DESCRIPTION OF AN X-RAY COUCH, DESIGNED FOR USE ON FIELD SERVICE, INCORPORATING A NEW TYPE OF LOCALIZING DEVICE.¹

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The task set was the designing of a suitable X-ray couch for use on Field Service, the main features being those of compactness, lightness, and the provision of a method of localizing foreign bodies that would be rapid and accurate, and at the same time simple to carry out.

There are, of course, very many methods of localization described—so many that to claim a method as original would probably be a mis-statement—the adage that "there is nothing new under the sun" is apt to be very true where radiology is concerned.

Having had the privilege, some years ago, of attending a course of lectures given by Dr. Thurstan Holland during which he described a method of localization used by him in France during the Great War, it was decided to adapt his method for this purpose.

Briefly, the method used by Dr. Thurstan Holland was as follows: The patient was laid on the X-ray table and a fluorescent screen placed flat over the part of the patient concerned. The screen was mounted in a wooden frame having a lead rubber surround for protection. Near one margin of the screen a small hole had been drilled in the glass which served the double purpose of being centred over the foreign body and of admitting the point of an indelible pencil to mark the patient's skin under which the foreign body lay. Fixed to the fluorescent screen was a metal scale and a sliding pointer to run along the scale.

The under-table tube being used, the tube having a known shift controlled by the foot, the following factors were constant, viz., the tube shift and the anticathode-table distance. The full factors required for localization, bearing in mind the formula:

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\frac{\text{Tube distance} \times \text{shadow shift}}{\text{Tube shift} + \text{shadow shift}}
\]

were obtained in a most ingenious way. A tape-measure was suspended from above, inverted and shortened by the already known tube-table distance, so that to get the correct tube-skin distance (referred to above in the formula as the tube distance) the tape measure had merely to be run down to touch the skin and the required measurement read off.

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The shadow shift of the foreign body was obtained from the movable pointer on the screen, and with the required factors available, the depth distance of the foreign body was obtained from a carefully prepared chart hanging on the wall.

With all this spade work behind us of a method used in war with unqualified success, the simplification of the method was a relatively easy matter.

We may now turn to fig. 1, a view of the couch fully assembled. The fluorescent screen can be seen mounted on an upright stand which is calibrated in inches. Thus when the screen is brought in contact with the patient the distance from the skin to the table can be read off.

At the side of the screen nearest the operator, seen best in fig. 3, is a small metal drum containing parchment inscribed in red and black lines—the red representing five centimetres, and the black one centimetre—shown in a longitudinal slot.

The method of use is as follows: The tube is switched on and the foreign body is brought under the small circle marked on the screen (the glass being perforated in the centre of the circle) by adjusting the movable screen. The stereoscopic movement of the tube is made by turning the handle, marked in fig. 1 as “stereo shift.” This gives the tube a range of movement of ten centimetres and is so constructed that on attaining its new position the tube locks, so obtaining the correct amount of shift. Should complete tube shift not be made, the tube slides back to its original position.

Having completed the tube shift, the shadow of the foreign body takes up a new position on the screen along the scribed line noted in fig. 3, and the sliding pointer is adjusted to bear on this new position. The next step is to read off the scale on the upright screen stand. Shall we say that the figure read off is 6? The milled right-hand edge of the drum is rotated until the figure 6 appears on the right-hand edge of the parchment and where the pointer on the drum, which can be seen to be part of the main pointer, reads off the depth of the foreign body by means of the red and black lines.

The method is easy to perform and can quite well be undertaken by a nursing sister or trained orderly.

I do not propose to go into a detailed description of the couch, but the following points are incorporated.

The couch is of robust design and can be rapidly folded up, vide fig. 2, in which the parts are seen loose, fitting inside, when correctly packed. Strong base plates are fitted to the legs, ensuring firm stance. The tube is held in a condenser bushing surmounted by a lead funnel to prevent undue X-ray scattering, and the diaphragm is controlled by simple lever movement. The tube under-carriage runs most smoothly along stainless steel rods, with dust-proof ball bearings.

The end castings are of silicon aluminium alloy, and the table top is
Couch Dismantled

FIG. 2.
constructed of "haefalite," which is a paper compounded and varnished under hydraulic pressure. The sheet metal sides of the couch serve to ensure complete rigidity, assist shockproofing and form the sides of the package when the table is being transported.

A Potter-Bucky diaphragm is incorporated, also a lead side shield for protection, 2.3 millimetres of lead in thickness, sliding in a U-shaped channel from head to foot of couch.

The fluorescent screen and stand can be quickly removed when necessary by being lifted bodily off the runners.

The two holes seen in the sheet metal sides of the couch are for the passage of the high-tension shockproof cables to the tube, via paxolin insulators.

The intention is to use this couch with a fifty milliampere shockproof mobile X-ray unit capable of over-couch work also. This X-ray unit has a change-over switch incorporated in the transformer and can be used in conjunction with the couch or can be used as a bedside unit at will.

In the working out of this couch my thanks are due to Messrs. Schall, who placed themselves unreservedly at my disposal with their advice and assistance—even to the extent of constructing a full-size experimental model, from which the illustrations were obtained. Dr. Thurstan Holland, may I add, has very kindly allowed me to use his name in connexion with this description—and to him also my very grateful thanks.