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RECENT
ELECTRO-THERAPEUTIC WORK
IN
MEDICINE AND SURGERY.

BY

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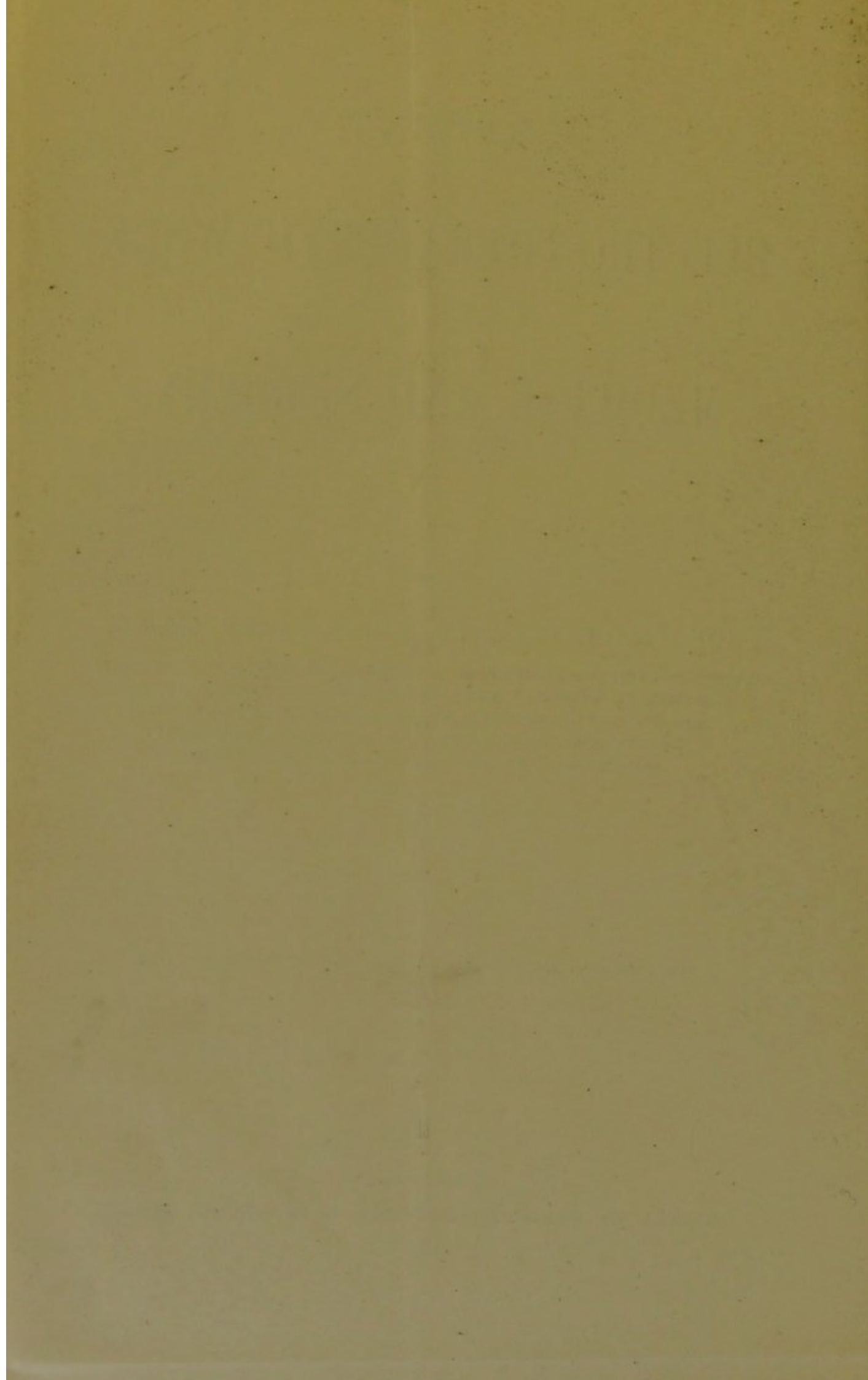
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RECENT
ELECTRO-THERAPEUTIC WORK
IN
MEDICINE AND SURGERY.¹

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ON more than one occasion in the past I have had the honour of giving a demonstration to the members of the Medico-Chirurgical Society of Glasgow upon the subject of x -rays and other waves in ether which have attracted the attention of physicians and surgeons, in as far as they proved useful in the diagnosis of affections of both hard and soft tissues. To-night I intend to show some lantern slides and apparatus by way of demonstrating the therapeutic value of the same forces. Amongst these are the x -rays, and many others long familiar to us, but all of which are believed to be some form of transverse wave or waves in ether.

Professor Roentgen's historical and sensational discovery has long ceased to be a novelty, yet comparatively few people

¹ Demonstration to the Glasgow Medico-Chirurgical Society, 21st February, 1902.

in the early part of the year 1896 could have foreseen the enormous amount of research which followed it, whether in the physical laboratory or at the bedside. Not that we attribute all recent therapeutic work in this direction to this great discovery; on the contrary, I hope, before the evening is advanced, to show that the work of Finsen had previously been carried out independently and with great success in the therapeutics of skin affections. Further, Tesla's great work preceded Roentgen's, and, thanks to the application of his methods by Dr. Arsonval, the profession has become familiar with the application of high-frequency currents in medicine. What is of particular value, however, is the interest which has followed Roentgen's discovery, not only in connection with the *x*-rays themselves, but in many new forces closely related to them; because, thanks to the work of Becquerel, the Curies, Russell, and others who have added much to our knowledge by demonstrating the existence of radiations emanating from many hitherto unsuspected substances, the possibility of therapeutic results from new sources becomes daily more evident. As a result, it may be safely said that just as at the beginning of 1896 it was impossible to foresee what has already taken place, so it is now as difficult to predict how far-reaching may be the results in the future.

In order to accomplish as much as possible during the limited time at my disposal, I shall arrange the demonstration so as to include, firstly, a reference to some of the principles of physical science upon which this work is founded; secondly, many forms of apparatus required for different methods of treatment, and, in dealing with the latter, I shall try to indicate the pathological conditions most suited for each method; thirdly and lastly, the results so far as they have been obtained.

First of all, then, dealing with the principles involved, I will throw the ordinary spectrum of light upon the screen, showing the different colours with which we are all familiar, from the red at the one extreme to the green and on to the violet, and, further, into that region which has been so long known to us as ultra-violet. To begin with, therefore, we believe that the different conditions are due to differences in the transverse waves in ether, all of these colours being present in what is known as white light, and easily separated by means of the prism. We now believe, however, that many other waves at each end might be drawn in or represented in addition to the spectrum, and if we do not demand too strict adherence to analogy we might compare these in some way with the key-

board of the piano, and think of waves in ether as in a similar way being related to each other as we pass from the extreme left or low notes of sound on the one hand, to the highest notes on the other. For this reason I will throw now upon the screen a diagrammatic spectrum (Fig. 1) in which the first one I showed takes its place with the others. Some of these will be seen to be away octaves, as it were, beyond the violet rays, while others will be seen to the left of the red. The diagram represents in a way a relationship in size and

