

**The new electrical pavilion of the Glasgow Royal Infirmary / by John Macintyre.**

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# THE NEW ELECTRICAL PAVILION

OF THE

## GLASGOW ROYAL INFIRMARY.

BY

JOHN MACINTYRE, M.B., C.M., F.R.S.E.,

CONSULTING MEDICAL ELECTRICIAN TO THE HOSPITAL.

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IN the year 1887 an electrical department was instituted by the managers of the Royal Infirmary, and probably for the first time in hospital practice arrangements were made for applying currents in the central room or wards by means of wires carried through the building.

Eight years ago, owing to the kindness and generosity of one or two friends interested in the hospital, a considerable addition was made to the apparatus, consisting of gas engine, secondary cells, medical and surgical switchboards, and electrical apparatus generally for use in the treatment of disease.

Five years ago, within three months of Roentgen's discovery, an *x*-ray laboratory was fitted up, thoroughly equipped with everything that was then thought necessary for the work.

During these years the apparatus has been very largely used by the staff, both visiting and dispensary, and the outdoor department has increased year by year, so that the accommodation was found quite inadequate for the requirements. This will be better understood from the fact that in



the *x*-ray department alone over three thousand *x*-ray photographs have been taken in four years, in addition to the very frequent use of the fluorescent screen. Last year over fourteen hundred *x*-ray photographs were taken for the staff.

Towards the end of last year the activity everywhere displayed in therapeutic work made it apparent that new arrangements for *x*-ray work, Finsen's light treatment, ultra-violet rays, static electricity, and other forms of radio-active rays, would be required. It was further evident that we had not sufficient accommodation in the hospital for the fitting up

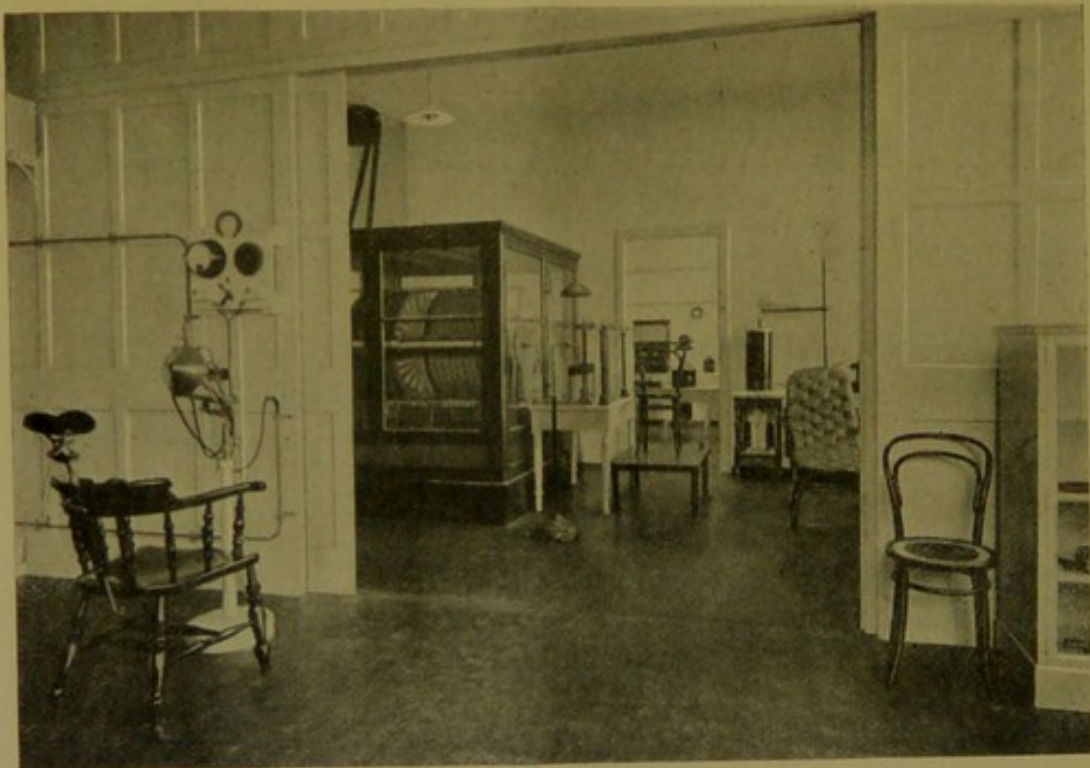


FIG. 1

Interior of electrical pavilion.

of such an extensive installation, and so the managers agreed to erect a new electrical pavilion, which has now been completed. To a few generous friends we are indebted for defraying the very considerable expense which has been incurred in building and equipment.

