing for the parts. Rose ointment will relieve one case while a solution of subacetate of lead and opium gives relief to another, and an orthoform dressing gives relief to a third.

X-ray treatment, by breaking down diseased tissue and throwing it upon the lymphatic circulation in large quantities may cause an auto-intoxication, and if persisted in, may cause speedy death. When this takes place, the elimination of this waste may be accelerated by stimulating the glands to greater activity, either

by means of a static spray or fine sparks to the infected tissue or vibratory massage with the brush over the infected area.

In applying the X-rays our aim should be to get all the therapeutic energy we can, reducing to a minimum the risk of producing a burn. Four prominent factors must be considered:

First, the quality of the tube to use for a given case. For superficial lesions a tube with about 3-inch spark length will do. For deep lesions a tube with about 5-inch spark length will be sufficient.

Second, the distance of the tube from the surface exposed. About 7 to 8 inches should be used to begin with, bringing it closer as work progresses.

Never make a long exposure with a low vacuum tube, but let the distance be about 18 to 30 inches and ground the intervening plate. The intensity of the X-rays varies inversely as the square of the distance from its center.

The closer the surface of the tube is to the growth, the greater is the intensity of the ray, the greater its destructive influence, and consequently the greater the physio-chemical change in the tissue.

Third and fourth, the length of exposure and frequency. Study the individual, as a marked idiosyncrasy exists in some patients. Be on the

safe side; a short exposure to begin with, 5 minutes, to be repeated in four or five days with same exposure. If no dermatitis occurs in two weeks an exposure every other day may be made. If it is desirable to get the tissues promptly under the influence of the X-rays, give an exposure six days in the week.

It is an iron-clad rule to stop exposures at the appearance of dermatitis—it may appear in fifteen minutes or not for several weeks after treatment—and to repeat treatment only when it has entirely disappeared. Thus the treatment may call for an endless repetition of X-ray applications over weeks, months and even years. The parts surrounding the area treated may be protected by sheet lead or tinfoil, or the tube may be protected by a shield—of which there are a number on the market.

Whichever technique you adopt, stick to it, in order to accumulate experience under as definite conditions as possible.

LIGHT.

It has long been known that impure air and darkness breed disease, but it is only recently that we have learned why and how light exercises its power. Investigation has demonstrated that it is not warmth but light which enables more complicated tissues to be formed from simple ones. The importance of light on living organisms, plants and animals alike, is well known to all. Lack of light causes disease and *vice versa*. We find the least illness and the most healthy conditions in places to which light has most ready access.

The existence of three different kinds of rays has been clearly demonstrated, and it is possible that others exist.

1. *Heat rays*, found near the red end of the spectrum, are for the most part invisible and do not impress the eye, but powerfully impress the nerves of the skin.

2. *Chemical rays*—violet and ultra-violet—make slight impression on the eye, but stimulate the skin in a remarkable manner, cause sunburn and bring about chemical changes or combinations in the tissues. It is these rays that make

it possible to photograph smallpox and measles before they become visible to the eye.

3. The *luminous rays* are centered near the yellow portion of the spectrum and are those which powerfully impress the optic nerve.

That light exercises a powerful influence over plant and animal life is well known. Plant growth seems to depend on the luminous rays; flowering on the ultra-violet, and the aroma on the heat rays.

The turning of flowers, leaves and even stems toward the sun, conclusively proves the influence of light upon vegetable organisms. Continuous exposure, however, proves injurious to plants, which require rest from sunlight as do animals.

Experiments show that electric light properly employed, compares favorably with sunlight in its power to promote protoplasmic activity, and to inhibit the action of bacteria. It acts as a tonic to plants and enables them to endure adverse conditions, which they would not otherwise resist.

A very important character of light in connection with its use for curative power is its power of destroying bacteria. Various animals have been inoculated with diphtheria and other germs. Those animals kept in the dark, died in from two to three days; those exposed to the rays of light resisted the effects of the inocula-

tion. Many forms of germs are killed more readily by sunlight than by strong germicides.

To Finsen the profession owes much for the thorough and scientific manner in which he has demonstrated the action of the chemical rays alone, and their usefulness in skin affections, especially those of a tubercular nature. His experiments show that the bactericidal effects of sunlight are found in the ultra-violet or chemical rays. He succeeded in separating the chemical from the heat rays by filtering sunlight, focused through quartz lenses, through a blue solution of copper sulphate in a dilute ammonia water, varying the strength of the solution to suit the intensity of sun's rays at the different seasons.

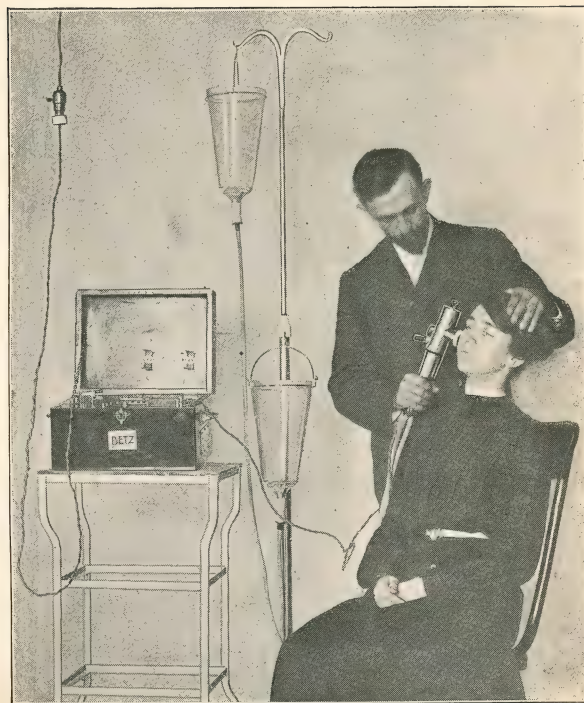
As sunlight is necessarily limited during the winter months, Finsen uses large arc lights of 60 to 80 amperes, each light having four condenser tubes dividing the light so as to treat four patients at once. The tissues outside of the lesion are protected from the rays. A nurse wearing dark glasses presses the compressor on the spot to be treated.

The tissues treated are compressed to empty the blood vessels, as opacity of tissue is due principally to red blood corpuscles. Compression is accomplished by a hollow crystal disk, which is cooled by a constant stream of cold water passing through it.

The treatment usually lasts from one to one and a half hours, and is repeated until the parts are cicatrized. The area treated is usually one to three square centimeters.

There is no pain during the application; sometimes there is an itching and the surface reddens. A few hours later a vesicle filled with clear serum appears and dries in a few days, leaving a thin crust. Sloughing never occurs. The effect is simply that of an intense sunburn. Cure is not due to the destruction of tissue, but to the destruction of parasitic elements upon which the disease depends, and a quickening of vital activities of tissues, whereby their power of defense is increased.

Various arrangements to use the arc light mechanism have been devised for the use of the chemical rays alone. A very satisfactory apparatus is that devised by Bang, Finsen's assistant. It is an easily handled, portable lamp, with hollow iron electrodes, which are kept cool by the constant circulation of water. It is provided with simple quartz lenses, which serve as compressors to render the parts anemic. The beam of white light is absolutely cold. The iron electrodes are richer in chemical rays than the carbon. It has great actinic power; a minute's exposure will produce erythema, or sunburn, followed by peeling of the skin.



APPLICATION OF BANG'S LUPUS LAMP.

Its bacterial power is 60 times greater than that of an arc lamp. It can be operated upon the direct or indirect current circuit of 110 volts.

The equipment is not expensive and is well constructed and easy to keep in order.

Various other makes of lamps are on the market, all containing more or less actinic power according to the amperage used.

Incandescent electric light and influence machines, as well as high tension coil, are available as a source of blue, violet and ultra-violet light. The negative terminal of the static machine is exceedingly rich in ultra-violet or chemical rays, though the violet end of the spectrum is not so intense as with the arc light.

Vacuum tube electrodes used on secondary circuit with static machine are rich in blue, violet and ultra-violet, but being of glass the effect is less than when sifted through quartz.

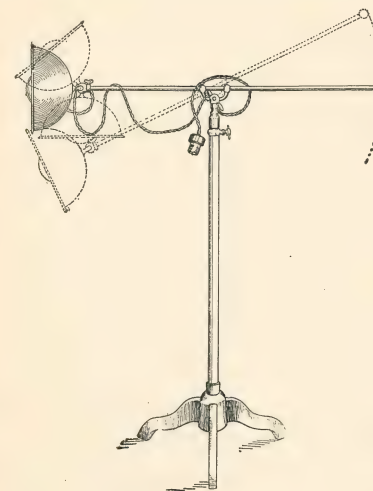
BLUE LIGHT TREATMENT.

PROFESSOR MININ of St. Petersburg first called attention to the therapeutic uses of the blue, incandescent light globe (in place of arc light filtered through a blue solution). These rays have a peculiar effect on the vasomotor nerves, causing a constriction of the blood vessels in the tissues exposed. A marked anemia is thus produced which frequently has a surprising pain-calming influence. Thus the pains of pleurisy, cutaneous inflammations, and contusions promptly disappear, permitting a more thorough examination. Prof. Minin even reports making painless incisions and stitches without the use of cocaine.

The constriction of the superficial blood vessels rapidly causes the absorption of infiltration about the edges of ulcers, and gives the impression that the ulcer is leveling itself and becoming smaller during each exposure. The ulceration is covered with a very thin membrane and becomes smaller. The edges of the ulcer are soon covered with skin of normal color and elasticity, and as these edges come nearer and nearer to each other, complete restitution of tis-

sue soon takes place. Cicatrization does not pass through those phases ordinarily observed, because there is no development of connective tissue.

It goes without saying that in specific ulcerations, the microbes which occasion them, perish in the first place, and then only does the restitution of the ulcerated tissues commence.



STAND AND REFLECTOR FOR MININ LIGHT.

The author has seen a severely infiltrated foot denuded of skin from the ankle down, following a severe infection, become covered with the fine membrane above spoken of, during the first exposure, which marked the beginning of a cure which took place in about six weeks. The con-

dition had lasted over eight months, during which period the patient was in a hospital, from which he was discharged because he was unwilling to undergo an operation, or a number of operations, for skin grafting, which the hospital staff had decided were necessary to bring about a cure.

The infiltrated, bleeding edges and surfaces of malignant growths are rendered anemic, which frequently prevents the recurrent hemorrhages and relieves the pain in surrounding tissues. It thus accelerates the cure of such cases as are being treated by the X-ray. The secretions so fetid and plentiful in malignant growths are checked to a marked degree by a long, daily exposure. The parts surrounding the sore may be protected against prolonged action of the light. The effect of this light is to deplete the granulating surface of its blood, thus preventing tissue activity.

