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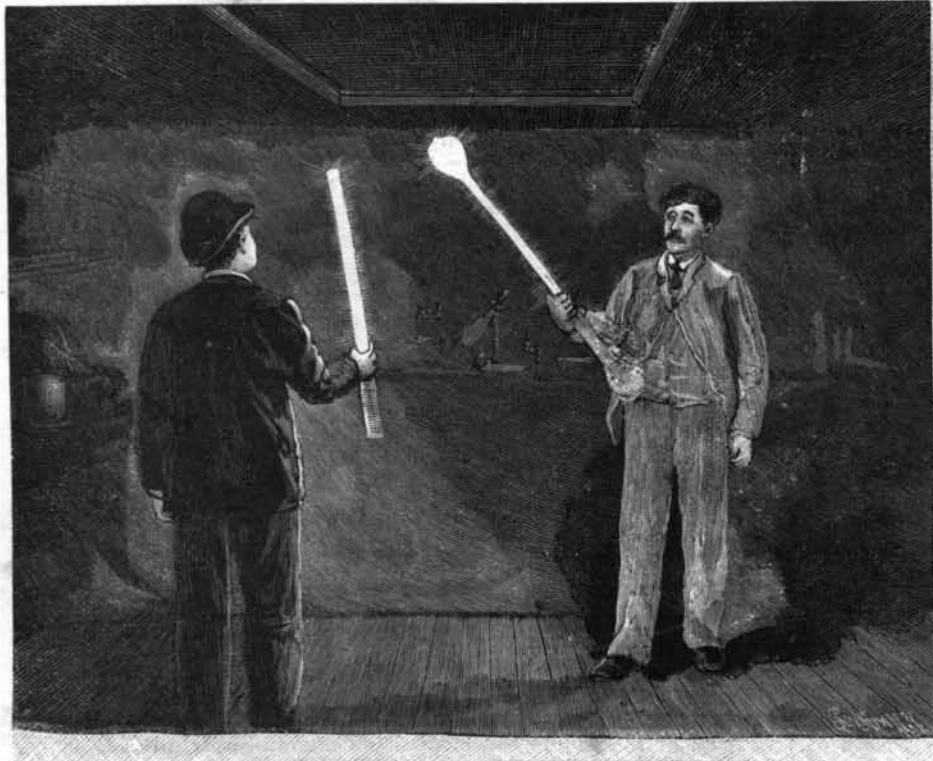
VACUUM TUBE ILLUMINATION BY THE D. McFARLAN MOORE SYSTEM.

The most impressive exhibitions of the power of electricity are those depending on induction. The mere pulling of an armature through space by a magnet, there being no connection between armature and magnet other than that furnished by the theoretical lines of force of the hypothetical ether, only loses its wonder to us because of its familiarity. Again, in

the operations of the alternating electric current, we find a particularly rich field for the display of inductive effects. From the induction coil or converter, where, without contact, a current is generated in an independent coil, to the polyphase motor, where, following the lines laid down by the genius of Tesla, an entirely disconnected coil of wire whirls around under the influence of the induction, all is wonderful. The hope of the future is that light may yet be produced

in a way less extravagant than that of the incandescent lamp, where the results of an entire horse power of energy are represented by four or five feet of incandescent carbon filament. These hopes are all based on induction, for it is in the utilization of alternating or broken currents that the hope of the future for this thing seems to lie.