The new building itself is situated alongside the corridor which joins the east and south blocks of the present building. It lies north and south, and consists of four large rooms, the first being devoted to the transformers and Finsen's treatment; the second contains the static machine, with its motor and



high-frequency apparatus; the third is to be used for the apparatus necessary for constant and interrupting currents for medical and surgical purposes, such as cauteries, drills, instruments for illuminating cavities of the body, magnets, with all the necessary accessories; in the fourth, all the *x*-ray apparatus for photographic, screen, and therapeutic work is arranged with the necessary dark room accommodation. Where it is necessary, arrangements have also been made for completely excluding or modifying the light.

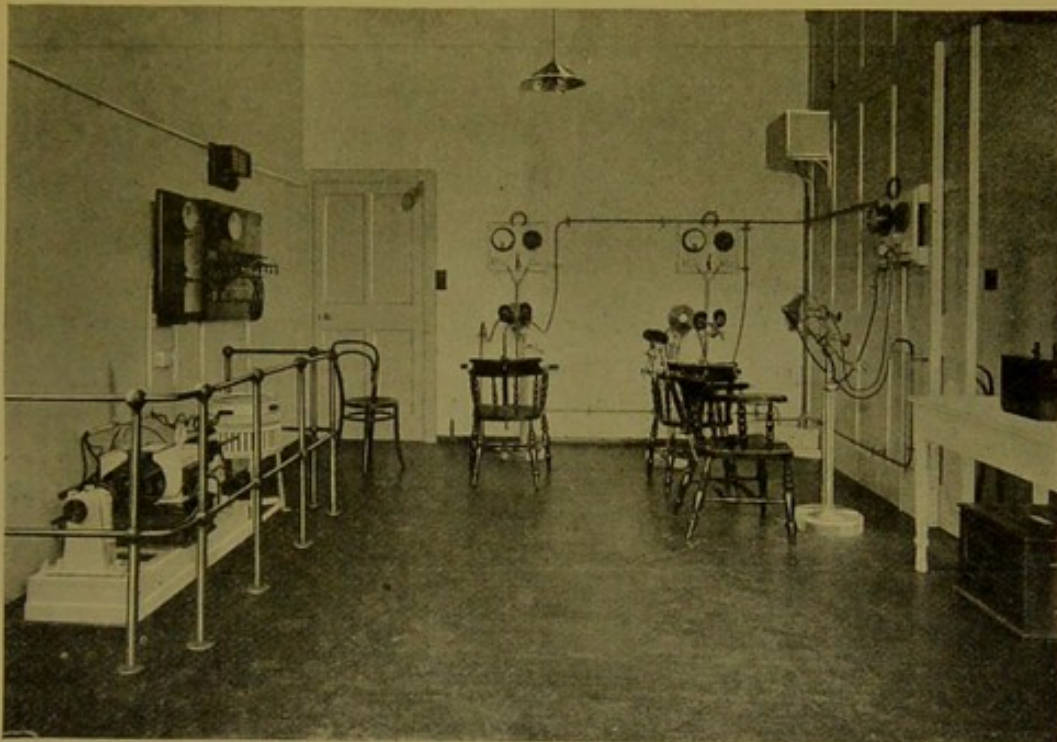


FIG. 2.

Room for transformers, and light treatment.

#### INSTALLATION.

This may be divided into three distinct installations. Firstly, the rooms themselves are lighted by the 250 volt circuit from the Corporation; secondly, a transformer has been built by Messrs. Mavor & Coulson to give 55 volts and 50 amperes from the Corporation supply; thirdly, there is the old gas engine, with dynamo and secondary cells, giving 56 volts and 30 amperes. The last two are intended for all medical and surgical purposes, whether for diagnostic or therapeutic use, and by means of turn-over switches either can be used, so



that, in the event of a breakdown with the Corporation supply through the transformer, the gas engine and cells can be utilised, or *vice versa*.