Bearing in mind the physical properties of this light, we find a wide field of usefulness for its absorptive, antiseptic and anesthetic powers, and its portability permits its use even by bed-ridden patients.

In phymosis due to chancre of recent origin the foreskin can frequently be retracted after five to ten minutes' exposure.

In orchitis the pain and swelling are greatly diminished after 10 to 20 minutes' exposure. The swelling about an infected area usually diminishes in about 15 to 30 minutes to disappear entirely or to reappear in a milder form.

Excellent results have been reported from the use of the blue light in hematomas, sprains, housemaid's knee, articular rheumatism and weeping eczema.

The cure of a case of lupus by means of this light is reported by Prof. Minin. The patient had resisted a thorough treatment by means of the Finsen's method.

In neuralgias the action of the blue light is to increase the pain, because it increases the already anemic condition of the nerves. In these cases, massage of the painful nerve tract with a ground glass incandescent light frequently gives great relief, for the action of white light is directly opposite to that of the blue light and increases the flow of blood to the parts.

The lamp is placed just near enough to the affected part to permit the feeling of slight heat, care being taken not to raise a blister. Treatment may be given every other day for 15 to 30 minutes, or oftener as conditions may indicate.

Parts surrounding the sore spot may be gently massaged to improve local blood circulation.

This lamp is placed on the market under the name of Minin's Ultra-Violet Ray outfit, and has the four globes of different sizes as suggested by Prof. Minin.

RED LIGHT TREATMENT.

INTENSE red light long continued favorably affects acne vulgaris, ulcers of the leg, etc. The effect is the same as that produced by hot compresses. Heat stimulates the cells of the connective tissues to proliferation, and so to the formation of cicatrices.

The exclusion of the irritating chemical rays, by confining the patient in a room containing only red light (the rays of light are readily separated by means of glasses of various colors which usually filter out all the rays but those of their own color), has been successful in the treatment of variola, though a number of very remarkable failures are also reported.

ELECTRIC LIGHT BATHS.

SUNLIGHT is one of the most powerful tonics at our disposal, the various rays being present in the highest degree.

The heat rays of the sun raise the body temperature the same as hot water, air or vapor. This rise of body temperature stimulates the metabolic activity of all the organs of the body, as is, indicated by an increased production of carbonic acid. Animals eliminate more carbon dioxide under the influence of light than when confined in the dark.

Exhaustive experiments show that frogs throw off from one-twelfth to one-fourth more carbonic acid gas in the light than in the dark. Experiments on dogs and rabbits give similar results.

Metabolism is unquestionably stimulated by the reflex action set up by light rays upon the nerve endings of the skin and retina. Oxidation is increased by action of sunlight and less carbon dioxide is eliminated at night than during equal hours of the day, even if an equal degree of rest be observed.

This stimulation of heat rays causes a dilatation of the cutaneous vessels, which, when filled, may contain from one-half to two-thirds of the total quantity of the blood in the body, thus relieving the congested visceral organs, as the liver, kidney, stomach, spleen and brain. Owing to cerebral anemia thus brought on, the patient often falls into a profound slumber. The heating of the blood thus brought to the surface stimulates the sweat glands to active perspiration, and may increase this excretion from one and a half ounces to two or three pounds per hour.

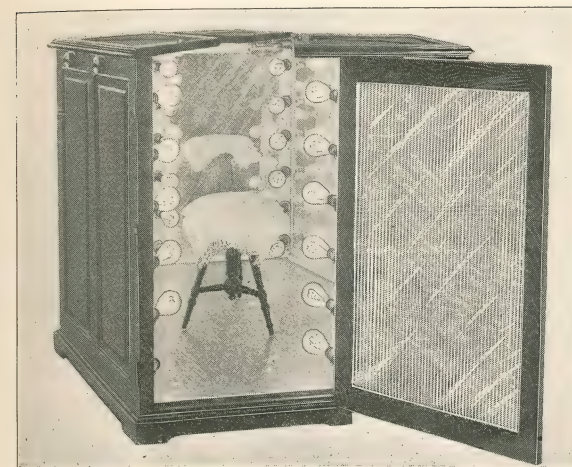
Sunlight affects the great majority of diseased conditions in the most favorable manner, especially all those forms of disease accompanied by defective metabolism, characterized by defective oxidation, such as obesity, diabetes, uric acid diathesis, gout, Bright's disease, cirrhosis of the liver, rheumatism, etc.

Acne, eczema, and even psoriasis have yielded surprising results on exposure to sunlight. Spasm of the cutaneous vessels is relieved, permitting the blood from the congested visceral organs to come to the surface. Neurasthenia in all its forms is materially influenced as the blood improves.

In giving a sun bath it is well to protect the head by means of parasol or a moist towel covered by some darker material. The action of

the chemical rays, which are a powerful nerve stimulant, frequently bring on a headache and nausea, insomnia and depression.

The duration of the sun bath varies with the patient. A feeble patient may not be able to bear more than five minutes, while another will



ELECTRIC LIGHT BATH.

find marked improvement and benefit from several hours daily.

A cold douche or alcohol rub should follow the sun bath and will aid in contracting the superficial blood vessels to avoid the depressing effect, which may be induced by the superheated blood.

After a sun bath the incandescent electric light bath is the most useful and sensible. The heat in this bath is not derived from the air surrounding the patient, as in a hot air bath, but from radiant energy from the incandescent films. These rays pass through air surrounding the patient, without heating it to any considerable degree. As the rays enter the body they come in contact with various opaque structures, the resistance afforded by which, converts radiant energy into heat.

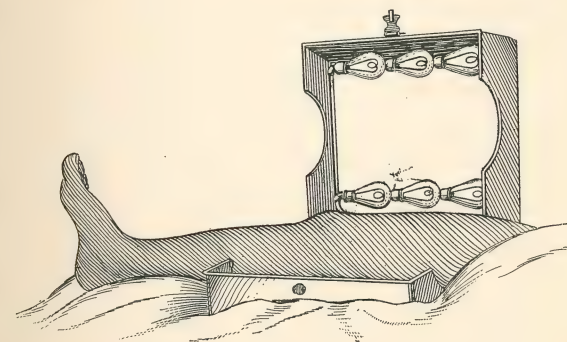
There are more heat rays present in an incandescent lamp than in an arc lamp which is very rich in actinic rays which are a direct stimulant for animal and vegetable life. Rheumatic individuals have noted the fact that when exposed to the direct rays of an arc lamp their condition seem to be improved.

The stimulating effect of light, or rather heat rays, on the nerve endings in the skin brings about a relaxation of the cutaneous blood vessels. The temperature of the blood in these widely distended vessels is frequently raised from four to five degrees Fahrenheit in fifteen minutes. This increase in body temperature is probably the cause of the increased production of carbon dioxide with its remarkable reconstructive effect on the animal metabolism.

General perspiration is produced faster than by any other known procedure. It frequently begins in three to five minutes after entering the bath, the temperature of which may be as low as 85 degrees. In a Turkish bath with a temperature of 170 degrees Fahrenheit it takes much longer. The cutaneous activity is greater than under any other sweating procedure.

The respiration also shows an increased elimination of carbon dioxide amounting at times to 44 per cent.

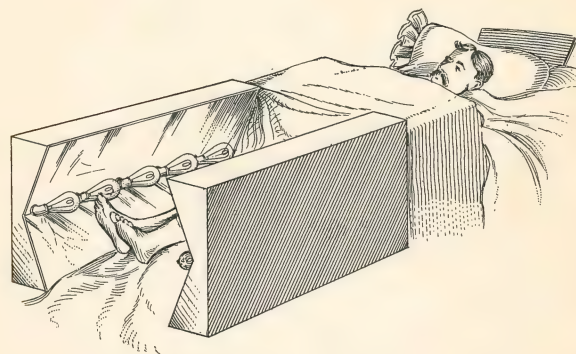
The electric light baths are fast superseding all other kinds of sudatory baths, as they con-



LOCAL LIGHT BATH.

tain, in addition to decided benefits of their own, all the benefits of the Turkish or Russian bath, which are withheld from many sufferers from heart troubles. The user of a light bath is in

reality enjoying a pleasant sensation, just as if the body were exposed to a mild sunlight whereas the long-continued use of the Turkish or Russian bath necessarily causes weakness. Light



LIGHT BATH, PATIENT IN BED.

baths, on the contrary, strengthen and give tone to the system, and may be used on account of their strengthening and invigorating qualities.

Locally applied, the light baths are most effective in promoting absorption of exudates from joints, and the pleural and peritoneal cavities. Even absorptions of exudates from the cornea and vitreous opacities have been reported.

TECHNIQUE.

No light bath should be given without due regard to the time since the last meal; one hour

and a half after a light, and two hours after a hearty meal.

The duration of a bath may be continued from three to ten minutes for a tonic effect, and from ten to thirty minutes for eliminative effects.

Urge patient to drink water copiously to encourage diaphoresis.

Moisten the face and scalp with cloths wrung out of water at a temperature of 60 to 65 degrees F. See that the feet are warm. It may be necessary to place them in a basin of warm water.

A cold douche after the light bath is necessary to tone up the cutaneous vessels.

In feeble individuals, especially those suffering from neuralgic pains, a cold douche is frequently not advisable. Here alcohol may be applied to a small area at a time, and friction applied until it evaporates. The entire body should be gone over in this manner to bring about universal contraction of the cutaneous vessels.



PATIENT PROTECTED AND READY FOR A GENERAL HOT AIR BATH.

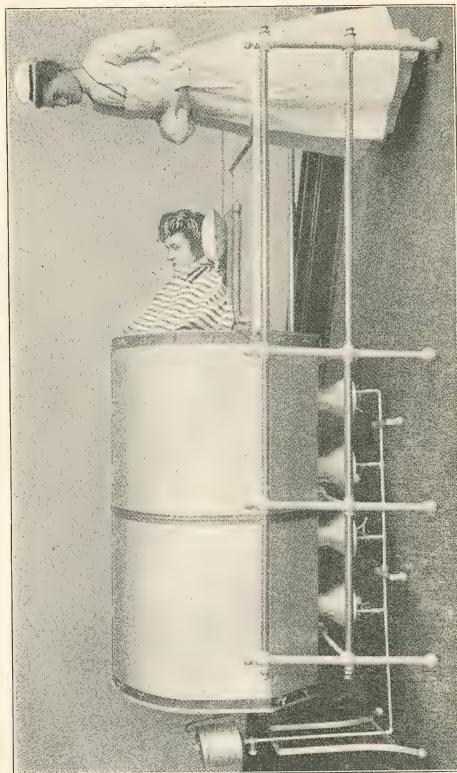
HOT AIR.