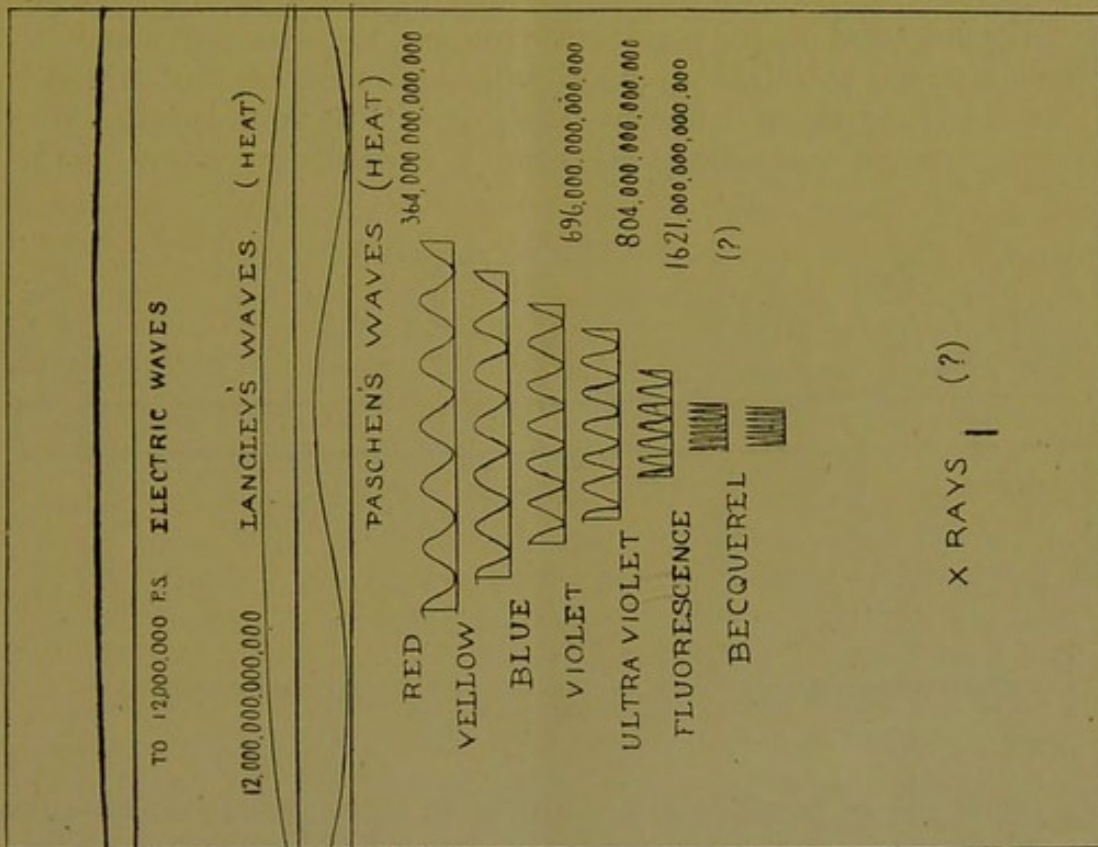


FIG. 1.

Diagrammatic representation of different waves in ether to the right and left of the ordinary light spectrum and including this.

frequency which the waves bear to each other, and the figures represent the number of vibrations per second.

As we pass from left to right we have represented the electric and magnetic waves, heat waves, red, green, violet, and ultra-violet rays; beyond these such radiations as those described by Becquerel and others, and far away to the extreme right we find the *x*-rays, that is, assuming them to be really transverse waves in ether. Be it noted here that we are far from being able to make up a complete spectrum, and

you will notice great gaps of which we know nothing; even in regions such as the electric, magnetic, and heat the classification is not nearly as complete as we know it in connection with light waves (Fig. 2).

Much yet remains to be done in the physical world of science, but in view of the magnificent demonstration of Hertz in connection with Clark Maxwell's theory of electric waves, there is much room for hope. Imperfect and all, however, as our knowledge is at present, it is clear that we have recently had many new forces registered, all worthy of further consideration, whether viewed from the diagnostic or therapeutic standpoint, and as a result of the employment of some of these at least, satisfactory results have already been obtained.

In studying these different forces it will be found that some possess one or more properties not possessed by others, such,

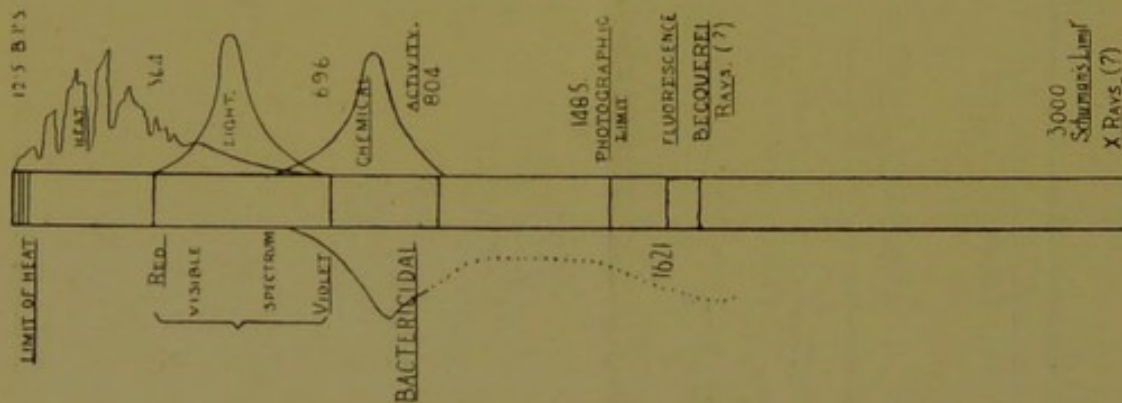


FIG. 2.

Diagrammatic representation of waves in ether used in medicine for diagnosis or therapeutics.

for example, as polarisation of light in electric waves; absent in others such as *x*-rays. On the other hand, many of them possess properties in common, such as the action on a photographic plate, a property possessed by *x*-rays and radiant matter, demonstrated by Crookes; and long ago Abney was able to photograph objects by means of heat alone. And so we find that many of these forces seem to possess properties which, if they be not the same, resemble each other in their therapeutic actions when applied to diseased tissues. We have long been using electric currents, more or less scientifically, it is true, and every physician is acquainted with the action of heat from long and well-known familiar methods. We are all believers in the recuperative and beneficial actions of light, so that we have been employing such radiations for long before the days of D'Arsonval's work, or the new apparatus

for radiant dry heat, or Finsen's artificial light, which, with radiant matter and *x*-rays, forms the subject of to-night's demonstration.

We now come to the question of theories involved in therapeutic actions. For the most part these are theoretical, although there are few who would be inclined to disbelieve the statement that some waves destroy organic life or retard its growth, and in this connection the researches of Downs, Blunt, Marshall Ward, and others deserve our great recognition. These results have been proved by the effects upon cultures. In passing, here it may not be out of the way to remember how different is the action in cultures as opposed to that upon organisms buried in the deep tissues. Our difficulties are not lessened by reflecting upon the results of workers with the *x*-rays; some of them have found that they may not destroy, but actually stimulate the growth of organisms. Those who believe in this view of the question seek for, and attribute the results to, bactericidal action, but there are others who fall back upon the older idea that the tissues themselves possess the power of destroying pathogenic micro-organic life, and that these radiations in some way or other stimulate these.

Passing to the consideration of the different forces now employed in medicine, I shall, first of all, take up very briefly that class with which Crookes, Becquerel, the Curies, and Russell have made us familiar. It may be said that substances have already been tried therapeutically which are known to give off radiations, say, in skin affections. They have been dusted on the affected parts, but the results obtained so far are not well known. In this connection, however, we cannot but think of the many substances which are used therapeutically as antiseptics, and when doing so ask ourselves the question, how are these substances acting? May the results not be due to radiations, in some instances at least? In the past we have been content to describe them as "chemical," "stimulating," "bactericidal" actions, or in some indefinite way to regard them as capable of producing a beneficial result without troubling ourselves to ask by what methods these were obtained. After all, such terms, when carefully examined, tell us about results, but do not explain the action.

FINSEN'S LIGHT TREATMENT.