While patients may be attended to in the electrical department itself, the hospital theatres and wards have been wired, so that the instruments can be used at the bedside or at the operating table. The necessary fuses for the complex series of instruments have been provided in sections, so that in the event of one fuse giving way, the other parts of the house are not cut out. Different plugs have been arranged in the wall,

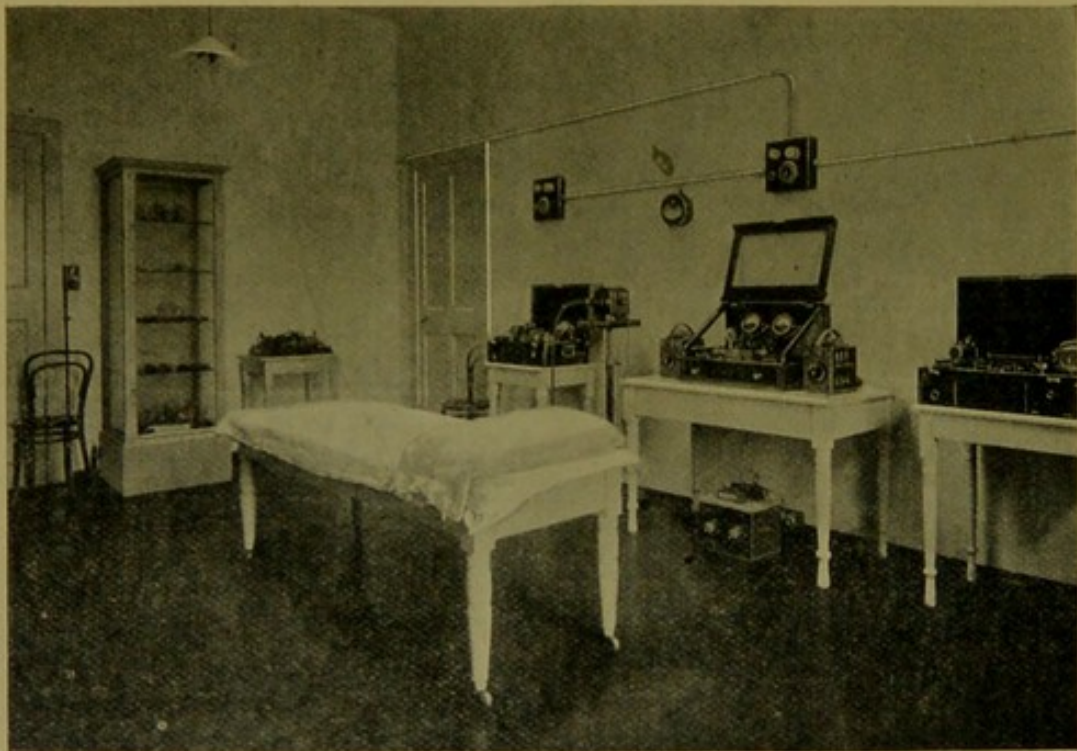


FIG. 3.

Room for general medical and surgical appliances.

of the most recent pattern, to give good contact, and are so arranged that an instrument for the 250 volt circuit cannot be switched on to the 50.

A main switchboard has been fitted up on the Corporation side of the transformer which controls the whole supply to the department. This is provided with the necessary starting switches. On the other side of the transformer is a large distributing board with six switches going to different rooms, so as to send the energy where it is required.

The transformer was specially built for medical work, and



the voltage was selected because the first apparatus in the house was worked from a similar supply, hence the old, as well as the new, instruments can be used. It is, moreover, safe to work with such a voltage.

#### APPARATUS.

For medical and surgical purposes, where the constant or interrupted current is required when testing muscles and nerves and also for therapeutic purposes, special apparatus for utilising the currents from the transformers has been obtained. In the electrical pavilion a stationary apparatus has been fitted up for giving galvanic and faradic currents. It contains switches, fuses, volt regulator, current reverser, volt meter, and milliamperemeter, with a large number of electrodes and other accessories. For convenience in the wards where the physicians and surgeons wish to test the condition of the nerves and muscles themselves, similar but portable cases have been provided, and these can be applied at the bedside by means of plugs and flexible wires.