LIKE all other physiological methods of treatment heat is not a panacea. Its action is in line with electricity and massage and it is frequently necessary to combine them in order to accomplish results. That heat is an invaluable aid in the treatment of many diseases has been established, and many patients, formerly abandoned as incurable, now recover rapidly under this treatment.

The immediate effect of an application of hot air on the tissues exposed, is first to dilate the integumental blood vessels of the body. These small vessels are capable of holding from one-half to two-thirds of the blood in the body.

Second. The blood thus brought to the surface relaxes the muscular spasm and relieves the congestion of the internal organs, and also eases the heart's action.

The cutaneous surface is the easiest and safest way of exit for any virulent and septic matter introduced or developed in the organism. Elimination by this means is greatly hastened, as an elevation of temperature of the sweat glands and nerve structures heightens their



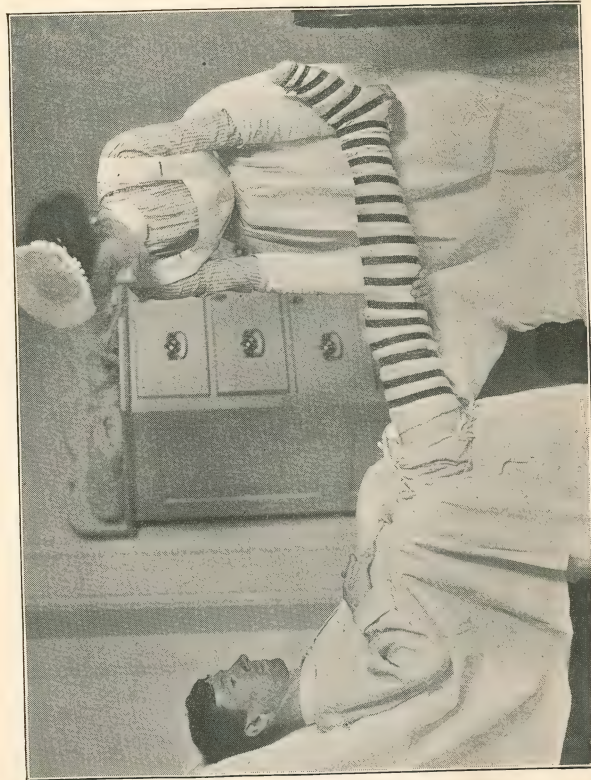
PATIENT IN HOT AIR APPARATUS.

activity to a great extent. Relief of pain is brought about by the absorption and removal of irritating material. The cases are extremely rare in which pain, even of the most excruciating nature, cannot be relieved, or at least mitigated to a degree of tolerance by thermic measures.

The flow of superheated blood through the tissues acts as a physical stimulant and increases the activity of protoplasmic changes, and if heat is continued long enough to raise the body temperature, all the vital activities of the body are accelerated, and excretions by way of the lungs and kidneys are markedly increased, not only in quantity but in specific gravity as well.

The effect of heat in increasing oxidation of proteid waste renders this agent almost indispensable in the treatment of all affections accompanied by organic change, in all of which some form of auto-intoxication is probably of causative importance, as in spinal sclerosis, tabes dorsalis, etc. Albumen disappears from the urine due to relief of the congested kidneys; acne of a gouty nature disappears; chronic skin cases improve; small, stiff joints are loosened and deposits, exudates and adhesions are softened and absorbed.

Hot air seems to be unusually efficacious in the treatment of arthritic disorders, and is a val-



ABSORBENT DRESSING, PREPARATORY TO HOT AIR TREATMENT.

uable aid in the treatment of the following conditions:

- Articular rheumatism.
- Chronic bronchial catarrh.
- Chronic intestinal catarrh.
- Chronic visceral congestion.
- Chronic inflammation of pelvic viscera.
- Chronic gastritis.
- Chronic cerebral congestion.
- Chronic ulcers.
- Gonorrheal and tuberculous joints.
- Traumata.
- Periostitis.
- Bursitis.
- Synovitis.
- Asthma.
- Lumbago.
- Torticollis.
- Sprains.
- Syphilis.
- Bright's disease.
- Diabetes.
- Lead palsy.
- Hypertrophic tonsillitis.
- Hypertrophic laryngitis.

It has been found a valuable adjunct in the treatment of chronic otitis media, stimulating the circulation and causing absorption of articular

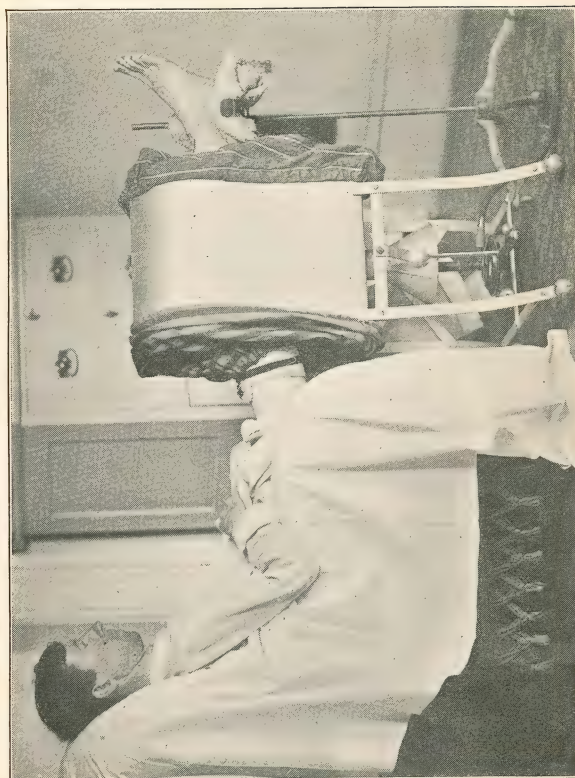
deposits, removing atrophy and relieving rigidity of the tensor tympani.

It will not remove pus, but the hot air treatments tend to localize the inflammation to the abscess cavity so that the outside structures will not be affected, the abscess cavity being lined with thick pyogenic membrane.

TECHNIQUE.

In treating a patient with superheated air we must observe a certain amount of care in administering the treatment, or we may make it very uncomfortable for the patient, and as in other physical therapeutic measures, personal experience is the best teacher.

Before placing the patient in the hot air apparatus the tissues must be protected by means of a covering which absorbs the sweat from the skin, and maintains the essential factor of safety and dryness during exposure. If this is interfered with, a blister or burn results. A fresh bath robe for each patient and plenty of Turkish toweling will serve as an absorbent for this purpose. There is no excuse for burning a patient. Too much covering for one will be too light a covering for another. As there is very little perspiration from the nails and knuckles of hands and feet, they are less tolerant to heat than the soft parts cooled by exaporation from the



APPLICATION OF HOT AIR TO LEG.



APPLICATION OF HOT AIR TO ABDOMEN.

sweat glands, consequently they need an extra covering. See that no pins touch the patient's skin, as they may cause an unpleasant burn.

To prevent unpleasant effects such as nausea, vertigo, dyspnea, as well as congestion and headache, wrap a wet towel around patient's head, as moisture assists in the radiation of heat. Renew this continually through the seance. this cold towel under the nape of the neck and frontal region does not disturb a woman's hair. Lend the patient aid in wiping away sweat, as it is frequently irritating to the skin, and acid perspiration at times even causes a rash similar to urticaria, which, however, disappears after a few treatments.

As the perspiration causes the patient to become very thirsty, it is well to encourage him to drink water (unless it be a corpulent or edematous patient whom we wish to deplete). The water should be cool, but not ice cold and should be taken very slowly, in dessertspoonfuls, to avoid shock and vomiting. Hot drinks are more grateful to some. The treatment must not be given immediately after meals. Wait at least an hour after a light meal, or two hours after a heavy meal.

In applying hot air, study the individual patient as to his tolerance, and increase the treatment as the tolerance increases. The temperature

for a general body treatment is rarely raised beyond 280 degrees, while profuse perspiration usually begins at 180 degrees F. If the patient sweats with difficulty he may find that a few moments' application of vibratory massage over the entire body, but especially the spine, will stimulate the glands, or even the vibratory static wave current will have same result. Perspiration alone is not an indication of the work desired, for a low temperature may cause sweat, (as seen in electric light baths). The reflex response is what is required.

The time of treatment depends on the patient, the disease, and the extent of tissue to be treated. It may last from 15 minutes (not counting ten minutes which it takes apparatus to become heated) to one-half hour, but in some cases even an hour will not be too much. If the patient is run down by disease, the treatment should not be pushed too vigorously: 15 minutes a day may be sufficient to begin with; to be lengthened as tolerance increases. Leave the patient in the apparatus ten minutes after heat is turned off. Then open and expose to air in room twenty minutes. Pulse should be normal before the patient leaves, as he may faint and syncope result if he gets up before.

Pain may be aggravated by the first treatment, but gradually decreases until with four or five treatments it is entirely gone.

It is best to omit treatments during the menstrual periods, as it increases the flow. If menstruation is painful and scanty, heat to the pelvis is frequently a great relief and much appreciated by the patient.

Though cold acts in the opposite way, depresses the vital functions and diminishes the activity of sweat glands, it also acts as an excitant to the cold nerves of temperature sense and produces strong excitation of almost every bodily function. Force of heart contraction is augmented, blood pressure is raised, heat production increased, metabolic activity quickened and disposition to and capacity for mental and muscular activity is heightened.

It takes the temperature and the circulation about an hour to become normal. It is well to bear this in mind in cold or bad weather so as to take proper precautions and avoid undue risks. After a cold spray the patient may safely dress. The application of a static breeze is an excellent adjuvant to the hot air treatment and hastens the cure.

The treatment is usually followed by languor which ensues in about ten minutes. If treatment is continued too long, languor is fol-

lowed by exhaustion, cardiac palpation and oppressed breathing, which may persist for hours.

The pulse and temperature must be our guide.

Towels must be sterilized, and must never be used for more than one patient.

In giving local treatments it is well to observe all the precautions as in general body treatment, especially as to covering the hands or wasted limbs, which feel the heat intensely, with absorbent cotton. Cover the patient with a blanket to avoid the frequent complaint of roasting on one side and freezing on the other. Wrap the patient up well and apply a double layer of towels just above the parts to be treated, to prevent the application of heat beyond the point desired.

The temperature for the treatment of local lesions is usually higher than for general body treatment, and the temperature may frequently be run up to 400 degrees F.

Do not continue the treatment too long as it may lead to an over accumulation of heat in the part, and a dilatation of the deep lying vessels, thus diminishing the revulsive action.

In local application, a cold compress should be applied to parts for one to two minutes after treatment, to restore the tone to the blood vessels and remove heat stored in skin.

MASSAGE AND VIBRATION.