Finsen's earliest apparatus for the successful treatment of lupus was expensive and cumbersome. On the screen is shown a photograph (Fig. 3, p. 8) of the apparatus, and the early

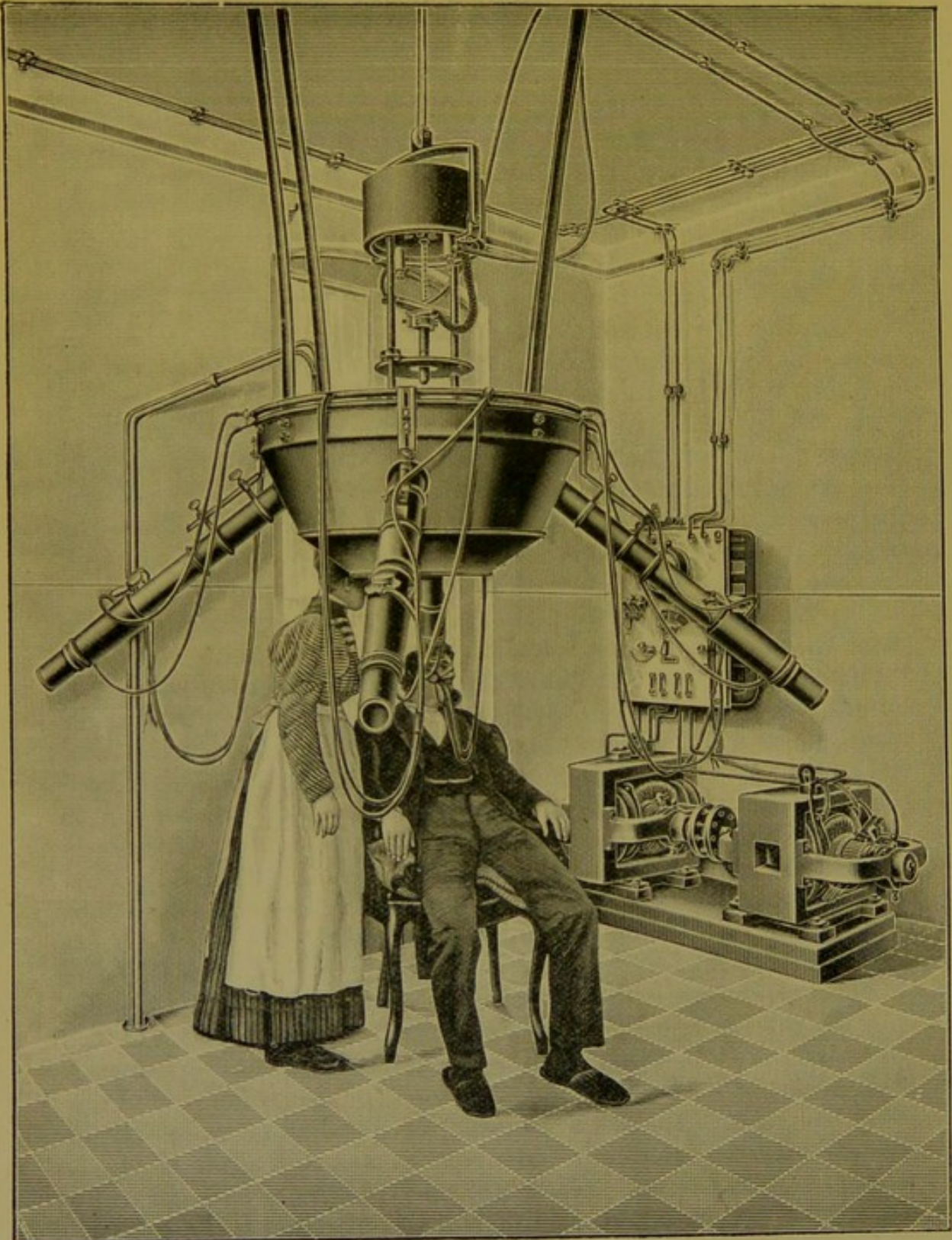


FIG. 3.

Finsen's original apparatus (from Schall's catalogue).

method of application. Suspended from the roof was a powerful arc light of 10,000 candle power, and the rays were

collected by means of a telescope in which quartz lenses were fitted in order to facilitate the passage of violet and ultra-violet rays. On the affected part a water cell was placed, through which cold water circulated to absorb the heat waves, so that by pressure the tissues were rendered as anæmic as possible, for we must remember that these short waves have a very slight power of penetration, and are easily stopped, as we know from Lenard's experiments. The objections to it

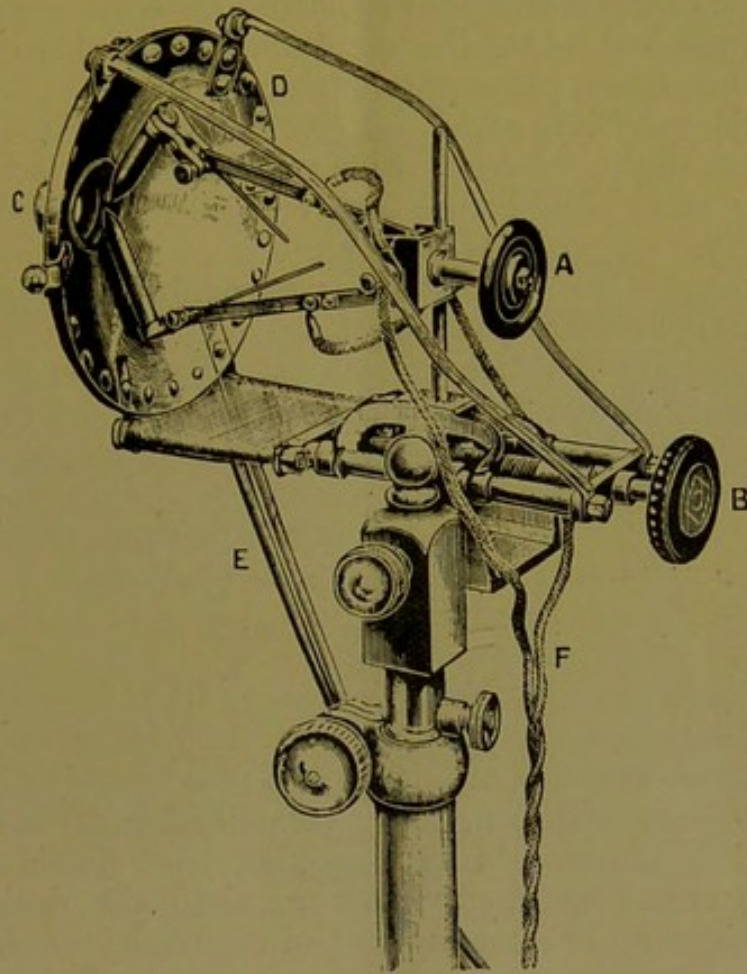


FIG. 4.

Lortet and Gounod's modification of Finsen's apparatus (Miller & Wood).

were, among others, firstly, that the light being so far from the patient considerable loss took place; secondly, the area within which the action took place was very small; and thirdly, the expense of the apparatus itself and the cost of maintaining it became a serious matter. Moreover, by this means it is not easy in any case to get to the deeper parts of the tissues. Reaction, sometimes troublesome, is set up in the skin, and the whole process is exceedingly slow. I know of one

case in which the patient attended a large clinic during thirteen months for a patch of lupus on the side of the face, and two equally large areas of affected tissue in other parts of the body were not touched because they were not considered as urgent as the face. Under the great pressure on the operator, evidently there was not time to treat these as well. It may be asked here whether it would not have been better to have scraped or cauterised the parts, but in answer to that it may be pointed out that even these methods are not always satisfactory, and the general experience of those working with Finsen's apparatus is that the worst scars form where operative procedure has taken place previously.

