then sandbags are applied and the head is kept in position by a folded towel carried across the forehead and fixed beneath the sandbags.

The internal administration of sulphur has been advised ; with what justification based upon experience I know not. I have used chrom-argentum in one case, which ended in recovery ; it has been claimed that very severe cases have been cured by the sole administration of it

intravenously. In China (Hankow), I am told by Dr. E. F. Wills, certain leaves are credited with curative properties, and samples have reached me ; but as only two authenticated cases have, to my knowledge, been so treated—with recovery, it is true—I have not felt justified in applying the leaves to the exclusion of every other remedy—the only method by which their claim to utility can be vindicated.

AN IMPROVED PATTERN OF THE REVOLVING SPINAL BED

BY

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Three years ago I published an account of a special reversible spinal bed (*Journal*, January 11th, 1930). Since that time the value and utility of this appliance has been abundantly demonstrated by the experience of others as well as myself. But a difficulty in its use has also been experienced, and this has been overcome by the design of a new model.

The principle of the bed is to enclose the patient in a cage, which, supported on a bed-frame, could be revolved. When the patient is lying on his back the front of the cage can be removed, and when he has been turned over the back can be exposed by removing the back part of the cage. In the original model the cage was flat behind and in front—that is, it was shaped like a parallelogram in transverse section. The difficulties met with in the use of this pattern were twofold. First, it was necessary to pack the patient very tightly in the cage by a number of pillows, in order to prevent him from slipping sideways in the act of turning him over. Secondly, it was difficult to adapt the same cage for thin or stout patients, and this, too, could only be done by packing with pillows in the case of a small patient.

The new model illustrated here overcomes both these difficulties. The cage is oval or elliptical in transverse section. The patient lies in a trough, formed by a shaped mattress, in two halves, lying on the curved framework of the cage. This has another advantage, in addition to the firmer fixation, when being turned. It is that the patient's body is kept more

rigid when lying on his back in this trough than it was when he lay on a flat mattress: he cannot roll from side to side, and this prevention of rolling is certainly desirable in cases of spinal affections, whether tuberculous or traumatic. The front of the cage is also curved in transverse section, and this is more easily explained by reference to the illustration than by description. In the upper figure the cage is open, the front portion being thrown back and lying against the sides of the bed. In the lower figure the cage is shut, as it would be when the patient is about to be turned over. In this position the patient lies held quite snugly all round his

body and legs by the mattresses, and there is no need for any packing pillows. When he is being turned he is held just as securely when half-way round, on his side, as he is when lying on his face, or on his back, so that the turning can be done as slowly as desired. The oval shape of the frame makes it easy to adapt it to patients of different girth. The curved metal bars of the frame overlap for rather more than six inches, and can be locked in any one of six different positions, so that as this varying amount of overlap occurs behind as well as in front, the circumference of the oval frame can be varied by 12 inches. The arrangement of the bedpan may be made in one of two ways. There is a gap between the back mattresses opposite to the buttocks. This can be occupied by a round cushion or the bedpan, or, if the patient is incontinent, or if a nurse is not in constant attendance, the bedpan is placed outside the cage supported on a special metal arm, which can be swung into place or outwards as may be desired.

I have found this type of bed-frame of the utmost service for all kinds of serious spinal disease, and especially for those necessitating bone grafting or laminectomy. Then, too, fractures of the spine, with or without paraplegia, almost demand some such appliance. The back, the buttocks, and the skin require daily attention to prevent bed-sores, and it is almost impossible to move such a patient without great risk and great pain, unless

some mechanical device is provided. With this bed one nurse can manage the case single-handed without effort or strain. With the ordinary hospital bed a patient with a fractured spine can only be turned by the united efforts of two, three, or four nurses, and each turning movement is painful and risky. In addition to cases of spinal disease or injury, those of fractured pelvis are most conveniently treated on this bed. The pelvis and buttocks are firmly held when the patient is turned over.

The bed is made by Messrs. Nesbit Evans of Wednesbury, and can be obtained from Messrs. Down Bros., 21, St. Thomas Street, S.E.1.