Viewed from one point, all disorders of whatever sort are due to defective nutrition. It is the first step in every abnormal process, or indeed constitutes the whole of it. The integrity of an organ as well as the maintenance of its functions depends on a suitable supply of nutriment both in quality and quantity. If it were possible for us at all times to know what is at fault, and to be at hand when the nutritive processes first begin to depart from physiological paths, and to have at our demand and apply means to set these processes right, both our pathology and our therapeutics would reach their ideal stage. But, as a rule, the abnormal goes on and we often recognize it only at a later stage, and here it is that we begin our process of repair, if repair is possible.

The deeper the insight one acquires of the nature of physiological action in living tissues and of the causes and influences that tend to divert that action beyond the limits of health, the more simple and rational will be the therapeutic means to be employed to remove the causes and check the morbid tendencies.



CUTANEOUS LYMPHATICS.

Action brings waste, and time and rest are needed for the reconstruction of the wasted substance. Often through disregard of physiological laws, repair takes place slowly and laboriously, and at times even a cessation of efforts at repair may occur.

The nutrition of the body is decided by the quality of circulation in the minute lymph channels outside of the capillary walls. It is through these channels that the stream of plasma from the blood reaches the tissues, and it is here that the destructive germ or poison is seized upon by the phagocyte and torn apart, to be digested and the detritus robbed of its infecting quality and discharged into the blood to be finally eliminated. The minute size, situation and function of these channels render them peculiarly susceptible and liable to obstruction. Impurities which readily circulate through the heart and arteries without inconvenience, frequently lodge in these channels and obstruct them, greatly to the concern of the organs or tissues affected. Along the larger lymph vessels we have numerous lymph glands, which act like catch basins in the sewerage system of our city. The waste that is poured into the pipes at our houses does not flow out into the main sewer of the street at once, but passes through a catch basin where the heavy material settles to the bot-

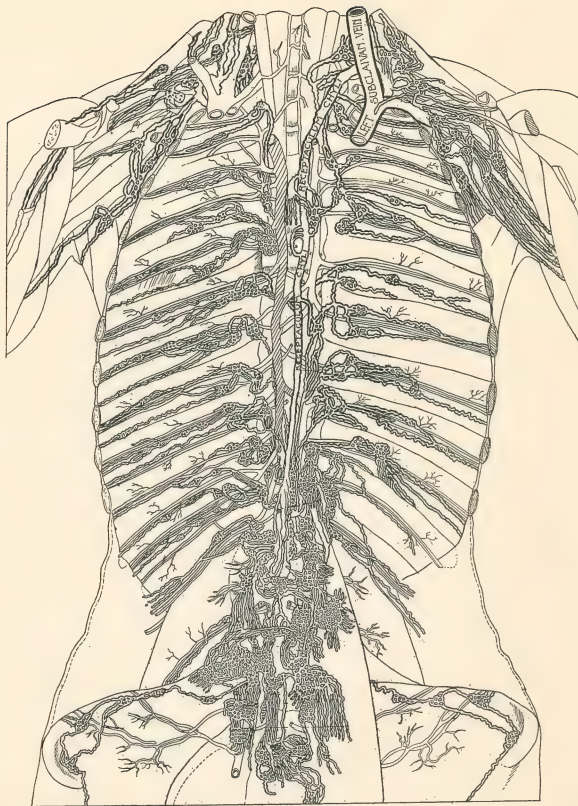


GLANDS AND LYMPHATICS OF CERVICAL REGION.

LYMPHATICS ON POSTERIOR OF STERNUM.

tom and the lighter fluid flows on into the sewer. The most numerous of these glands are found along the great lymph vessels of the abdomen, neck, mesentery, axilla, groin and popliteal space. These so-called reservoirs, drain the tissues adjacent to them, and their activity is an important process in absorption and nutrition, being more intimately connected with tissue metabolism than the blood. If these glands become overloaded with waste, their activity is markedly interfered with and auto-infection takes place, instances of which we find in such diseases as syphilis, scrofula, tuberculosis, etc., where the glands become enlarged and indurated. The more profoundly they are enlarged or involved, the more profound is the systemic infection. The whole problem of elimination of waste depends upon the efficient functioning of this system. The detritus and broken-down products of waste must be removed from the tissues and lymphatics and discharged into the circulation *en route* to the organs of elimination.

When the roadway over which the poisonous products must pass is clogged up, drug stimulation of the heart, liver, kidney and spleen frequently does not meet with the success we desire and nature must be supplemented and complemented in another way.

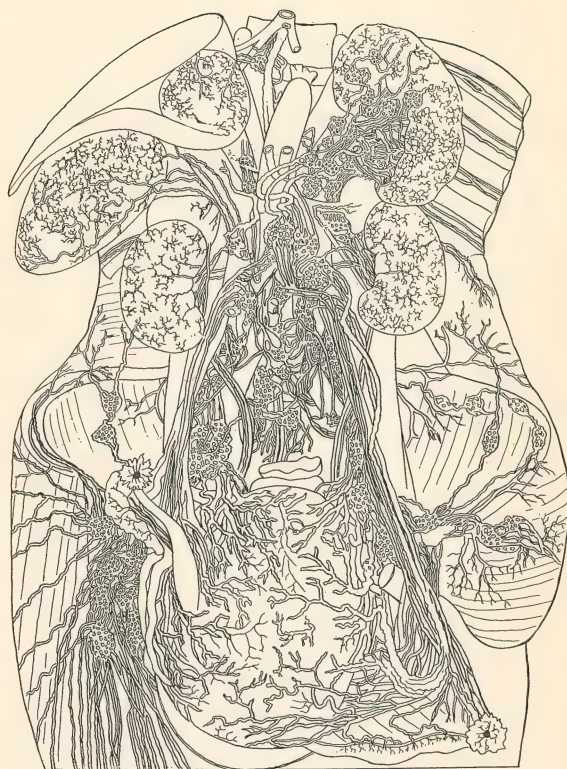


RECEPTACULUM CHYLI; THORACIC AND ABDOMINAL
LYMPHATICS.

Study of this chart shows, why the deep cervical glands on the left side are always more or less involved in auto-intoxication from intestinal disorders.

When we consider the cause and seek a cure for these conditions, we can find nothing more logical and helpful than passive motion as represented by scientific massage.

Massage is the most direct, agreeable and certain of remedies, as it restores nutrition, sensation and power. One of the most striking effects of this treatment is the prompt and agreeable manner in which it relieves pain. It not only suppresses the consciousness of pain after the manner of opiates and other nerve sedatives, but it abolishes it by restoring to a normal, harmonious state, the disorderly conditions which are responsible for its existence; strengthens the organs involved, thus preventing a return of the difficulty; re-establishes the normal currents in the blood vessels and intravascular fluids, and thus initiates a new and healthful condition. Massage is peculiarly adapted to promote and establish physiological drainage for local stagnation, as it employs the same means which nature uses in health, with the additional value of intensifying them, and making them operative in the regions where they are most needed. It progressively rends asunder adhesions, which may exist in the tissues, and causes the absorption of effused material and causes an increased nutrition of the body tissues.



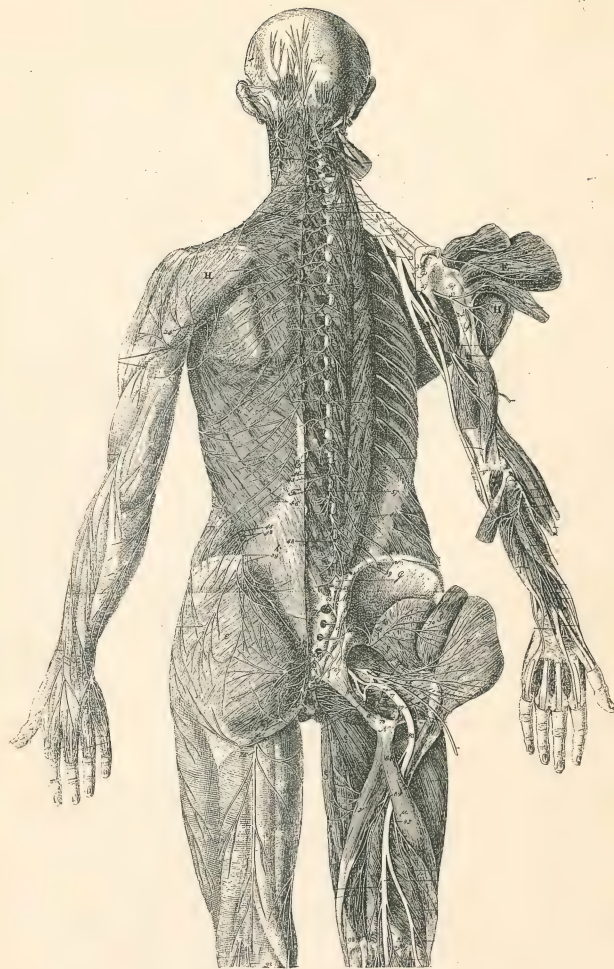
ABDOMINAL AND PELVIC LYMPHATICS.

There is no hypnotic so conducive to restful sleep as an equalized nerve force; no stimulation so effective, as a perfect circulation; no reaction so natural, as that which follows physiological action.

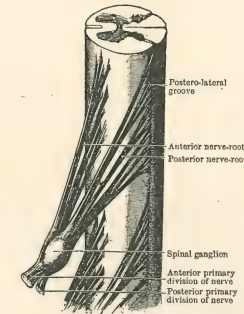
The nervous structure is very sensitive to any morbid action in its nutritive supply, and is everywhere supplied with large vessels which freely anastomose and give evidence of the need of this tissue for an abundant stream of nutrient fluid, in order that its activities may not flag. If for any reason, the expenditure of energy, due to overwork, whatever its nature, in any one part of the body becomes excessive, we find an excess of blood transferred to the nutrient centers of that organ in the spinal cord to give support to the activities constantly taking place. This disturbed equilibrium in the circulation of the nervous system is apt to perpetuate itself in various functional disorders, which can be cured only by removing the cause.

The spinal cord in man resembles the trunk line of a telephone system, having sub-stations from which branch lines run to various subscribers. These sub-stations are known as nerve ganglions, while the subscribers are the various organs of the body. When the telephone at our office or residence fails to work properly, or the sounds transmitted become very faint, the trouble

usually lies in the instrument itself, or somewhere between it and the switchboard at the local office. It is very much the same with our



DISTRIBUTION OF DEEP AND CUTANEOUS NERVES ON BACK OF TRUNK.