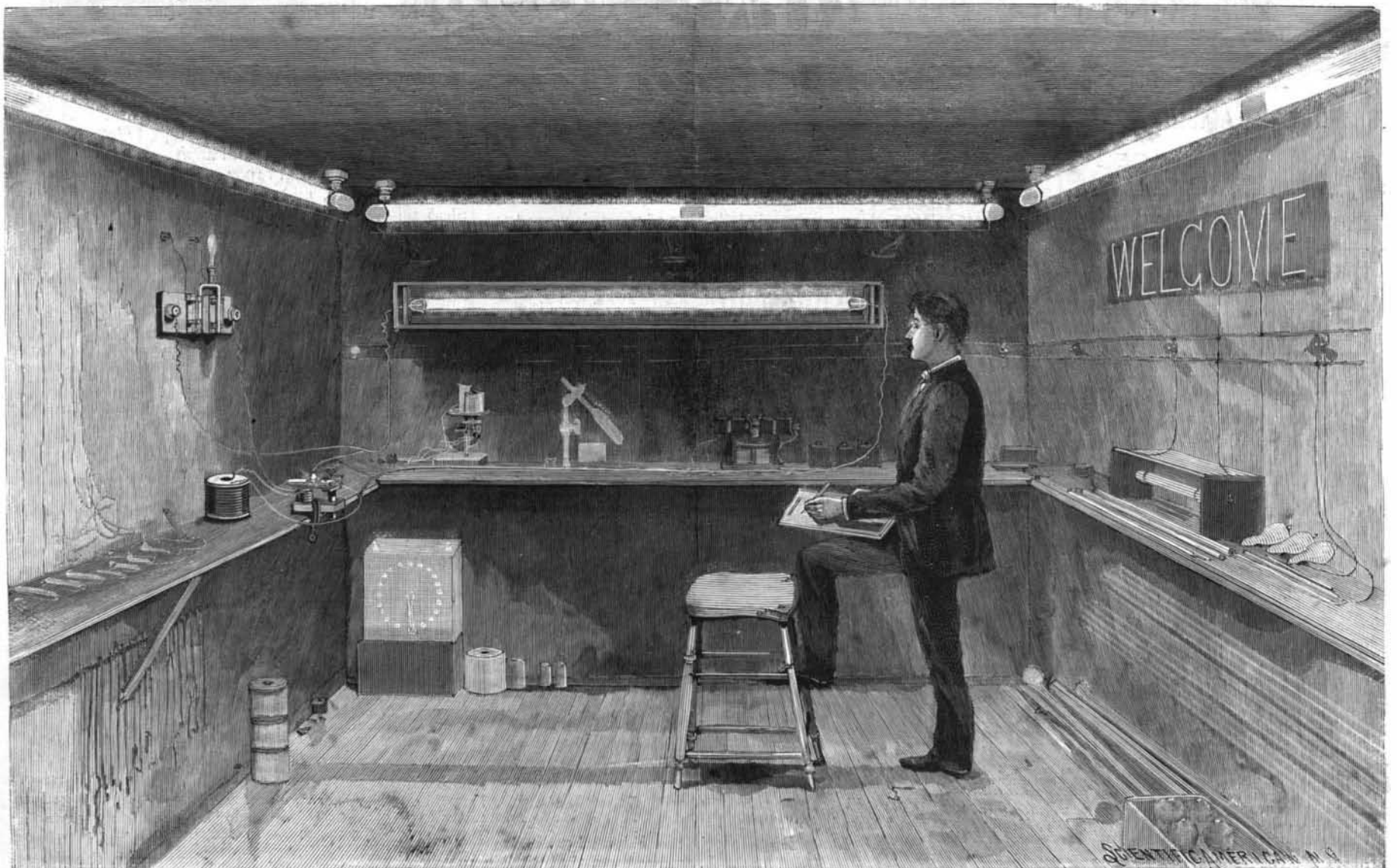
Mr. D. McFarlan Moore, of Newark, N. J., has,
(Continued on page 135.)



LIGHTING TUBES BY INDUCTION.



VIBRATOR, VACUUM TUBE, SIGNS, AND LETTERS.



GENERAL VIEW OF LABORATORY LIGHTED BY VACUUM TUBES.

VACUUM TUBE LIGHTING BY INDUCTION FROM INCANDESCENT CIRCUIT.

VACUUM TUBE ILLUMINATION BY THE
D. McFARLAN MOORE SYSTEM.

(Continued from first page.)

with relatively simple apparatus, produced very remarkable effects in inductive lighting, and, after some years of work and study, his system has taken a definite shape. Mr. Moore has worked upon the principle of effecting as clean cut and rapid a break of an electric current as possible, and has utilized for lighting purposes the effects of this break upon a current in a self-inductive circuit, recognizing the fact that it was the so-called action due to the break, the inductive "kick," which he had to rely on, and he concentrated his energy on making the break as sharp and as decided as possible.