THE PERMEABILITY OF THE BODY TO INFRA-RED RAYS

PRELIMINARY COMMUNICATION

BY

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It is impossible to work with the Finsen light on lupus, or with the Kromayer lamp on tuberculous or other glands, without being convinced that clinically these apparatuses behave quite differently when compared with any of the ordinary methods of giving ultra-violet light to the body. The Kromayer lamp is essentially a mercury vapour lamp, and even when care is taken that the dose, as judged by skin erythema, is the same, the mechanical and physical differences between these two lamps are significant. In the Kromayer the rays emitted from the mercury arc travel through a very small air space, then through a circulating body of cold water; they then pass through quartz direct to the part to be treated, which is rendered as far as possible avascular by pressure. In the ordinary mercury vapour lamp the rays emitted pass through a relatively wide air gap before reaching the skin. The clinical differences observed must therefore be due either to the absorption of some ray in the air in the one case, to the removal of some other ray or rays by the water in the other, or to the greater permeability to some useful ray possessed by quartz and water in comparison with air.

Some three years ago Professor T. R. Merton kindly gave me the benefit of his technical advice on these observations, and pointed out that the water film cuts off all rays above about 11,000 Angström units, but that in the mercury vapour arc there is a strong band of infra-red rays between 7,000 and 9,000 units, and that it might be this band that accounted for the clinical differences, particularly in tissues below the skin. He supplied a filter that cut off the ultra-violet part of the beam, and experiments with this showed that his surmise was correct, and that reduction in glandular swellings could be effected without the production of the skin erythema associated with ultra-violet light irradiation. The drawback to the routine use of this filter lay in the fact that, while eliminating the ultra-violet, it also reduced the energy of the infra-red beam, and necessitated a greatly prolonged dose to produce adequate clinical response.

The production by the *Times* of their wonderful series of infra-red photographs reawakened my interest as to the possibility of using a similar process for taking photographs through the body, in the hope that, if successful, the rays would be found to penetrate tissues in a different ratio to x rays, and to show up structures not well delineated by the latter. They would thus form a complementary method for giving information about the internal condition of the body, particularly the soft tissues in and around joints.

PRELIMINARY INVESTIGATIONS

That rays towards the red end of the spectrum pass more readily through skin tissues is, of course, known to everyone who has held his hand to the bright sun and seen the pink appearance of the fingers. Carl Sonne¹ and Cartwright² have discussed the penetration of infra-red rays, and the latter, using a vacuum thermo-couple, took photographs of the spectrum on infra-red plates after passing a beam of light through the cheek. The diagnostic possibilities of the permeability of tissues to the infra-red rays do not, however, appear to have received attention, nor can any attempts be traced in the literature towards making these rays penetrate and emerge from the thicker parts of the body, and registering them on emergence.

With my experience of the Kromayer lamp, and the *Times* photographs in mind, I approached Mr. Bloch, Mr. Flower, and Dr. Harrison of Ilford Limited, who kindly endeavoured to obtain photographs through the hand, and, though these showed clearly that infra-red rays did go through the thickness of the fingers, the comparative insensitivity of the plates as at present manufactured so prolonged exposures that they made the method impracticable, even for such thin structures as the fingers, and quite impossible for the thicker parts of the body. I therefore asked Mr. Bloch if he would attempt to pick up the emergent ray on a photo-electric cell, and demonstrate its presence by a deflection, if any, on a suitable galvanometer. A diagram of the apparatus set up by Ilford Limited for picking up the emergent ray is illustrated in Fig. 1. It will be seen to consist simply of

FIG. 1.

a photo-electric cell particularly sensitive in the region of 7,000 to 9,000 Angström units, and a single-valve method of amplifying any alteration in the current flowing in the filament-plate circuit, such alterations being indicated by deflections on the galvanometer inserted in this circuit.

TECHNIQUE AND RESULTS

It then only remained to provide a source of infra-red light in such a position that the beam would fall upon the photo-electric cell. This was done by an ordinary 50-watt or 100-watt lamp in a light-proof casing with an infra-red filter upon the side facing the photo-electric cell. The cell was also encased in a light-proof metal shield, with aperture to admit the incident beam. The gap between the filter and the shielded cell was sufficient to admit a wrist or forearm, and also a movable screen opaque to infra-red rays. In the preliminary investigation a reflecting galvanometer was used, and the experiments were carried out in a dark room, so that stray beams of light should not be reflected off the skin and produce misleading deflections. These experiments showed that, with appropriate sensitivity in the amplifying instrument, a wide deflection of the spot of light could be obtained after the infra-red beam had been passed through