One of the most important points claimed for Finsen's treatment is the slight tendency to scar, whence the advisability of treating early and before any other local measures have been applied. A considerable number of modifications and improvements in the apparatus have already been made; thus Lortet and Gounod have made a lamp, which I now show you, and a photograph of which is also put on the screen (Fig. 4, p. 9). This particular lamp is the modification of the Lortet-Gounod as used by Sequeira at the London Hospital. By bringing the light close to the patient it is more efficient, the area acted on is larger, and it is much more economical both in cost and in maintenance. All these advantages combine to render each sitting and the whole course of sittings much shorter.

Others have been working in the same direction; thus Kjeldsen has sought a great amount of energy of chemical rays by the construction of a lamp, one pole of which is carbon, the other being metallic mercury volatilised inside a chamber. Although less luminous to the eye, its bactericidal property comes into action in much less time than the ordinary arc lamp, that is, for the same amount of electricity used.

Dr. Bang, of Copenhagen, has constructed a lamp, a model of which I show you, in which both electrodes are iron, his idea being that the spectrum of iron is rich in ultra-violet and violet rays. These electrodes may be cooled by water flowing through them, or they may be suspended in a vessel containing water. The apparatus is small and cheap; the bactericidal properties are great, and with a low amperage a reaction can easily be set up in the skin in a comparatively short space of time. Lastly, some experimenters have sought to employ the violet sparks between the discharge rods and an ordinary induction coil, and I now show you Goerl's apparatus, which consists of two metal points inside a metal chamber, carefully

insulated so that the patient may receive no shock. In the front part of this chamber is fixed a quartz lens, which can be pressed against the affected parts, and by means of a hand-ball, air is pumped in to keep the parts cool.

Walsham, of London, has been experimenting successfully in the same direction (Fig. 5), and he has introduced an interesting modification by dispensing with the quartz lens and passing the violet rays through a piece of ice, which offers comparatively little obstruction to the violet and ultra-violet rays. Another form of apparatus has lately been

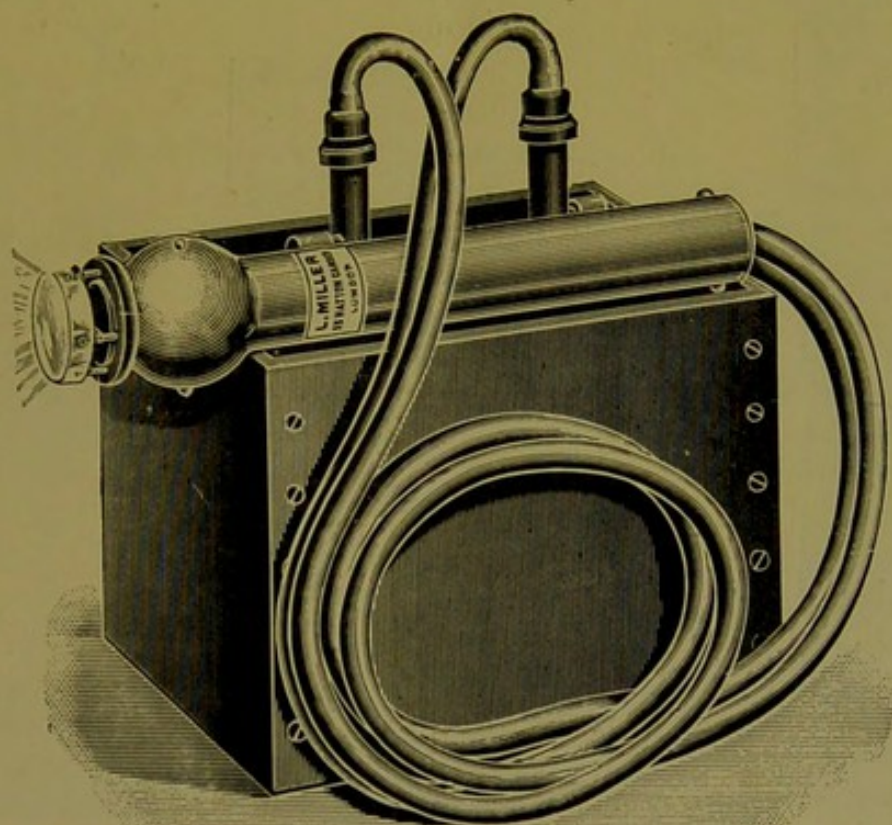


FIG. 5.

Walsham's apparatus for ultra-violet rays (Leslie Miller).

devised for giving ultra-violet rays, called the dermo lamp, of the Sanitas Company. It is very portable, and suitable for the consulting room (see Figs. 6 and 7, p. 12).

Of the results of this method of treatment little need be said at this meeting, inasmuch as Finsen has recorded the results of 456 cases, of which 130 have remained free of recurrence for periods of one to five years; and Sequeira, of the London Hospital, with whose results we are in this country most acquainted, has also had a large number of cases under

treatment, with most satisfactory results. Moreover, installations are becoming part of the electric departments of many hospitals in this country as well as on the American and European continents.

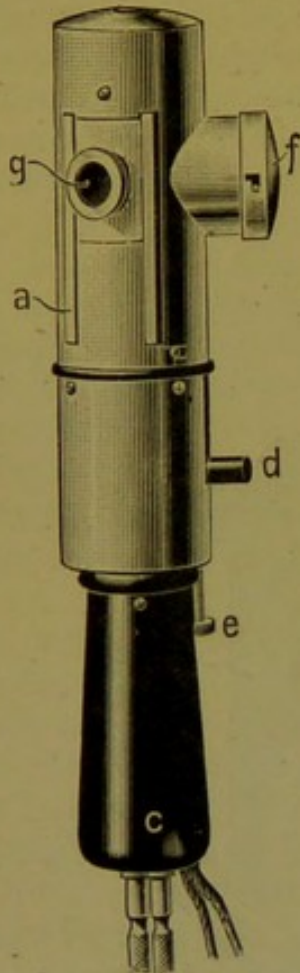


FIG. 6.

Sanitas dermo lamp.

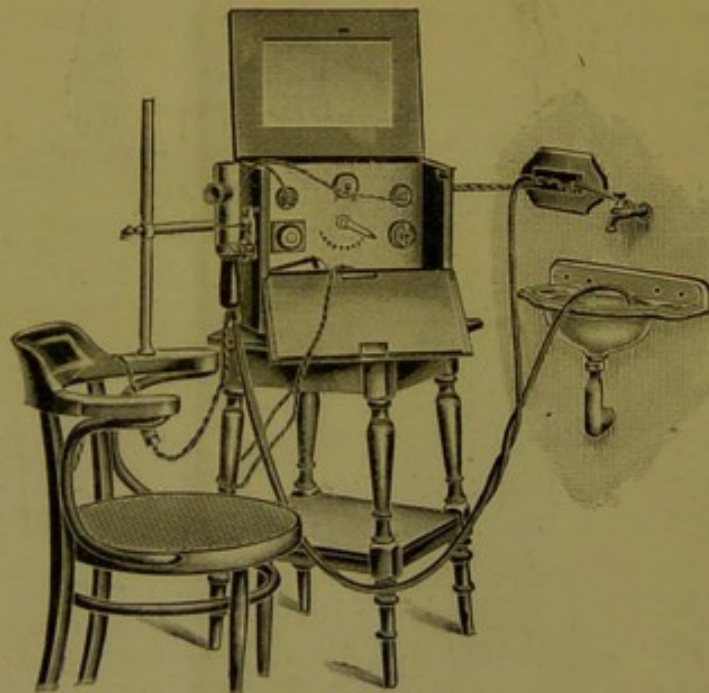


FIG. 7.