Specially devised boards have been constructed for using the cautery or electric lamps. These are portable, and can be employed in the theatres and other places, as well as in the electric pavilion. Suitable handles for platinum points and snares have also been provided. These boards may also be employed for illuminating the lamps of different pieces of apparatus used in examining the cavities of the body. These include the various forms of instruments for direct examination of the eye, ear, nose, accessory cavities (including the antrum), respiratory passages, œsophagus, urethra, bladder, and ureters.

#### SURGICAL DRILLS AND MOTORS.

Two motors will be found of different strengths, and are meant to be used for trephines, drills, circular and other saws. These are controlled by means of rheostats, and arrangements have been made for immediately stopping the current or reversing it, as may be required during the operation.

#### ELECTRO-MAGNET.

A very powerful electro-magnet has been designed to be employed in the extraction of metallic foreign bodies. Different points may be attached to this instrument, suitable for various parts of the body and different cavities. It is extremely



powerful, is capable of suspending several hundredweights, and is built upon similar lines to Hab's huge electro-magnet.

This instrument consists of a special metal stand, 6 feet high, with a cross bar at the top. This can be turned round the central portion easily by means of ball bearings, and at each end is a wheel, in the groove of which a strong iron rope passes. To one end of this the magnet is suspended, and to the other is attached a counterpoise. Further, the magnet is held in its position by a horse-shoe metal bar, permitting of movement in any direction.

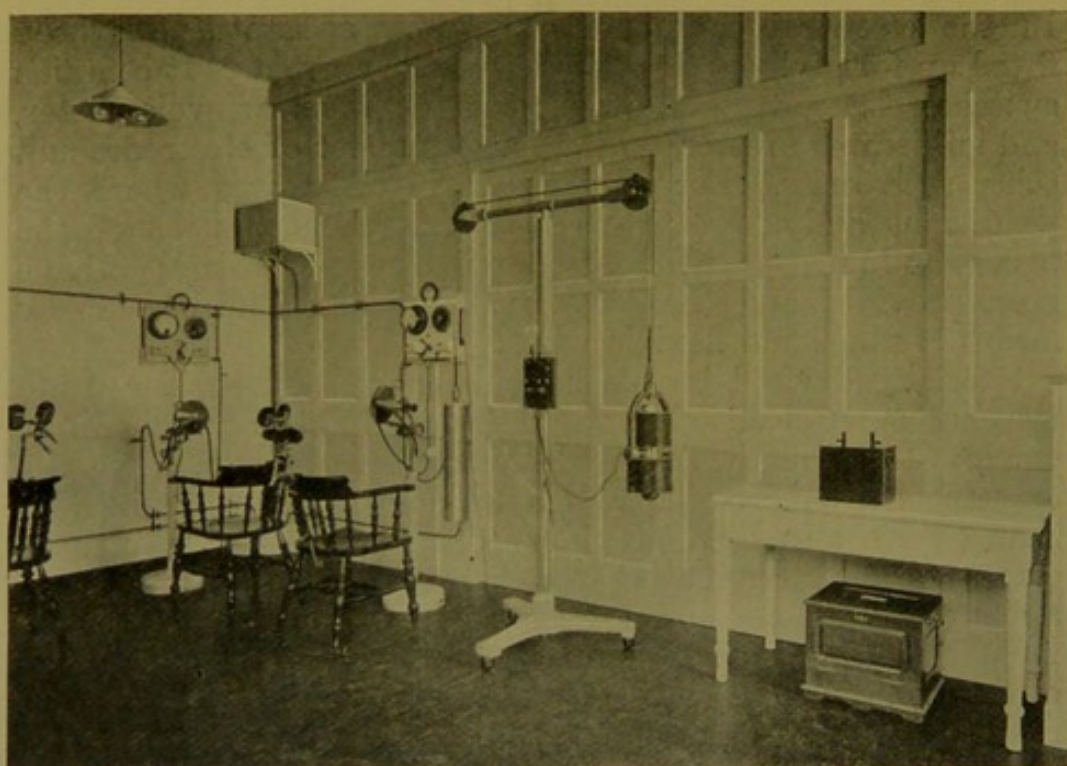


FIG. 4.  
Electro-magnet.