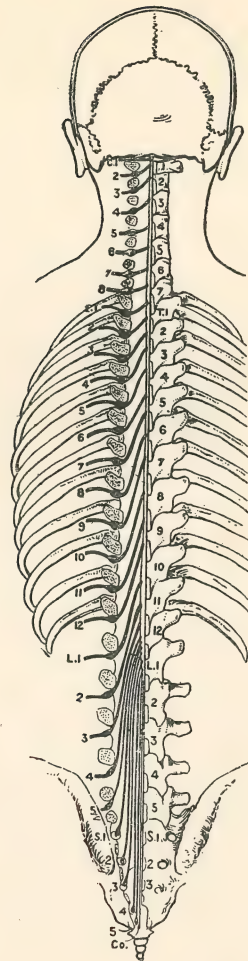


ROOTS AND ORIGIN OF THE SEVENTH DORSAL NERVE.

nervous system, and the fault rarely lies farther away than the local centers in the spine.

All the functions and organs of the body are controlled by certain nerves and almost every nerve in the body may be looked upon as influencing a certain set of blood vessels, thus controlling the nutrition in this vascular area regardless of the heart's action.

It is well known that a chronic irritation of the periphery or in a distinct viscus is usually communicated to the nerve center in the spine which controls its nutrition, and extreme sensitiveness at this point is frequently disclosed on deep pressure.



DIAGRAMMATIC REPRESENTATION OF THE ROOTS AND GANG-
LIA OF THE SPINAL NERVES.



NO. 1. VERTEBRA IN PLACE, SPINAL WINDOW OPEN.

NO. 2. VERTEBRA MISPLACED, SHOWING SPINAL WINDOW
NEARLY CLOSED. THIS CONDITION IS BROUGHT
ABOUT BY PROLONGED CONTRACTURE OF SPINAL
MUSCLES AND MARKEDLY INTERFERES WITH THE
FUNCTION OF THE SPINAL NERVES; DISEASE OF THE
ORGANS TO WHICH THEY LEAD IS INEVITABLE.

It is plain to see that the centers which control nutrition and excretion are of vast importance in regulating the general welfare of the organism. Any change in the blood supply to the stomach and intestines has its direct effect on the nutrition of the body, influencing both digestion and absorption, and also on the excretion through the kidneys.

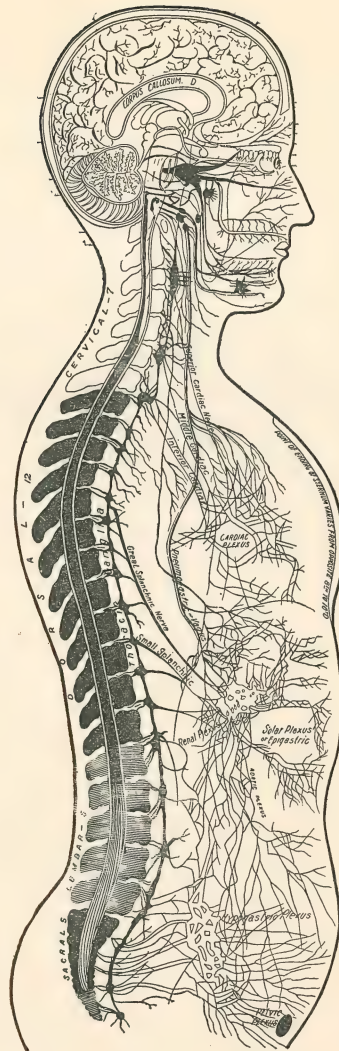


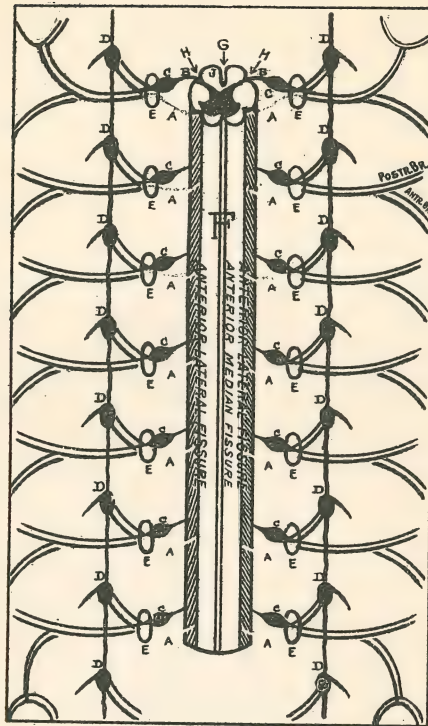
DIAGRAM OF SYMPATHETIC AND CEREBRO SPINAL SYSTEMS.

It is conceded by physiologists that there is a process of invisible muscular contractions constantly going on, even when the body is in a state of rest. If this process is true of muscles, it is equally reasonable to suppose it takes place in the nerves, which maintain the organs of the body and their functions at par.

It has long been realized that there was a need of some method of treatment by which the centers in the spine might be treated mechanically. The osteopath has attempted it by manual manipulation with a fair amount of success, but the invention of the electric vibrator, of which there are a number on the market, has placed at our disposal a means whereby the centers in the cord may be reached, thus maintaining a balance of circulation between the spinal cord and the organs of the body.

Stimulation of the spinal cord brings about that sensation of well-being conferred by nothing but good health. The man whose spinal cord is in perfect health is rare, for he possesses un-failing energy and cheerfulness and knows not what it is to be depressed.

The vibrator in the hands of a skilful operator will replace a masseur in many instances, for with the brush attachment we are able to treat sensitive areas with greater comfort and with final relief to patient, than by manipulation

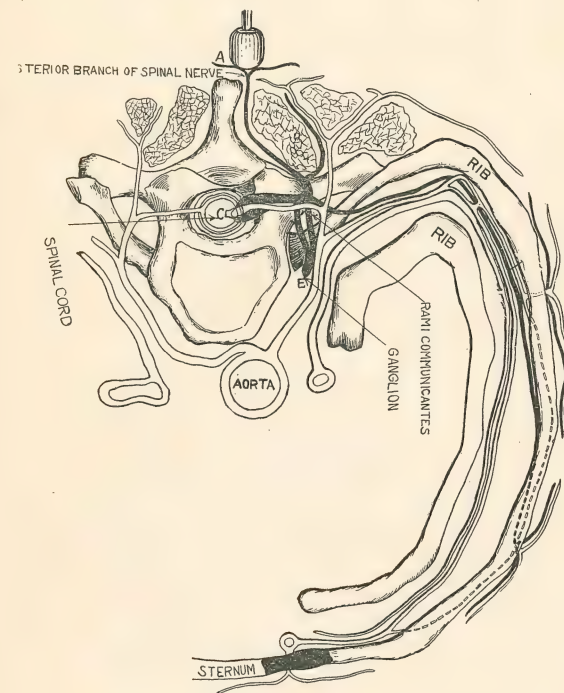


- A.—Anterior, motor root of spinal nerve.
- B.—Posterior, sensory root of spinal nerve.
- C.—Ganglion on posterior root.
- D.—Sympathetic nerve and ganglia, showing its probable connection with the spinal nerves.
- E.—Opening in vertebrae for nerves to emerge from spinal cord.
- F.—Section of spinal cord, anterior view.
- G.—Posterior median fissure.
- H.—Posterior lateral fissure.
- I.—Gray matter of spinal cord.
- J.—White matter of spinal cord.

CUT SHOWING CONNECTION OF SYMPATHETIC AND CEREBRO-SPINAL NERVOUS SYSTEM.

of the most skillful masseur. It must not be understood, however, that vibration can replace massage.

To be successful in the use of the vibrator it is absolutely essential to know the nerve connections of the various organs and tissues.

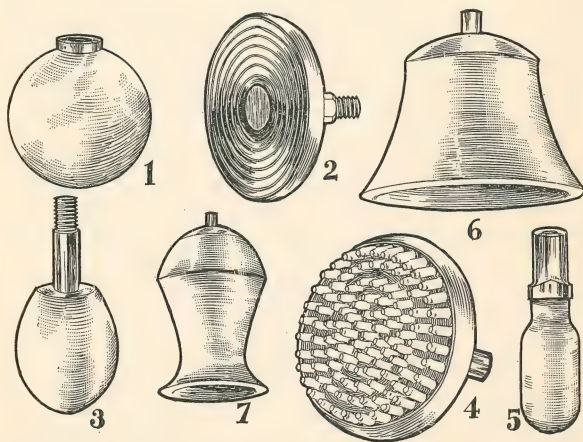


APPLICATION OF VIBRATOR TO SPINAL NERVE.

Having decided what tissue or organ is affected, we determine the vaso-motor area in

the spinal column which controls the circulation to the affected organ and apply stimulation to that area. In cases difficult of diagnosis we are frequently aided by the muscular contracture in the spinal muscles. Stimulation of the spinal centers causes the muscles to relax and become soft, increases metabolism and relieves pain. Pressure on a nerve causes it to vibrate or increase its natural impulse. An irritated nerve fiber responds to stimulation more quickly than the unaffected nerve fibers.

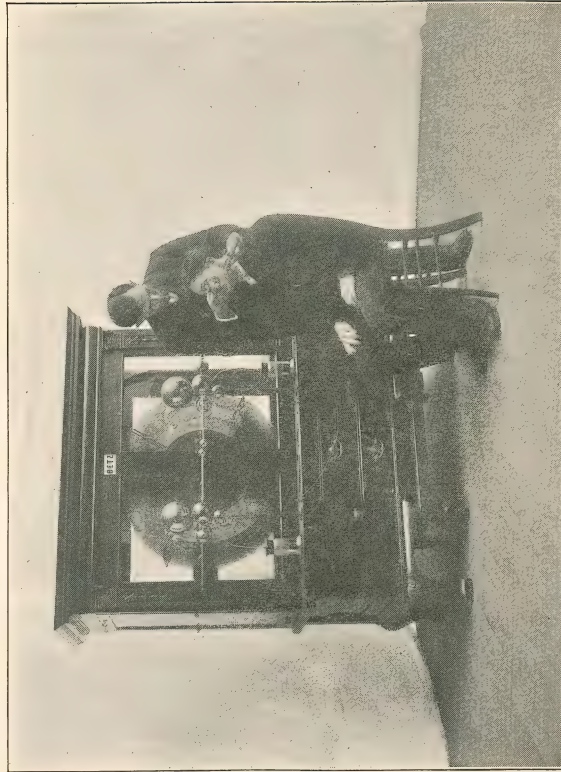
Stimulation of a center is produced by moderate pressure on the parts we desire to influence, while inhibition for relief of pain, etc., is brought about by deep pressure on the center or part treated.



APPLICATORS FOR VIBRATORY MASSAGE AND STIMULATION.

The following table may be used with advantage in applying vibration or electrical treatments at the spine.