Sanitas regulator and stand for lamp.

X-RAY APPARATUS.

I need not describe to you the apparatus for the production of the *x*-rays, because we are all so familiar with it. Suffice it to say that it is being largely employed in the same class of cases with success. The principle underlying its action is not known; some hoped that it was bactericidal, but the experimental work of Forbes-Robertson, and Wolfenden, and many others renders this exceedingly doubtful. In passing, I may be allowed here to say that there can be no question about the power of penetration; yet it is right we should remember that when a person is sitting in front of an *x*-ray tube he may be subjected to many forces. We know from Lenard, Crookes,

Sylvanus Thompson, and others that different forces are produced at the same time as the x -rays, and there is one to which I should like to draw your special attention, and which will be afterwards referred to this evening, namely, the electric field outside the tube. I have said that there is no need of describing the method of producing the x -rays to you, but I may be permitted to show you the whole apparatus in action, and to call your special attention to the condition of the tube. Most workers when they are exciting the Crookes'

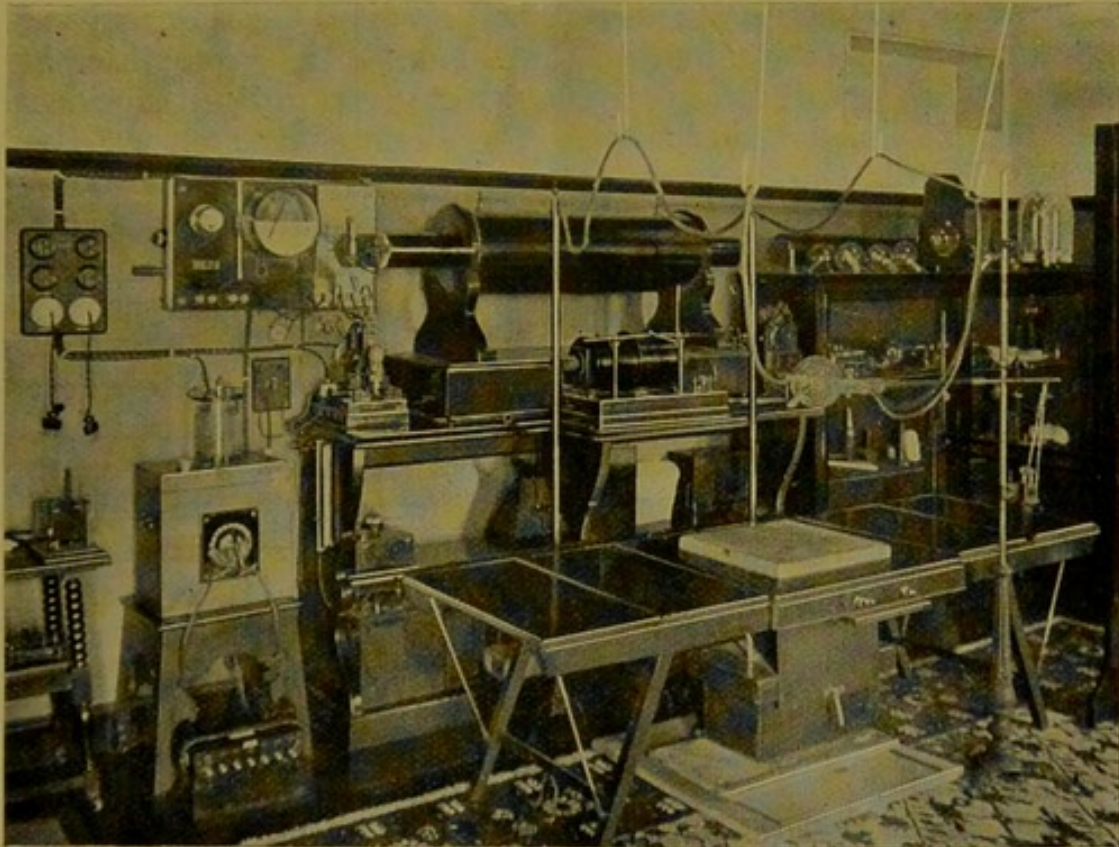


FIG. 8.

The writer's installation for x -ray therapeutic work.

tube for therapeutic purposes seek the very opposite conditions to that which we employ in photographing. In the latter case we are afraid of burns or reaction, but here we are less so, although the results have to be carefully looked for, and at the right moment arrested. Therefore we protect the healthy parts with a shield of metal, and expose only a limited part of the diseased tissues to the tube. For this reason a soft tube is usually chosen, and every part of the tube is not equally powerful. If you excite a Crookes' tube and look at the fluorescent screen you will often find one specially bright and

luminous spot, which may be, but is not always, opposite the anti-cathode. These points were well brought out by Miss Sharp, of London, and it is well to mark this part of the tube. This part of the tube may be brought near to the affected part, say to within 3 inches distance, while the healthy parts are protected by means of a metal shield. Tubes differ in their action and vary in their conditions, but many workers believe that when the tube shows a bluish-grey cone or streak behind the anti-cathode, as we often see in soft tubes, good results may be expected. The duration of treatment depends upon many circumstances. Each application may be from five to twenty minutes; the amount of reaction which is set up must be carefully noted, and rest given until it subsides.

The extent and duration of the disease, as well as the condition of the patient, influence the treatment. That patients subjected to the influence proceeding from the *x*-rays' tube have been benefited no one can now doubt, but the results so far, as in all other methods, are best seen in the superficial tissues. Those interested in this will find an excellent summary in Schieff's work on *Roentgen Therapeutics*, where it will be seen that cases of lupus, lupus erythematosus, eczema, psoriasis, simple and malignant ulcers have been more or less successfully dealt with by such workers as Schieff, Jutassy, Hahn, and others. Of epithelial pathological tissues, the best results have been obtained in simple forms, although rodent ulcer and like affections have yielded to the method. Improvement in malignant disease has been claimed in a number of cases, but of this subject I shall speak later. Sufficient be it, meantime, to say that, notwithstanding the great power of penetration of the *x*-rays, the results in the deeper structures have not yet been very promising. The particular arrangement for therapeutic work used by me is shown in Fig. 8 (p. 13).

HIGH-FREQUENCY METHOD.

These currents, the result of Tesla's great work, were first studied from the medical standpoint by D'Arsonval, and while we were quite familiar with them in the treatment of nervous diseases, it is only of late that they have been tried in the affections we have already referred to. The same ideas underlie the treatment, as have already been described, but at present the same doubts about bactericidal action exist. I have here a typical specimen of the apparatus (Fig. 8, p. 13), made by Mr. Dean, of London, and the apparatus may