By this means, at the bedside the magnet can be applied to and passed over any part of the body, as the free movement and exact counterbalance of weights enables one to pass it over the surface of the trachea with perfect ease. The magnet itself consists of a large bar electro-magnet, with charcoal iron core 20 inches long and 4 inches in diameter. It has six thousand turns of twenty S. W. G. copper wire on metal bobbins carefully insulated with mica. It is excited by connecting it to the 250 volt main. Across the turns of the magnet a 32 candle power lamp is placed, so as to save risk to insulation from self-induction when breaking the current.

## BULLET FINDERS.

Electric probes for the detection of bullets have been supplied.

## STATIC ELECTRICITY.

For medical purposes, and also for the treatment of lupus and other chronic affections, a very large and powerful static machine has been built specially for the hospital by Lord Blythswood in his laboratory at Renfrew.

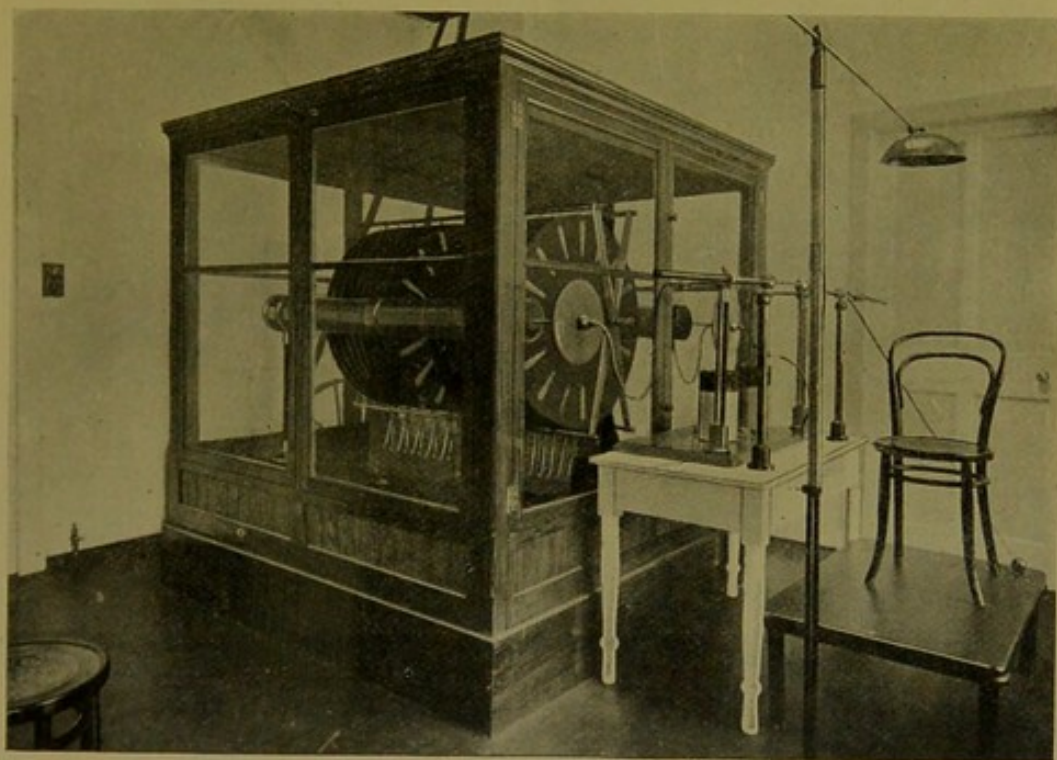


FIG 5.

Wimshurst machine.

The machine is of the Wimshurst type, and has 40 plates of 36 inches diameter. It is driven by a 1 horse power electro-motor, and has a special fan motor with ventilating shafts and apparatus for driving out any gases which form within the case when the machine is in action. Suitable insulating stools, and tables with discharge rods and spark-gap apparatus, form part of the installation, and there is also a number of electrodes for giving the current to different parts of the body.