C., Cervical. L., Lumbar. D., Dorsal. S., Sacral.				
Arteries.....	Circulation influenced by stimulation or inhibition at.....	1	to	6 C.
Brain.....	Blood supply, controlled.....	1	to	6 C.
	Cervical brain.....	1	C.	to 5 D.
	Abdominal brain.....	7	C.	to 3 L.
	Pelvic brain.....	9	D.	to 5 L.
Face.....	Vaso dilators.....	2	to	5 D.
	Vaso constrictors.....	1	to	6 D.
Eye.....	Recti of eye ball.....	2	to	3 D.
	Ciliary centre.....	2	to	3 D.
	Vaso constrictors of retina.....	2	to	3 D.
	Vaso dilator of ant. part of eye.....	1	to	2 D.
Oesophagus.....	Treat between.....	8	and	9 D.
Nose.....	Catarrh.....	1	to	6 C.
Nutrition centre.....		6	D.	to 5 S.
Larynx.....		1	to	3 C.
Heart.....	Rythm.....	3	to	4 C.
	Vaso motor of valves.....	1	to	3 D.
Lungs.....		2	to	4 D.
Diaphragm.....	Hiccough.....	1	to	9 D.
	Treat at.....	3	4	5 C.
Liver.....	And gall bladder.....	11	and	12 D.
	Torpid..... on rt. side and	6	to	12 D.
		6	to	7 C.
Stomach.....	Cardiac orifice.....	6	to	7 D.
	Pyloric orifice.....	4	to	5 D.
	" " rt. side.....	8	to	9 D.
Intestines.....	Duodenum.....	1	to	1 L.
	Jejunum.....	1	to	5 D.
	Ileum.....	5	to	11 D.
	Caecum.....	1	to	4 L.
	Colon.....	1	to	4 L.
	Induce peristalsis, stimulate	5	to	11 D.
	Diarrhoea, strong inhibition	9	to	12 D.
	Defecation centre.....	11	to	12 D.
		2	to	5 L.
Receptaculum chyli.....	To dilate..... stimulate	5	to	12 D.
Kidneys.....		6	D.	to 2 L.
Urethra.....	Bladder.....	4	to	5 L.
Testes.....	Vas. def. and seminal vesicle	10	D.	to 5 L.
Penis.....	Spermatic centre.....	2	to	2 L.
	Erection centre.....	2	to	2 L.
Prostate gland.....		5	L.	to 3 S.
Ovaries.....	Circulation controlled.....	9	to	11 D.
	Pain.....	10	to	10 D.
Uterus.....		1	L.	to 3 S.
	Cervix.....	9	to	9 D.
	Os.....	1	to	5 S.
	In contractions.....	1 L.	10	to 12 D.
	Vaso motor.....	12 D.	2	to 5 L.
	Amenorrhoea..... stimulate	2	to	5 L.
	Dysmenorrhoea..... inhibit	2	to	5 L.
	Morning sickness..... stimulate	4	to	5 D.
Vagina.....	To relax.....	4	to	4 S.
	Vaso motors.....	12	D.	2 5 L.
Paralysis.....	Upper extremity.....	5	C.	to 1 D.
	Vaso motors.....	5	to	6 D.
	Lower extremity.....	1	to	6 C.
	Vaso motors.....	from 2 D. down.		



LEYDEN JAR CURRENT TO REMOVE SWELLING AND DISCOLORATION IN "BLACK EYE."

RESUME.

NEPHRITIS.

WHATEVER the cause of this disease, it may be presumed that there is some inherent or acquired weakness of the kidneys present, rendering them the weak link in the visceral chain, and that this is the real cause why they fall victims to the various causes ascribed as the active agents in producing this disease. In many cases lesions of the spine, of such a nature as to interfere with the vital forces distributed to the kidneys, are present. This explains why the poisons of acute infectious diseases frequently produce nephritis in an already weakened urinary mechanism, and why one person suffers from the disease, while similar circumstances fail to cause it in another.

Owing to the serious pathological changes that have taken place before the patient consults a physician, the treatment is directed largely to the alleviation of the manifestations of the disease, such as nausea, vomiting, headache, pain in the back, dropsy, etc. It is necessary for the relief of the symptoms to rid the system of the accumulated poisons. As the visceral organs are usually in a congested condition and frequently fail to



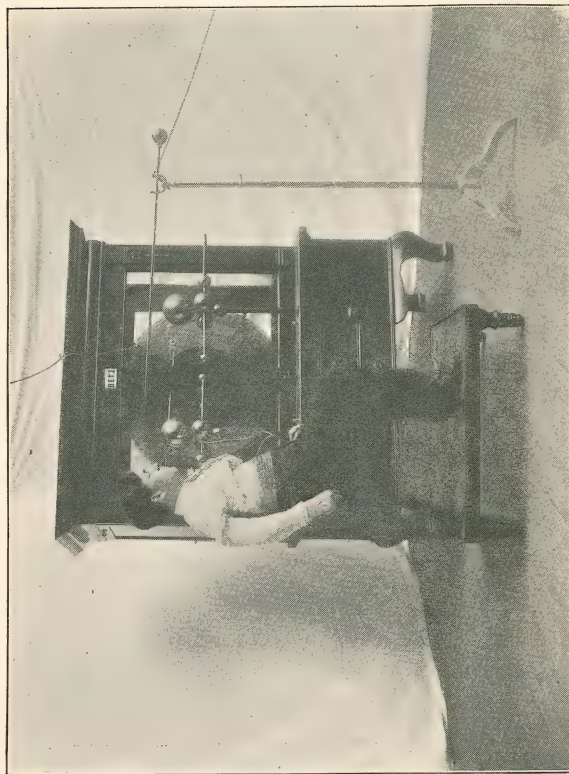
WAVE CURRENT, ELECTRODE OVER CERVICAL SPINE.

respond to diuretics, etc., recourse should always be had to either hot air or electric light bath, which give relief to the kidneys, liver and heart. In many cases where the first sound of the heart at the base can not even be heard, ten to fifteen minutes in the electric light bath will make it almost as plainly distinguishable as the second sound, whose ringing character is also greatly modified. The effect frequently lasts for hours, and where treatment is persisted in daily, for a long time, the apex beat, which is outside of the nipple line, may be brought back almost to its normal position.

Vibratory stimulation of the entire spine is indicated, as the vicious circle once established involves all the organs.

The high-frequency current, on account of the large amount of ozone developed, is a great aid in treating this disease. Treatment should be given to the entire body for an hour, several times a day if necessary in severe cases.

The wave current with the electrode over the liver, kidneys and spine, with a spark-gap of five to six inches, for one-half hour daily, as well as the static bath may be given with a great deal of benefit.



WAVE CURRENT IN DIABETES, ELECTRODE OVER LIVER AND INTERRUPTED BREEZE TO FOREHEAD.

DIABETES.

THE influence of the general nervous system in diabetes is well known, but not understood. Lesions in the medulla, cord, and sympathetic system have caused diabetes. In the floor of the fourth ventricle lies the so-called diabetes center. It is a point, puncture of which results in diabetes. The effect is doubtless gotten through the vagi nerves which originate from this point. The vagi also participate in liver function.

Treatment—Stimulate the cervical spinal centers, solar plexus, splanchnic and lumbar region, restoring the function of the pancreas, liver and small intestines. Apply the wave current with the electrode over liver. The pain in the hepatic region is usually relieved almost instantly by application of the negative spray to this region. The head breeze usually relieves the headache and dizziness. Electric light baths will hasten elimination and oxidation of waste. The high-frequency current is also a great aid in hastening oxidation of tissue waste.

AUTO-INTOXICATION.

IN the course of all diseases we find nature trying to dispose of the deleterious or poisonous products by means of elimination, and anything that will assist in the removal and oxidation of

this waste material will help to relieve the diseased condition.

The elimination of waste is most easily accomplished by means of the hot air bath, which causes elimination of waste through the skin, causes ingestion of water in abundant amount and at the same time permits absorption through the mucous surfaces, subjecting the tissues to a veritable water bath.

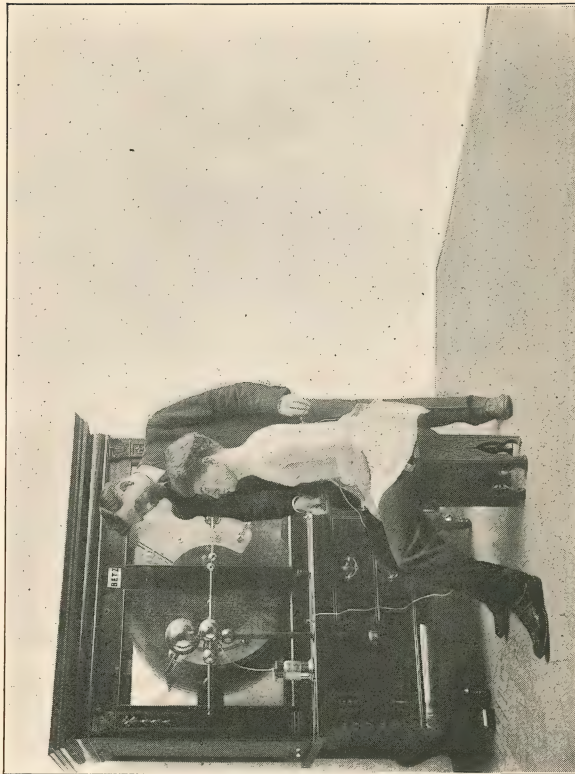
Anything that will assist in the oxidation of the waste material present in the body will hasten a cure in the diseased condition. Hence the wave current with the electrode over the liver or organ involved, and positive insulation will be most effective. Friction sparks over the entire body will also be a great aid by stimulating the integumental tissues to empty their waste into the general circulation.

When the heart is involved, positive insulation with the active pole over the heart is frequently very effective.

The entire lymphatic system needs stimulation and this may be secured by stimulation of the trophic nerves which supply the glands draining the infected areas.

PARALYSIS.

Study the nerve distribution from the spine to the affected region. A contracted muscle after



LEYDEN JAR CURRENT TO SPINAL CENTER AND SOLAR PLEXUS.



LEYDEN JAR CURRENT IN PARALYSIS.

an injury may bring direct pressure on a nerve fiber, or a plexus, cutting off its function and causing paralysis in its area of distribution. In such cases the result is seen directly upon the parts supplied by the combined nerves; it is uncomplicated in other parts of the body and is manifested in a circumscribed area; namely, in muscle groups supplied by the nerve or nerves in question.

If the trouble is due to an auto-intoxication, such as we find in anterior poliomyelitis, where the source of trouble lies in the bowels, we frequently find that flushing of bowels and the hot air bath to eliminate the poison from the system, as well as stimulation of liver and kidneys are of great aid.

It may not be amiss, here to acknowledge the value of lymph hypodermatically administered, in cases of paralysis due to auto-intoxication or auto-infection. Early administration is advised.