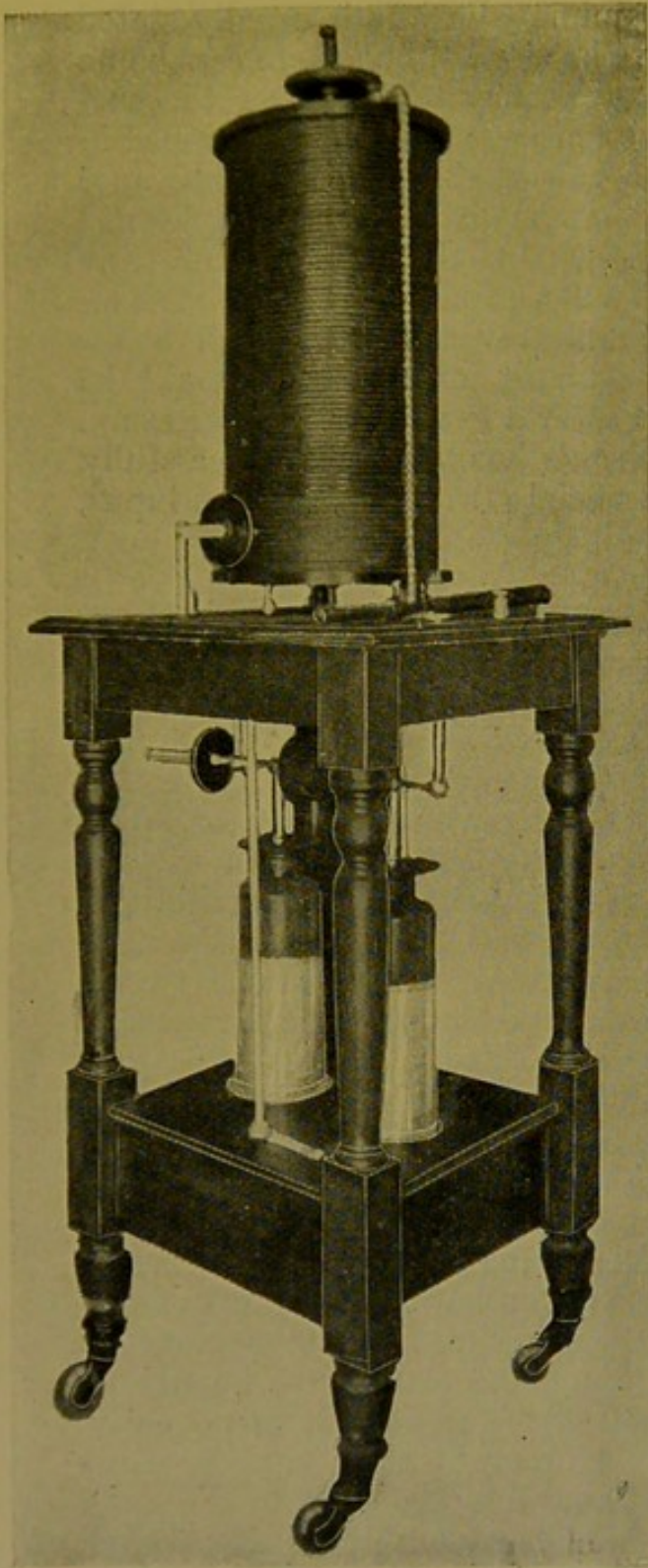


FIG. 9.

Dean's form of D'Arsonval's high-frequency apparatus.

be excited by means of the coil or alternating circuits. The powerful electric discharges from the secondary of the coil charge the condensers, which in this case are two Leyden jars, and these are discharged across the spark gap, which causes the current to be very frequently interrupted, and the waves are discharged into the auto-transformer, which in therapeutic apparatus corresponds to the primary and secondary of an ordinary Tesla.

For superficial affections it is customary to use an electrode of Dr. Oudin, which I show you. A breeze may be got from this resembling a static one from the Wimshurst's

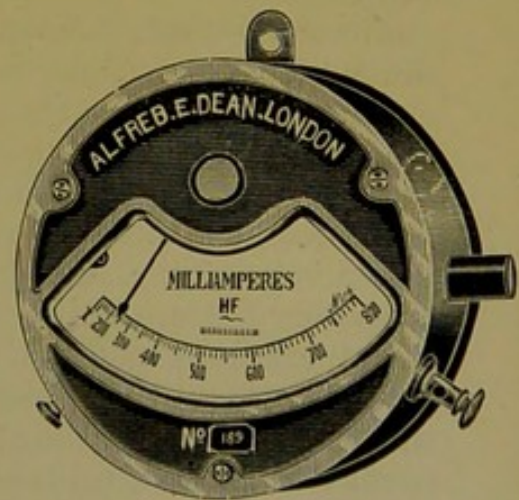


FIG. 10.

Dean's apparatus for measuring high-frequency currents.

machine. Lately, as you will see from the medical journals, beneficial results have been claimed from high-frequency

currents in cases of phthisis pulmonalis. It is usually stated that these currents penetrate the tissues, but there can be no doubt they have a very great tendency to flow over the surface; experimental proof is not easily obtained. If applied in anything like strength they are more painful, probably because there is greater quantity, and because if one were graphically describing the curve of the waves it would be found that they reached their greatest intensity more quickly than in the case of the static machine which, however, would reach a far higher point, although the summit of the one would be attained not so suddenly but after a gradual rise in pressure. The class of affections in which this has been most successfully employed is again in the superficial structures, such as lupus, rodent ulcer, tubercle, &c.

HIGH-POTENTIAL CURRENTS.

Everyone here is more or less acquainted with the very old form of static machine, and the best of these is the Wimshurst. I show you on the screen the apparatus (Fig. 11, p. 19) arranged by me for applying the currents to the patient. The reason for trying high-potential currents was to a certain extent due to the fact that they seemed to offer possibilities for attacking diseased structures within the cavities, although, as will immediately be seen, the idea was suggested to me from observations upon different conditions of the fluorescent tube.

The following statements from my presidential address to the Laryngological Association last year, which I now quote, explain the reasons for employing the current, and suggest the possibility of electro-therapeutic action from the field in the region of the excited Crookes' tube:—

“It was difficult to see how we could apply the *x*-rays from the Crookes tube, seeing there is no means of reflecting or refracting them. I did, however, make many experiments on the superficial parts with considerable success. It was equally difficult when we tried to apply any of the radiating salts within the cavities, and the same may be said of Finsen's apparatus, although that has been considerably improved and simplified in the hands of Dr. Sequeira. Arsonval's modification of Tesla's high frequency apparatus promises much, and I have by no means exhausted my experiments in this direction. One great difficulty in its present form is the liability to sparking, which occurs from the electrodes when placed in the cavities, and which cannot be borne by the

sensitive mucous membranes. Many modifications of Oudin's resonator were made, and I think it yet possible that something may be done to modify these results. In consequence of careful study, however, I was induced to fall back on other means, of which I shall speak later. The subject was approached, however, in the following way:—The first thing which attracted my attention to the possibilities of therapeutic action was a dermatitis of my own hand, which occurred early in 1896. For reasons which need not be mentioned here, I was studying the effects of the rays on the fluorescent screen, and had placed a Bunsen burner below the tube. I was trying to verify the statements of J. J. Thomson as to the fact that there were different kinds of x -rays. At the end of a few nights' experiments, my hand became affected to such an extent that it was impossible to proceed with the experiments. It is to be noted here that the conditions in the tube were just such as we now recognise to be the best possible for producing such a dermatitis. The tube was soft, blue in colour, with a bluish-white stream passing down the centre of it. The hand was placed within a few inches of the bulb. There was no protection to the skin, and the experiments were repeated very frequently. I may here say that one beneficial result of these experiments was that it enabled me to avoid reaction in working generally with the x -rays ever since. I next went to the other extreme, and worked for a long period with hard tubes; and, thanks to Lord Blythswood, who presented me with an excellent device of his own for exhausting Crookes' tubes, I was able to make many experiments during the next two years in every possible condition of vacuum. My first observations were recorded in the *Lancet* at the date mentioned five years ago. There I stated that, at the time the dermatitis occurred, there were at least three possible agencies at work:—Firstly, x -rays; secondly, heat waves; and, thirdly, electric discharges round the tube. I found, as the result of experiment, that the heat waves could practically be discarded, and I am not now going to enter into controversy as to whether the x -rays produce the dermatitis or not. For our work, however, we could not risk them in the region of the larynx. It seemed, therefore, that the electric discharges were worth while considering, and to these I directed special attention. The next fact which arrested my attention was one which occurred over two years ago, when I tried the effect of the electric discharges themselves upon a patient suffering from rodent ulcer in the nose and face. The patient had been operated upon three times before.