One of his first systems was the inclosing inside of a Geissler tube of a mechanical circuit breaker for the tube itself, and with this apparatus he obtained very good effects, the tube lighting up much brighter than when actuated in the usual way. The process seemed to lend itself so well to existing conditions that much was hoped for from it, but it has now been superseded. His present treatment of the problem of lighting, for his work tends to that end, has taken the shape of using a special circuit breaker, to make and break a current for actuating electrodeless vacuum tubes no longer inclosing the circuit breaker in the tube it is used for. This circuit breaker is based on the principle that in order to make a sharp break it is essential to remove anything that acts as a conductor between contact point and contact point, the air ordinarily acting as a conductor between the contact points so as to prolong the action. This prolongation of the action is precisely what it is desirable to avoid, the amount of counter E. M. F. is dependent on the length of time required for a single break, and in one of our illustrations we show the very simple apparatus by which it is disposed of. An ordinary spring circuit breaker is inclosed in a glass tube which is hermetically sealed after a vacuum has been produced therein. In the usual type of circuit breaker the air acts mechanically as a damper on the movements of the spring. In the exhausted tube this dampening is done away with, the frequency of the oscillations being increased six times, which effects a step in the mechanical perfection of the arrangement. From the electric standpoint the absence of air causes the make and break to be far more instantaneous than it would otherwise be, the opening required in the vacuo being less than in air.

The circuit breaker is really the critical feature of the system. Its functions are performed in union with apparatus of known and accepted type. Connected to one of the terminals of the magnetizing coil in the circuit breaker is another coil of wire to increase the self-induction. The apparatus is put into the ordinary incandescent circuit.

Electrodeless vacuum tubes, sealed glass tubes with nothing in them, with no metal attached except the metallic paint on the outside, therefore with nothing to burn out, are used to give the light. They are connected either across the make and break or in parallel with the coil. When all is properly adjusted and the circuit breaker is operating to make and break the circuit, the tubes glow with a strong light, uniform from end to end, without striations and without flickerings. It is as if the entire tube was filled with an even atmosphere of light. In the case of a straight tube, it is a glowing cylinder of the diameter of the tube.

In his laboratory in Newark, Mr. Moore has carried out his experiments, and the exhibitions of his light have been very impressive. The direct current incandescent lighting circuit at 110 volts potential is used and is connected directly to the circuit breaker coil and to the other coil placed in series. When the current is turned on, the circuit breaker vibrates, and at once the tubes connected with it glow evenly from end to end, their light being many times brighter than that of the old fashioned Geissler tube as ordinarily operated, there being absolutely no comparison between the two, the Geissler tube giving a mere thread of weak light as ordinarily worked. Around the cornice of one of his experimental rooms, Mr. Moore has arranged four tubes, 1½ inch diameter and 9½ and 11½ feet long. The ends of these tubes are coated with aluminum powder; there is no wire connected with interior of the tubes, and the interior of the tubes is brought to a degree of exhaustion suited for Geissler tube action. In his experiments these tubes may be lighted all at once from the one circuit breaker, or from several, when the whole room becomes brilliantly illuminated. In this distribution of tubes along the cornice a suggestion in a practical way is made, as it is proposed ultimately to illuminate apartments by placing vacuum tubes in exactly such positions. The recognized tendency of the day is toward multiplication of lights, the avoidance of strong shadows and of uneven illumination being desirable in the eyes of the public. In the illumination by tubes carried all around a room, we have what amounts to an infinite multiplication of lights, causing shadows to disappear and the room to receive the equivalent of what a

microscopist would call "the light of a white cloud," recognized by eye workers as the most perfect illumination. It is artificial day light without the red glare of ordinary lamps. Normally, the tubes would have their ends connected, but this is not necessary. The most beautiful effects can be produced by induction, as one excited tube will illuminate another if placed near it. One of the illustrations shows an experiment in which tubes held in the hand are illuminated by being brought near a metallic netting, the latter being in circuit with the circuit breaker and coil.