## HIGH-FREQUENCY CURRENTS.

The pattern employed of D'Arsonval's apparatus is that constructed by Dean, of London. A specially designed switch-board has been fitted up, so that different interrupters—such as the mercury or Mackenzie Davidson—can be employed as desired. On the switchboard, all the arrangements for measuring high-frequency currents, reversers, rheostats for the motors, are provided. A large number of electrodes,

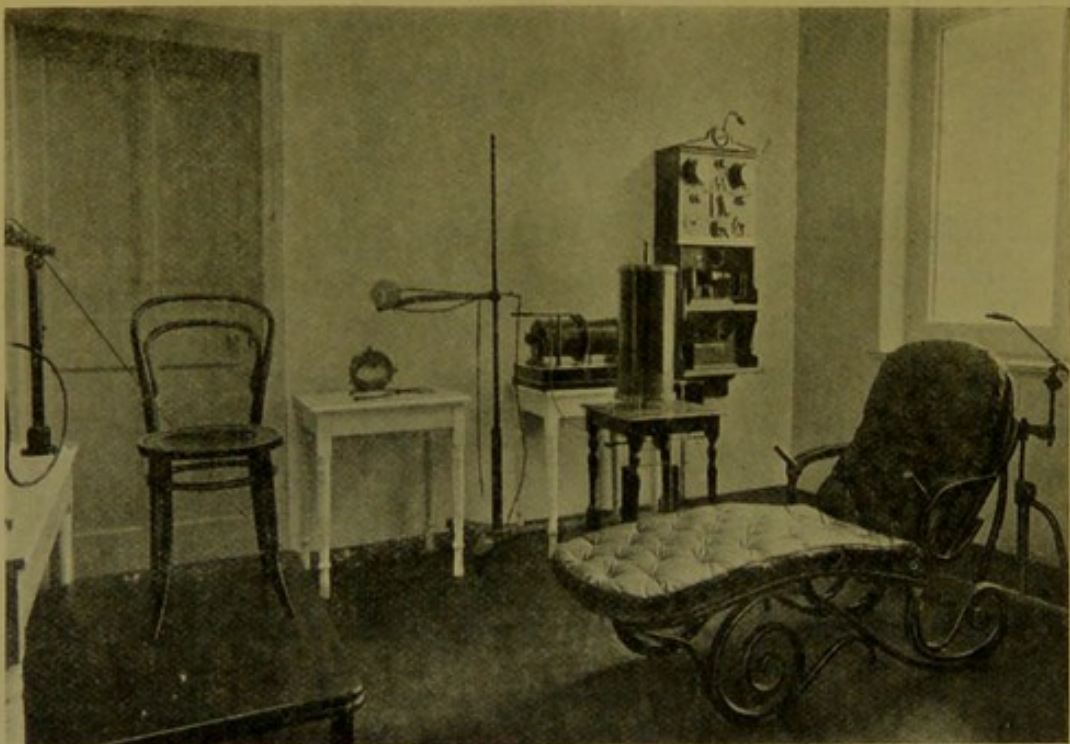


FIG 6.  
High-frequency apparatus.

including Oudin's resonator, brushes, vacuum tubes, &c., for use in nervous and muscular affections, as well as in the treatment of lupus and rodent ulcer, are included in the equipment. The current is applied to the patients while resting on a specially devised couch.

## X-RAYS.

Three large coils, capable of giving 14 to 12 inches spark respectively, have been added to the installation. All the

well-known forms of interrupters have been fitted up, including the mercury, Mackenzie Davidson, and Wehnelt. A

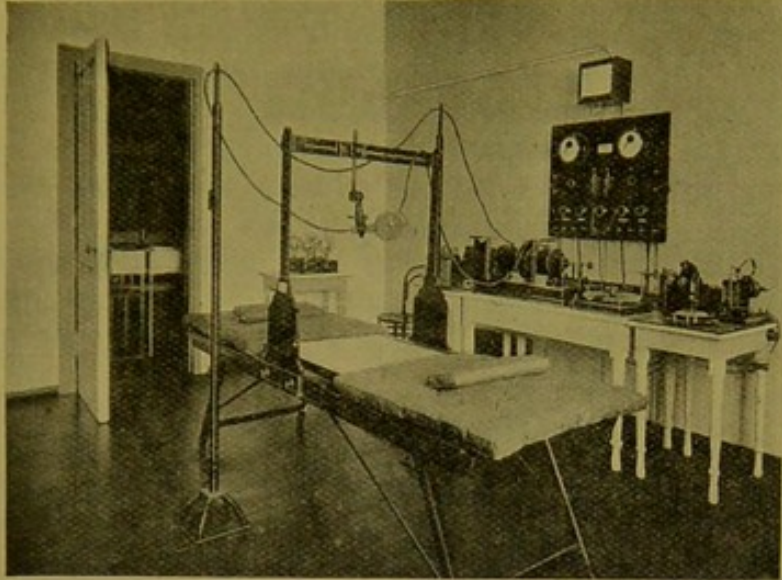


FIG. 7.