I placed him in front of the *x*-ray tube, but arranged the current from the coil in such a way that one could not detect any *x*-rays by means of the fluorescent screen; the *x*-rays were, in fact, practically absent. The patient was treated daily for three weeks, and, at the end of that time, the rodent ulcer had healed. He was afterwards watched for a period, and instructed to return should there be a recurrence, but the part remained in a satisfactory condition. While the patient was being treated, if one drew the finger along his skin, a brush discharge could be felt distinctly; and, in fact, the patient was being charged much the same as if he had been placed in front of the old and well-known static machine. Being in possession of a large Wimshurst, I began experimenting; but, unfortunately, owing to a breakdown in the apparatus, my work was suspended for some months. It was quite clear to me, however, that the subject was one well worth investigation, because it suggested to a certain extent—but only to a certain extent—the lines upon which Arsonval had been working so successfully. It differed in the following advantages:—A current of greater potential, if less frequency; less liability to sparking; the choice of the negative or positive poles, the former being less painful; and, lastly, absolute control of the strength of these currents. If you follow me so far, you will see that one can obtain these high-potential currents, first, from the electric field round the tube; secondly, from a modification of Tesla's original apparatus, which I have made and tried; and, lastly, from the static machine. Moreover, by the modification of introducing a spark-gap (well described by Monell in 1893), greater force could be added at will, and by introducing a piece of spiral copper wire into the circuit with condensers it could be made to approximate to Arsonval's modification of Tesla. These methods I shall demonstrate by means of lantern slides.

"Turning, then, to the method of applying this force, let me say that I have followed the old and well-established rules of workers with static machines. The patient is seated on a chair placed on a table insulated by glass legs. Contact is made with the table by means of a metal conductor from the negative pole, and a wire from the positive terminal is led to the electrode. For our work I prefer a polished metal ball, and this may be placed at a distance from the patient, or introduced into a cavity. Some of these points or electrodes I have brought with me.

"Let me for a moment show you on the screen a photograph (Fig. 11, p. 19) of the ordinary electric discharge, or, in other

words, the sparks between the terminals of the Wimshurst. This is familiar to you all. Next, let me show you one representing the bluish lines of force passing from the positive electrode, which are quite visible to the eye, or what takes place in air under the conditions I have above described. This bluish, brush-like discharge suggests a force of great potential dashing towards the patient. It is accompanied by a hissing sound, and if there be no sparking it is painless, although the patient feels stimulated as if a cool breeze were playing upon the part.

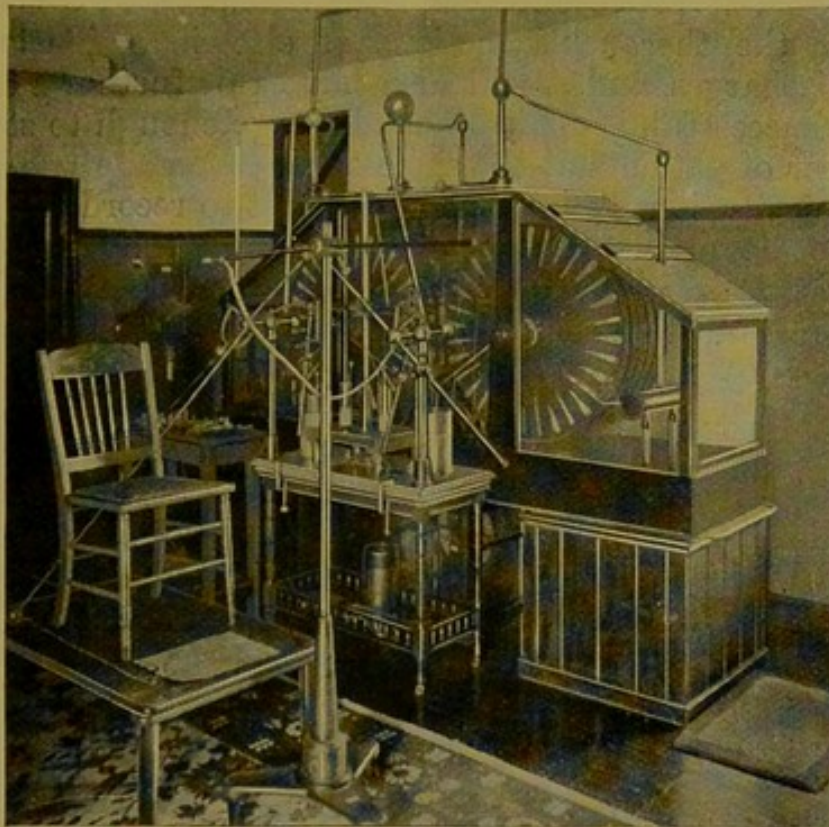


FIG. 11.

Installation for high-potential currents, showing large Wimshurst machine.

The adjustments of the electrode must be made carefully to prevent sparking, but the speed of the machine easily modifies the force. The sittings last from ten to twenty minutes, and are given daily. The mouth or nose can be kept open by glass tubes.

"We might pause for a moment to consider what affects the patient. The electric currents themselves are invisible, but still the patient is receiving a tremendous number of stimuli from this bluish stream, the result of contact with

the air. We have it on the authority of Tesla that, with his apparatus at least, when a person is so electrified, he is bombarded with millions of particles of air, which, as they give up their charges of electricity, are setting up innumerable oscillations in the patient's tissues. In the hope of distinguishing between these two agents, I am showing you a parabolic reflector placed behind a series of brass balls, which can be stimulated to give off electric vibrations much the same way as in a wireless telegraphic transmitter. This mirror will send out no brush discharge, but electric oscillations; and, should it prove effectual, it will help us to differentiate between the therapeutic actions of electric oscillations and other discharges, and it will also have this further advantage that, if successful, it could be made large enough to stimulate a number of patients at the same time.

"Clinically, it may be of some interest to record the general facts to be observed during treatment. The patient experiences nothing beyond an exhilarating general effect; no pain is felt unless a spark should pass to the patient, and even then it is not serious. The dust of the room rapidly collects on the surface of the patient's body, being attracted by the electric currents. Healing, as a rule, progresses steadily; granulations form in the parts until they have reached the proper level, after which epithelial structures cover in the parts. It is further interesting to note that discharges rapidly dry, and that the effect is not limited to the part in front of the electrode, because in some instances I have found that, while one side of the face which alone had been stimulated was healing, other diseased structures on the other side at a distance took on the same action. There is no scar left. I have never seen the slightest attempt at reaction or dermatitis, which often accompanies *x*-rays, Finsen's, and in one case with me at least, high-frequency currents. I have had the best results where no surgical operation had previously been performed; in fact, in any case where a scar has resulted, or loss of tissue, it has been where other measures had at first been tried. No medicine in the test cases was administered, and no other kind of treatment was applied to the patient.

"I have thought of trying these high-potential currents in the deeper tissues; in other words, it is a fair question to ask—Would not the tissues of the larynx or the lungs be affected indirectly? So far, my best results have been got by applying the current in the way I have indicated, but I am at present engaged in a series of experiments to test the

internal as well as the external benefits. As yet, I have not been able to come to a definite conclusion in the matter."

RESULTS.

Passing to the consideration of the clinical results, let me first say that it is a matter of great difficulty to lay down any rule for the choice of a particular method. Each seems to possess advantages and disadvantages in different affections, and even in individuals, but one is guided somewhat by the seat of the affection, the acute or chronic nature of it, the condition of the patient, whether the disease is superficial, deep, or in a cavity, how the affection responds to the treatment, the prospective duration and number of the sittings, and many other things which can only be gained by experience.