A curious feature of this experiment, itself most impressive, is that the intensity of illumination is greatly diminished in the portions of the tube below the hand, the increase of electrostatic capacity by the body apparently producing this phenomenon. It is obvious that in this illuminating there is an endless range for decorative effects. It is proposed to use it for advertising signs, and it has already been exhibited in this capacity. It can be utilized for theatrical purposes.

How economical the process will be is as yet uncertain. The great loss in all high E. M. F. systems, including a circuit breaker action, is in the arc; great energy being dissipated in the surrounding air. When this is removed and the arc is left working, the economy is enormously increased. There is no question that the tube is economical; the efficiency of the circuit breaker seems now to be the critical point. But the most impressive feature is the compactness and simplicity of the apparatus by which the operations are carried out. The circuit breaker and coil occupy perhaps a quarter of a cubic foot of space, yet suffice for regulating the supply of current for an indefinite number of Geissler tubes, producing with inexpensive apparatus effects hitherto unknown, and only approximated to by the most expensive apparatus.

Laryngeal Tuberculosis.*

I do not take up this subject with the hope of adding anything astonishingly new, but to impress those who treat general tuberculosis with the importance of accurate local diagnosis, as a prominent feature in the prognosis, and to give some few points in recent methods of treatment. It is probable that about one-third of all patients suffering from pulmonary tuberculosis manifest a greater or less degree of laryngeal involvement. Although, according to most authors, the pulmonary involvement is the initial manifestation of the disease, and the laryngeal involvement presents only as the disease develops, still I believe there are many cases in which a careful laryngeal examination may tell us, sooner than any other physical examination, of the approach of this insidious disease.

It is a too commonly accepted fact that, when an examination reveals a healthy pair of lungs, it is proof positive that consumption does not exist, for very frequently in its incipency the disease is located in the upper air passages, only revealing itself in the lungs after complete systemic infection.

There is a class of cases with which you are all familiar, presenting recurrent attacks of laryngeal cough, occasional hoarseness, associated with general debility, and yet showing no pathological pulmonary condition. However, a careful laryngeal examination will reveal to the trained eye an unnaturally pale mucous membrane, which alone may give us warning of some threatened disease; a little later on a slight infiltration between the arytenoid cartilages appears, with possible swelling of the arytenoids themselves. All of these signs pass away, only to recur in perhaps an aggravated form, and finally we can diagnose unmistakable tuberculosis, perhaps, by this time, both in the lungs and the larynx.

The point that I wish to make is that these first suspicious signs should be promptly recognized, and treatment, both remedial and climatic, might prevent the development of the general disease.

The unmistakable signs of laryngeal tuberculosis occurring in their natural sequence are:

- (a) Inter-arytenoid thickening.
- (b) Pyriform swelling of the arytenoids.
- (c) Infiltration of the epiglottis.
- (d) Lesions of the vocal cords (both false and true).
- (e) Superficial and deep ulcerations, and
- (f) Necrosis.

I will say nothing as to the general treatment of tuberculosis, as you are all familiar with its various phases; but the local treatment will often be of great assistance to the patient in preventing deeper infection, in the removal of symptoms, and perhaps in preventing much suffering.

Catarrhal laryngitis rarely becomes tubercular, but it is nevertheless advisable to cure such catarrhal trouble when possible.

Local cleansing sprays are both agreeable and helpful to the patient—such sprays as solutions of boracic acid, bicarbonate of soda, sulpho-carbolate of soda, diluted listerine, Pond's extract, or dilutions of the indicated internal remedy.

In the case of suspected oncoming tuberculosis, but before it is actually present, local laryngeal treatment

* By C. Gurnee Fellows, M.D., Chicago, Illinois State Homeopathic Medical Society, 1895 (as reported in Medical Arena).

is neither necessary nor advisable. But as soon as the inter-arytenoid thickening above mentioned shows itself, and through the progressive steps, local treatment becomes of inestimable value. I have seen ulcerations heal, arytenoid swellings diminish, infiltrations decrease, vocal power restored, and painful deglutition cease under appropriate treatment.

