
_A direct-reading Localiser for X-Ray Work_ is copyright by Edward O. Marks 1919.

Permission has been granted by the executors of the estate of Dr Elizabeth Nesta Marks for display of _A direct-reading Localiser for X-Ray Work_ on the SERF website.
ART. VII.—A Direct Reading Localiser for X-ray Work.*

By EDWARD OSWALD MARKS, M.D. Univ. Dubl.; late Captain, R.A.M.C.

X-rays being propagated in straight lines, the position of a shadow thrown by an opaque body must depend on the relative positions of the source of rays, the opaque body, and the receiving surface. If the source of rays is moved the position of the shadow alters according to simple geometrical principles. If by actual measurement we know two positions of the x-ray tube in relation to the fluorescent screen or photographic plate and know the two corresponding positions of the shadow cast by an opaque body, it is a simple geometrical problem to determine the position of the opaque body.

With the exception of such methods as the use of visual

* A Thesis read for the Degree of Doctor of Medicine in the University of Dublin on July 3, 1919.
tance it is obvious that the movement of a shadow on the screen will depend on the distance from the screen of the opaque body. By centering the tube under a vertical series of opaque objects — such, for instance, as a ladder of needles at one centimetre intervals — the shadows of the series coincide. On then shifting the tube the shadows are separated and form a scale showing the movement of shadows of bodies at definitely varying distances from the screen. If now at our definite working distance we take two exposures on the one plate — the first with the tube centred under the ladder of needles, the second after the tube has been shifted the definite distance, the resulting negative is an accurate empirical scale which may be copied into more convenient form as desired. A tracing of it in Indian ink on a transparent sheet of celluloid has been found satisfactory in use as well as easy to make quite accurately.

To localize a foreign body in the tissues it is necessary to center the tube vertically under the foreign body. A metallic skin marker is now placed on the skin, so that its shadow coincides with that of the foreign body. The skin marker now, of course, indicates the point on the skin vertically above the foreign body. If it is intended to work with the screen the scale is now placed on the screen so that its zero mark coincides with the shadows of the foreign body and skin marker. The tube is then shifted through the constant shift, and the shadows of the skin marker and foreign body are thrown on to different portions of the scale. At our fixed working distance for which the scale was constructed, the number of scale divisions separating the two shadows is obviously the depth in centimetres of the foreign body from the skin marker. If, as is usually more satisfactory and accurate owing to the greater clearness, it is desired to work with a photographic plate, it is necessary to make two exposures in order to show the initial and the subsequent positions of the shadows, unless the apparatus has a cross wire in contact with the plate when, if the cross wire coincide with the initial shadow position, only the exposure in the second position is necessary. By adjusting the zero of the scale to the initial posi-
tion on the negative we can read the number of scale divisions separating the shadows of the skin marker and foreign body.

This has been the only measurement made, and gives us the depth direct without any calculation.

There are by this method one or two obvious sources of error, but these are common to all methods working on the one principle, and are not in any way due to the use of an empirical scale, the accuracy of which depends on the accuracy with which we can fix our two constant working distances—as also, of course, does the sketch showing the shadow movement of the foreign body. Since these working distances can be fixed mechanically without measurement there is in fact rather less possible source of error than by those methods where the distances are measured, and so subject to a personal equation.

The degree of accuracy really depends on the accuracy with which we can read the position of the shadows on the negative, and this is the same whether we use a scale or calculations to determine the result.

It might be thought that since in the present method the photographic plate is not necessarily close to the skin, and so further from the foreign body than in other methods, the resulting shadows being in consequence less sharp, that they would not be capable of as exact measurement. This, however, does not give rise to any greater inaccuracy, for with increased distance from the plate, though the sharpness of outline is certainly diminished, there is a proportionate increase of shadow movement and lengthening of the scale divisions. Thus the same degree of accuracy is really obtained over any portion of the scale, a degree which depends primarily on the sharpness of focus of the tube, and to a less extent on the magnitude of the tube shift.

A considerable error may, of course, be due to the shape of the foreign body, since the outline of its shadow may vary considerably when the rays come from a different direction. It is very desirable, therefore, to take, if pos-
sible, some definite projecting point on the foreign body for estimation.

While possessing advantages in simplicity of working it is not suggested that this method is suitable except for those cases where the vertical depth from the skin is all that is required, which cases, of course, form the vast majority.

Where, as in injuries to the eye, the position of the foreign body is required in relation to the eye-ball, something more than mere depth from the skin is desired, and other methods must be employed.

For the accompanying skigram illustrating the method I have to thank the kindness of Dr. E. J. Watson.

PART II.

REVIEWS AND BIBLIOGRAPHICAL NOTICES


There is no doubt that this work of De Lee is an up-to-date exposition of Obstetrics. In this, the third edition, the size of the already large tome is increased. It is mentioned in the preface that in the treatment of eclampsia more prominence is given to the conservative methods, but we find on turning to the chapter on this subject that “rapid emptying of the uterus gives the best results.” This dictum does not tally with modern statistics.

We do not approve the figure demonstrating expression of the placenta; it appears as if a torn piece of membrane is being delivered with the placenta, which is appearing maternal surface first. Were the placenta to be delivered in the manner illustrated trouble might be expected in the puerperium. While tamponade of the vagina in the treatment of accidental hemorrhage is mentioned it is not carefully explained. In a work of this size such an important and successful treatment should not have been omitted. The overdoing of asepsis in midwifery is as baneful in its results as its neglect. We advocate gowns, masks, and caps in the operating theatre, but we look upon their use in the private house as a source of danger, inasmuch as the gowned, capped, inexperienced practitioner thinks he need do but little to keep clean when he is thus attired. The dreadful picture (figure 494) of the patient straining against the doctor who wears a