X-RAY DEPARTMENT.

Showing arrangement for taking photographs from above, special switchboard, and dark rooms.

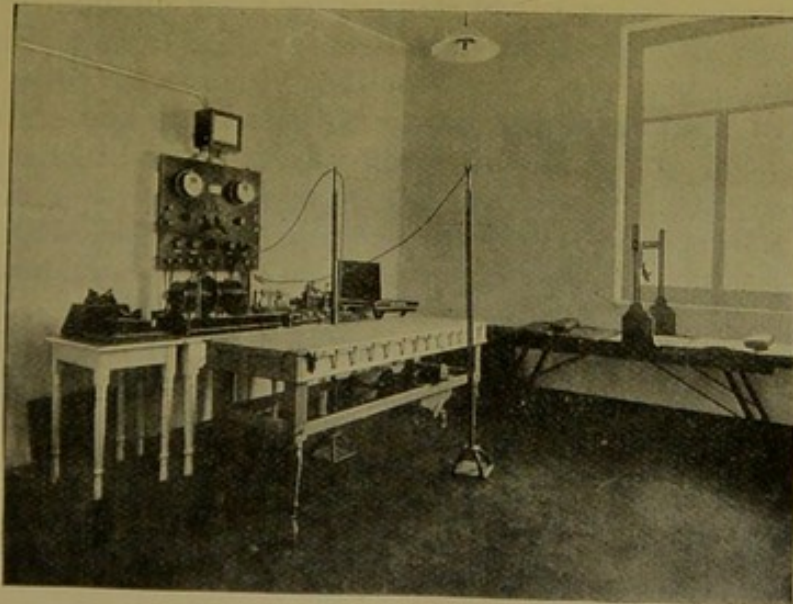


FIG. 8

X-RAY DEPARTMENT.

Showing arrangement for taking photographs from below, and also for illumination of screen above patient when operating.



specially designed switchboard has been attached to the wall, with rheostats for motors, volt and ampere meters. There is also a special set of switches, so that any one of the interrupters with suitable condensers can instantly be employed as required for different purposes. Stands and vacuum tubes (Queen's, Dean's and Cox's record designs) have been provided, as well as fluorescent screens, and all the most recent accessories for therapeutic as well as photographic purposes. Two couches have been provided for taking photographs from above or from below. There is also a localiser of the most recent design for detecting the situation of foreign bodies. All the apparatus necessary for the taking and demonstration of stereoscopic photographs has been added to the department.

#### LIGHT TREATMENT.

Finsen's lamps, modified by Lortet and Gounod for the treatment of lupus and other affections, are the forms included in the new apparatus. Three sets of these, with suitable arc lights, quartz lenses, and water coolers, have been provided, each lamp being controlled by a separate switchboard with rheostat and ampere meters. Couches, chairs with head rests, and all the necessary apparatus have been fitted up with the other accessories.

Of late, experiments have been made by Professor Goerl, Walsham, and others. It is claimed for their method of treatment that they produce more rapid effects than Finsen's apparatus, being very rich in the violet and ultra rays. Walsham's apparatus for use with the ordinary induction coil has been provided with rock crystal, and the necessary means for cutting ice blocks for compressing the tissues.

During the past year a very portable and useful instrument for the production of violet and ultra-violet rays has been brought out under the name of the "dermo" lamp. In this particular apparatus iron is used instead of the ordinary carbon points for the arc light. Dr. Bang, of Copenhagen, was amongst the first to show the great bactericidal action of this lamp as compared with others. A complete set of this apparatus has also been fitted up.

That the new building and apparatus were required is shown by the fact that already the staff has had to be increased, and, even now, it takes the whole accommodation to get through the large number of cases attending for all kinds of medical and surgical work.