A child suffering from a severe gastro enteric infection, developed marked cerebral symptoms. Paralysis of the optic nerves and absence of reflex to light were present. The child had slept with its eyes wide open, even when under the influence of an opiate, which had to be administered to prevent shrieking and restless tossing about. This condition had been going on for about a week when the patient was seen in con-



LEYDEN JAR CURRENT OVER FACIAL NERVE.

sultation by two specialists who made an unfavorable prognosis, they had never seen a child with such severe involvement recover the use of its faculties. It occurred to the author that as the use of lymph had been followed by favorable results in case of adults, it might be employed in this case, while the active cause was still in progress. Two injections were made four hours apart, and were followed by a normal sleep with closed eyes. A marked improvement was noticeable after eight hours. Three injections a day were made for the next four days. At the end of this time, the child had recovered the use of all its faculties and was able to recognise everything that was going on, even calling for his playmates.

If the action of the trophic centers in the cord, which control the nutritive processes is impaired, thereby complicating the paralysis, the parts affected rapidly become soft, and atrophy. In brain lesions the trophic centers, not becoming involved, the motor mechanism suffers only from disuse, and thereby secondarily affects general nutrition. In peripheral paralysis, if exercise of other parts of the body is not impaired only the part paralyzed suffers.

Stimulation tends to preserve the balance of nutrition, which is restored and degeneration thereby retarded. If it is due to a blood clot on



LEYDEN JAR CURRENT IN MYOCITIS.

in the origin of the nerve supplying them. This is also true in chronic articular rheumatism, and the nerve supply of the limbs, is almost always obstructed. The obstruction may be at the exact locality of the pain, or in the course, or at the origin of the nerve supplying the part.

In lumbago there is almost invariably some irritation of the nerve fibers supplying the muscle bundles of the erector spinæ. The causative agent of rheumatism acts by deranging the blood and nerve supply locally or generally. In inflammatory rheumatism the effect is stationary, possibly an infection, acting on the system through causes which derange the functions of the liver and kidney and also of the central nervous system.

The treatment consists principally in treating the primary cause, looking particularly to the excretion of the poisons from the system. The circulation to the part affected must be kept free. This is accomplished by vibratory stimulation along its vessels and lymphatics, as well as by the removal of the cause and the muscular contraction, if present. The treatment in these cases must be persistent.

Hot air or electric light baths (local or general as indicated) are an important aid in eliminating the poison. If cold is applied after the bath it must not be too prolonged or too intense, as cold



LEYDEN JAR CURRENT IN CHRONIC RHEUMATISM.

water flowing directly on the joints may increase the pain.

The wave current over the liver and kidney will stimulate these organs to activity. This current may be applied over the affected joint with a spark-gap of from six to ten inches, or as long as it can be borne without causing painful contractions, about fifteen or twenty minutes.

As it is of importance to increase the nutrition of the parts, the trophic centers in the spine must be actively stimulated.

ACUTE RHEUMATISM.

THE electric light or hot air bath; static brush discharge or high-frequency current for twenty to forty minutes over the seat of inflammation frequently relieves the swelling and improves metabolism in acute rheumatism.

Local applications of methyl salicylate, the affected part being afterward covered with flannel, are made very effective by static friction sparks which hasten absorption and improve the circulation.

SCIATICA.

SCIATICA is more frequently a neuralgia than a rheumatism, and as in other neuralgias, the pain is often due to pressure on the nerve filaments by spasm of its nutrient vessels, as well as by com-



LEYDEN JAR CURRENT IN SCIATICA, ONE ELECTRODE UNDER SOLE.

pression of the nerve trunks by the overfilling of the blood vessels in the contiguous area. Consequently the pain is often relieved by simple relaxation of the nutrient vessels in the nerve trunks, drawing away the stagnant stream of nutrient material.

Treatment consists in first releasing the tissues about the sciatic notch and the entire course of the nerve; stimulation of the spinal centers from the fourth or fifth lumbar down and relaxation of the sacro-iliac articulation. Frequently deep vibration all along the course of the nerve will give almost instant relief.

Almost any kind of electricity may aggravate the symptoms at the first treatment. The wave current, localized over the nerve exit and as far down as it extends on the thigh, is most easily borne by patients.

In acute cases, a hot spray over the origin of the nerve, static brush discharge, and the high-frequency current over the course of the nerve for 20 to 30 minutes, as well as applications of Leyden jar currents are very effective.

In chronic cases long sparks applied over the nerve track frequently give great relief. Although cases are often cured in a short time, many cases call for patient continuance of treatment.

If the neuralgia is of a toxic nature, electric light or hot air baths are indicated.

OCCUPATION NEUROSES.

ALL the numerous occupation neuroses, such as those of musicians, telegraphers, seamstresses, drivers, milkers, cigar makers, penmen, etc., are in reality starvation neuroses and manifestations of a more or less severe obstruction of nerve supply. The occupation which brings about these conditions usually requires the elevation of the right shoulder, resulting in drawing the upper ribs together and approximating the clavicle and first rib in such a manner as to bring pressure to bear upon the brachial plexus.

Treatment consists in stimulating the vasomotor secretory and trophic centers involved, by means of mechanical vibration and exercising the limbs by means of the wave current.

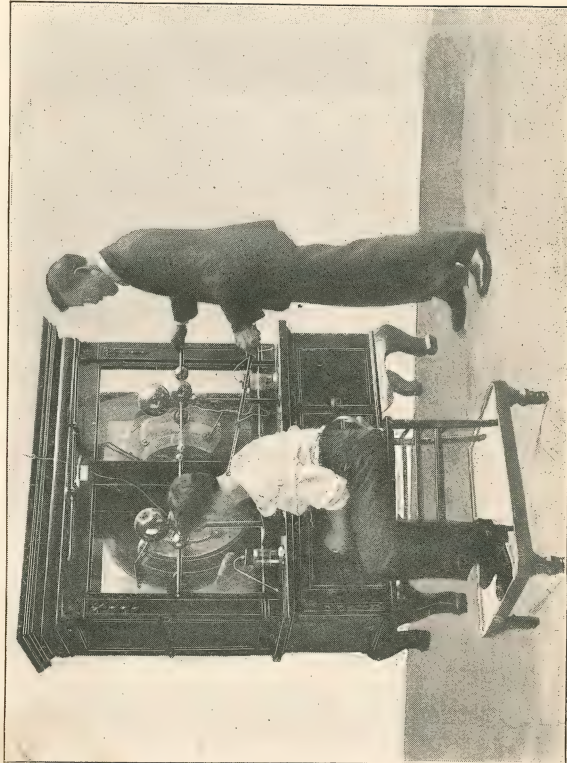
SPRAINS.

IF the incandescent blue light be used shortly after the injury, sprains are greatly modified as swelling is prevented and pain averted.

Massage and vibration of the affected parts is also very effective, as it removes the stagnant condition in blood and lymph systems. Look well to the glands draining this area.

Hot air will cause the swelling to disappear in a comparatively short time.

The static wave current and Leyden jar current are also great aids in improving the nutrition and metabolism in the parts.



STIMULATION OF SPINAL CENTER BY INTERRUPTED CURRENT.

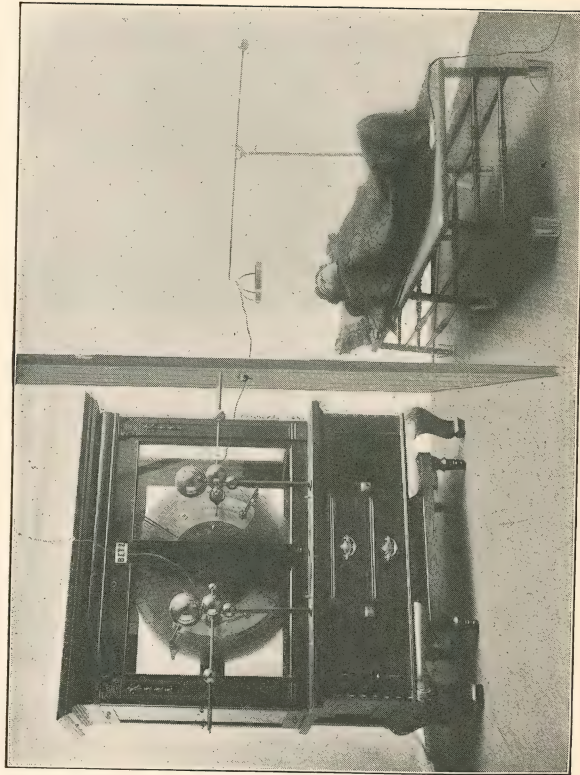
INSOMNIA.

INSOMNIA is only a symptom of some underlying pathological condition, and whether this condition be due to infection or auto-intoxication, it must be remembered that there are always a number of cerebral cells in an unusual state of vigilance, while they should be in repose. This perverted cerebral circulation must be corrected before the cells can perform their normal functions.

While receiving the static breeze, patients suffering from insomnia often fall into a refreshing physiological sleep, due to lowered arterial tension, which in turn is followed by lowered frequency of the heart's action and increased volume of pulse. Internal congestion and strain upon the heart muscle are relieved by dilatation of the integumental blood vessels. This lowered tension in the blood vessels also has the effect of aiding respiration, which becomes less labored, less frequent, and deeper.

As a sedative to the nervous system it surpasses the hypnotic and sedative drugs by inducing a return to normal sleep, and assures it popularity wherever its uses are known.

Vibration over both sides of the neck, as well as stimulation of centers in spine from seventh dorsal up; hot static spray over the spine, liver



HEAD BREEZE IN ADJOINING ROOM FOR INSOMNIA.

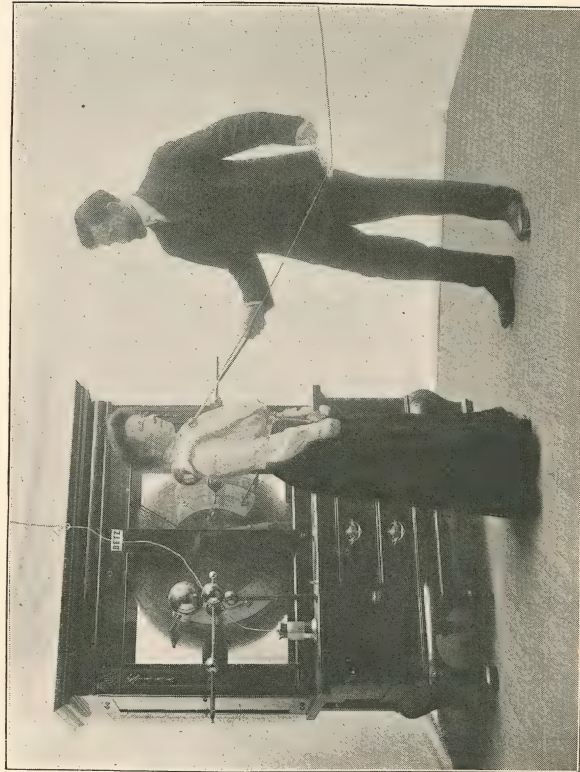
and solar plexus; wave current over the liver, and electric light or hot air baths are all agents that tend to correct or combat the underlying pathological condition.