In the second place, I should like to say of the different methods that it would be presumption on my part, as far as Finsen's methods are concerned, to offer an opinion, as they have now been sufficiently practised by Finsen and others to enable anyone to judge of the results. Further, the fact that clinics are being established in many of the great centres all over the European and American continents is sufficient testimony to the general belief in their efficacy, notwithstanding all the disadvantages. I have had ample opportunity here and elsewhere of judging of the results, and, like others, have seen, and can record, successful results.

With a view to showing the difficulties in selecting a method, I may say that a patient, suffering for thirty years from lupus of the nose and face, was sent by me to Dr. Sequeira, in London, because of a fear of its having been invaded by malignant disease, and he chose *x*-rays, not Finsen, with gratifying results.

Speaking of *x*-rays, it may at once be said that we have at present over thirty cases under observation at the Glasgow Royal Infirmary, where Finsen's method is also being practised, for the most part in lupus, scrofuloderma, rodent ulcer, &c., with most favourable results, and in two-thirds of the cases patients have ceased to attend because of the successful results. They will, of course, be kept as far as possible under observation, lest there should be recurrence, for many were of many years' standing, and had been previously subjected to other methods of treatment. If I were to offer an opinion, I should say that in properly selected cases the results seem to be more quickly obtained than with Finsen's

method, but one must not venture to dogmatise on this point. Of high-frequency currents I have not yet had so much experience, either in hospital or private practice, for the reason that most of the cases seem better suited for other methods; but in the hands of others, and likewise in a few instances in my own, the results have been quite satisfactory.

The effects of high-potential currents have, in a considerable number of instances, proved very satisfactory in cases of lupus, rodent ulcer, and in one or two cases of tubercle. Experimental work is being further pursued, and I have tried the method in malignant disease.

A considerable number of photographs of patients under treatment will now be rapidly thrown upon the screen showing the results in cases still under treatment, and in others which may be considered well and beyond the necessity of further application. Some of these are acute and recent, others of old standing; one of lupus of twenty years' duration, and satisfactorily improving, as you will see from a series of photographs of her case.

Perhaps I might, in a word or two, pay special attention to typical cases. Here is one of a young lady, 30 years of age, in whom the mouth, nose, and face were successively involved from below upwards. In this instance every known method had previously been tried, and another surgeon had, under chloroform, gouged, curetted, and cauterised the external parts with no sparing hand, but with almost immediate recurrence. In four months' treatment everything had healed up, as you see from the photographs. No scar remains, except where the parts had been destroyed by the previous procedure.

In another case a tumour of the septum of the nose, in a young man of 22, where a sarcomatous element was feared, but which was proved, on microscopic observation by the pathologist, to be tubercular, and which caused complete stenosis of the left nostril, has healed up. As showing the effects in a somewhat more acute affection, lupus erythematosus of four months' duration, and covering the whole scalp, face, and neck, decided improvement rapidly took place. This man, aged 33, had made very little progress under the usual methods of treatment carefully and skilfully applied over a period of four months. In this case it is right to state that no change was made in the treatment he was having from his medical adviser, Dr. Mortin, because the application of the static machine was considered experimental. In other words, this was added to his ordinary treatment. In six days the cheeks began to blanch, in seventeen he was able to pass a medical

examination to go abroad, in six weeks the treatment was finished.

In the next photograph, one of rodent ulcer of the face, you will see the improvement which has taken place in three weeks; the patient is just finishing treatment, after three months, but I am afraid of recurrence. In other cases I have been more successful, as I have one in which the treatment was completed nearly three years ago, and which still remains well.

Coming now to the grave question of malignant disease, I approach the subject with every sense of responsibility. In such times as these, when we read, not only in the lay papers, of "cures of cancer," and when suspicious headings of papers appear even in some medical journals, no one can be too guarded in making statements. If we mean by cancer the superficial forms of epithelial growths, such as rodent ulcer, or even diseases of the breast, such as Paget's nipple, then good results have undoubtedly been recorded. These are not what people generally understand by the word cancer, nor are they what you and I understand as the fatal types proceeding from primary seat of the lesion, to be followed by glandular and other secondary changes, with all the attendant results of blood poisoning. Of such advanced cases, deeply seated and in the cavities of organs, I do not dare to speak, and I know of no great results in such by any method of treatment. There is something to be said in this way, that patients who are considered within the range of operation will not submit themselves to new methods of treatment for obvious reasons, and hence the cases which are tried at present are, as a rule, beyond hope from any method; consequently tests are generally disadvantageous and unsatisfactory. Can we make any impression in such?

Speaking with all these reservations, might I be allowed to select from some, and point out what has taken place in two cases? In one, a man, aged 60, sent to me from London, suffering from epithelioma of the lower jaw and side of the tongue, and diagnosed by a number of prominent physicians and surgeons as undoubtedly genuine epithelioma, has been under treatment for three months. In extent, as I saw him at first, the ulcer reached from the second lower tooth back to the angle, and up the inside of the ramus to the upper maxilla. He had *x*-rays applied before coming to me, and at first I continued these, but, dreading reaction, I applied the high-potential currents. There was no glandular enlargement. Gradually the pain darting to his ear subsided, the jaw became freely movable, and he could chew and swallow with comfort.

During treatment the diseased area became very much circumscribed. He has gone south at present, and last week, when I left him with his medical attendant in London, the latter confirmed the improvement locally, while the general appearance was much better; his weight was being maintained for four months, and had even slightly increased. This result is all the more satisfactory, as one of the main reasons for the surgeons considering the case to be inoperable was the fact that he suffered from weak heart, and aneurysm of the aorta as well. I make no claim, but simply state the facts, remembering that from its situation the affected part could easily be attacked.

In another case of serious malignant disease, sent to me by Dr. Dundas Grant, and seen also by Mr. Watson Cheyne, changes worth noticing have been recorded. The case, one of a man, 58 years of age, is one of extensive disease involving the whole larynx, the left side of the pharynx, and the upper part of the œsophagus. The swelling could at first be felt externally as a mass about an inch in length, and this has practically disappeared after three months' treatment. The positive electrode was introduced, as far back in the mouth and as near the larynx as possible, through a glass tube which acted as a mouth gag. The mass, as seen with the laryngeal mirror, filled the hyoid fossa, and overhung the larynx on the left side. Breathing was somewhat obstructed, and there was difficulty in swallowing. From week to week it was observed that the tumour was decidedly breaking down, and now the larynx is quite clear. In two months' time he was again swallowing solid food. Instead of a large, exuberant, irregularly convex mass, it is now scooped out concave as seen from above, cleaner, and granulating. No doubt some of you will be inclined to say, and, perhaps, with truth, that an escharotic and many other things would have done the same thing. No other treatment has been given, but, so far, neither tracheotomy nor gastrostomy, which were feared, have been required, and the treatment is being continued.

This case is an advanced one, and there can only be one end to it, because the tumour is extending downwards in the neck while improving higher up, and the cachexia is distinct.

Two or three important things may be noticed in a general way about treatment. Occasionally one may see a red spot or two, afterwards healing up, but appearing at a distance from the wound, sometimes so far removed that the surgeon would perhaps not think it necessary to operate. These, I

have little doubt, are distant foci of infection. Again, sometimes when one side only of the face, say, is being treated, the other side begins to heal, showing that the effect is taking place at a considerable distance from the point of application. I have seen no bad results nor inconvenience follow with the static machine, even where the eyeball has been affected. As the tissues heal up, hollows fill up with granulation before the epidermal covering takes place, and consequently there is little tendency to the formation of scars. Recurrence I have witnessed in some cases, but that can be said of every method of treatment.