For general applications to the larynx sprays are advisable, but for accurate treatment, and particularly in the use of the stronger preparations, the laryngeal applicator is alone allowable. For simple infiltration, no matter where it is found, mild stimulation for the purpose of promotion of absorption is called for. Such stimulants are the sulphate, chloride, and sulpho-carbolate of zinc, carbolic acid, calendula, and glyceroles of various indicated remedies. Reaction should be watched for and noted, and the applications made only so often as is necessary to keep up the absorption, and not often enough to induce irritation. But when ulceration manifests itself, more radical treatment is demanded. Menthol, from 2 to 20 per cent, in benzoinol, is highly recommended and has been of decided use in stimulating the healing process, and is perhaps second in importance for the treatment of ulceration. But lactic acid stands pre-eminently first and is worthy of its reputation. Its application has generally been made directly to the ulcerated spots, beginning with a 40 per cent solution and increasing gradually to 60 and 80 per cent, and often to the pure drug.

Recent researches, and particularly those made by "Heryug," of Warsaw, have proved that the effect of lactic acid is far more powerful after curettement of the ulcerations, and a perusal of a recently published series of 300 consecutive cases treated in this manner adds strength to our belief in its efficacy. In my own work I have had some good results with this treatment, and several cases have maintained the improvement for a period of over two years. The internal treatment I shall not discuss, because each case needs individualization. But in passing I cannot refrain from mentioning with highest praise the iodide of lime. Its sphere of action has been particularly upon infiltrated tissue, causing its absorption and acting favorably upon spasmodic cough.

Inhalations of vaporized eucalyptus, menthol, pine-needle oil, creosote, naphthalene, iodine, etc., in benzoinol, give us to a certain extent the benefits of climatic change by creating medicated air for respiratory purposes.

Tiny Oxen.

One of the greatest curiosities among the domesticated animals of Ceylon is a breed of cattle known to the zoologists as the "sacred running oxen." They are the dwarfs of the whole ox family, the largest specimen of the species never exceeding thirty inches in height. One sent to the Marquis of Canterbury in the year 1891, which is still living, and is believed to be somewhere near ten years of age, is only twenty-two inches high, and weighs but one hundred and nine and a half pounds. In Ceylon they are used for quick trips across country with express matter and other light loads, and it is said that four of them can pull a driver of a two-wheeled cart and a two hundred pound load of miscellaneous matter sixty to seventy miles a day. They keep up a constant swinging trot or run, and have been known to travel one hundred miles in a day and night without either food or water. No one knows anything concerning the origin of this peculiar breed of miniature cattle. They have been known on the island of Ceylon and in other Buddhist countries for more than a thousand years.—Tit-Bits.

A MEANS for preventing the noise made by trains in passing over iron bridges has been devised by a German engineer named Boedecker. He puts a decking of 1¼ inch planks between the cross girders, resting on 3 inch timbers laid on the bottom flanges. On the planks a double layer of felt is laid, which is fixed to the vertical web of the cross girder. At the connections with the girder a timber cover joint is placed on felt, and two hooked bolts connect the whole firmly to the bottom flange. Four inches of slag gravel cover the decking, which is inclined toward the center of the bridge for drainage purposes. A layer of felt is laid between the planks and the timbers they rest upon and the ironwork in contact with decking and ballast is asphalted. The decking weighs 600 pounds per yard for a bridge 11 feet wide and costs 23 cents a square foot. It is watertight, and has proved very satisfactory in preventing noise.

Vivisection in Switzerland.

Recently the people of the Swiss canton of Schwyz voted by referendum on the question whether vivisection should be permitted in the canton or not. A motion to prohibit vivisection entirely was rejected by 39,476 votes against 17,297, and a proposal of the local Society for the Prevention of Cruelty to Animals to allow the practice of vivisection for bona fide scientific purposes was adopted by 35,191 against 19,554 votes.