SCOLIOSIS.

SPINAL curvatures are rarely painful, but when pain is present, the first step in the treatment is to carefully relax all spinal tissues deep and superficial; to increase or correct the circulation in them.

Treatment—Vibration—Treat with moderately deep pressure on the side toward the deviation to relax the contracted muscles, thereby removing the irritation to the nerves consequent on contracture. Next, treat the opposite side of the spinal column to increase the blood supply to the nerves of nutrition. This will materially aid in developing tone and strength in partially inhibited muscles.

It is a good rule in spinal curvature to direct attention to replacement of the parts affected. Begin at the lowest vertebra involved and make an attempt at each treatment to replace it. A considerable degree of force is sometimes necessary to put the parts back into place, but violence must be avoided. Wave current to the spine is a great aid in improving the circulation and tone of the muscles.



SOFT SPARK, PATIENT CHARGED BY INDUCTION.

EPILEPSY.

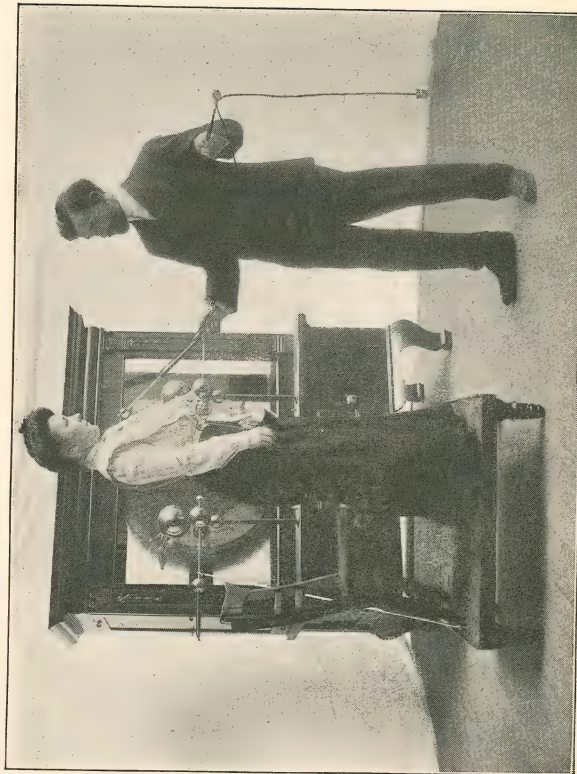
UNLESS due to heredity or brain lesion, a fair percentage of cases get well under proper treatment. In these cases the cause is usually found in some lesion which interferes with the nutrition of the cord or brain, or irritation of the motor nerve-strands running to the peripheral motor structures, exciting the connected nerves, or an auto-intoxication due to the obstruction of lymph and venous circulation. The exciting cause may be in the intestines.

Treatment—Stimulate the spinal centers in the cervical region as well as those from the middle dorsal to the last lumbar region, by means of vibration, and give the wave current to the upper spine, and the spray over the solar plexus daily. If due to auto-infection a hot air or electric light bath will be a great aid.

HYSTERIA.

HYSTERIA, being a functional disease of the nervous system, is frequently found to depend on some lesion which disturbs the nervous equilibrium. There is usually some actual derangement responsible for the altered conditions in those of neurotic temperament.

Treatment—Stimulation of the entire spine, especially the dorsal and sacral regions; friction



GIVING MILD SPARK WITH ELECTRODE NOT GROUNDED BUT HELD AT A VARYING DISTANCE FROM FLOOR.



LEYDEN JAR CURRENT IN CHRONIC APPENDICITIS.

sparks to entire body; sedative spray over pelvic organs; wave current with electrode applied to lower spine to correct circulation in the colon, intestines and genitals.

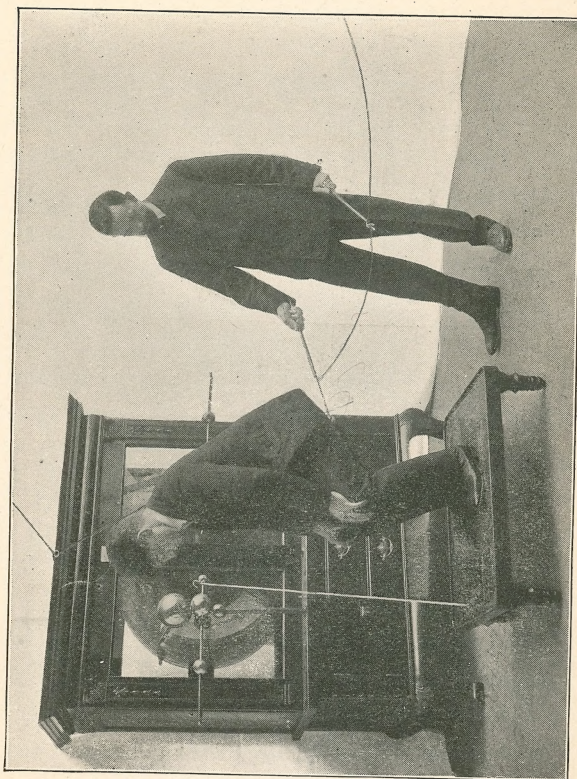
MENOPAUSE.

HOT flashes—headaches—nervous disturbances. Stimulate the spinal system by means of vibration—static friction sparks all over body—and positive static insulation to act as a sedative to the nerves.

PELVIC DISORDERS.

SUPPRESSION of menses, dysmenorrhea, leucorrhea and prolapse of the uterus, are all due more or less to faulty nutrition and circulation in the pelvis and can be relieved and improved only by removing the cause, which is usually found in the obstructed and enlarged lymph vessels and venous circulation.

Treatment—Stimulate the heart and lungs, but especially the spinal trophic centers in the lower lumbar and sacral regions. Relax the spinal muscles and the obstruction may be relieved; ligaments may be strengthened by external abdominal treatment to the iliac blood supply and stimulation of round ligaments. Pain in the ovaries is usually relieved at once by negative spray over the lower abdomen, and back. Friction



APPLYING SPARKS TO PERINEUM.

tion sparks to the entire spine frequently do great good.

The wave current over the lower spine may be employed daily, for 20 minutes, with a 3- to 4-inch spark-gap. The hot air bath is frequently a great aid in induration of uterus, etc.

In impotence, spermatorrhea and orchitis, relax and stimulate from the middle dorsal region downward.

HEMORRHOIDS.

HEMORRHOIDS are usually caused by an impediment to the return of venous blood from the hemorrhoidal veins, and are as a rule accompanied by constipation. The cause of this interference may be found in any of the areas of the spine that regulate the circulation and muscular tone of the abdominal and pelvic viscera, and obstruct portal circulation.

Many severe cases have been treated by vibration of the lower spinal centers and the solar plexus. The high-frequency current applied to the rectum by means of a glass electrode, usually relieves a good deal of local congestion at the first treatment. The active cause of the trouble (constipation) can frequently be reached by means of the static wave current applied by means of a rectal electrode. A spark-gap of at least four inches should be employed. This produces a powerful massage which affects the en-

tire alimentary canal. The swelling method with variations may also be used with success.

VARICOSE VEINS.

VARICOSE veins are usually due to pressure by adjacent organs or growths obstructing the venous flow. The course of the vessel, its surrounding anatomical parts and the sources of its innervation must be examined for obstruction, the removal of which constitutes the efficient treatment of these cases.

In varicosity of the internal saphenous vein, the most common cause, is the tension or thickening of the tissues about the saphenous opening, impeding the outflow from the vein. A displaced or pregnant uterus, a loaded cecum or sigmoid flexure may bring pressure to bear on the iliac veins and cause varicosis of the extremities, or a prolapsed diaphragm, may compress or obstruct the ascending vena cava.

A relaxed abdominal wall or ptosis of the abdominal viscera, may cause pressure on the femoral vein where it passes beneath Poupart's ligament.

Treatment.—Remove the cause. Vibratory stimulation of spinal lesion, if present, and relaxation of pressure by deep vibration over parts. Application of the wave current over the spinal centers may be a great aid in restoring the circulation.

PULMONARY TUBERCULOSIS.

Physiology teaches us that stimulation of the intercostal nerves, causes reflex constriction of the pulmonary vessels. The intercostal nerves are all connected directly with the sympathetic system, by rami communicantes, and the sympathetic vaso-dilator and vaso-constrictor fibers of the system are situated, all along the thoracic spinal region. Luxation of ribs and flattened thorax (dropped ribs), set up irritation in the intercostal nerves, leading to a constriction of the pulmonary vessels.

The general or local anaemia of lung tissue thus produced, weakens and devitalizes the tissues, affording a favorable foothold, to the pathogenic bacteria, it being a well-known fact, that bacteria cannot grow in healthy tissue.

The vaso-motor spinal area for the lungs (2nd to 7th Dorsal) and particularly the region of the 2nd, 3rd and 4th thoracic ganglia, are most apt to suffer from lesions in disease of the lungs. Contracture of spinal muscles, brought about, by an acute bronchitis, thus, frequently proves the starting point of pulmonary tuberculosis.

The starting point of tuberculosis is usually located in the apices of the lungs, opposite the first and second intercostal spaces, below the outer third of the clavicle, in close relation to the ribs apparently most often luxated in this disease.

TREATMENT.

Remove all obstruction to the normal nerve and circulatory activities. Build up the vaso-

motor activities; relax the spinal muscles and deep tissues by vibratory stimulation. Raise the clavicles and ribs to allow the greatest area of expansion, in this way increasing the blood supply to the lungs.

The cough may be relieved by toning up the pneumogastric, phrenic and cervical sympathetic nerves. This is done by treatment along the trachea and anterior thorax.

The wave current, from the static machine, with electrode over the spine, and the stationary spray (from wooden ball electrode) placed before patient in such a way as to give him the benefit of the ozone by inhalation, will be of benefit, as ozone will certainly kill the bacillus of tuberculosis if brought in contact with the infected area.

The high frequency current and the X-rays, have received favorable mention, and unquestionably results have been obtained, that are due to their use alone.

The electric light baths once or twice a week have a favorable action on system, by aiding in the elimination of toxins.

(Cataphoresis is an impossibility with static electricity. The action of the static spray in hastening the absorption of local applications to the skin, explains what was considered cataphoresis by many.)