

Modern Surgery and X-Ray Work in the War

By S. Gernsback

THE value of X-Ray photographs at the front does not need to be pointed out. There is no base hospital without a complete outfit of Roentgen apparatus, and the work accomplished by the surgeons is truly gigantic, as every soldier who is wounded by a bullet, fragment of a bomb or shrapnel, etc., is transferred to the nearest hospital and X-rayed.

The operation of taking X-Rays of the wounded must be executed quickly and accurately, therefore special installations are provided. The patient is lifted to a couch consisting of a frame over which a canvas is stretched, while underneath the couch the X-Ray bulb is located.

Before the operator takes the X-Ray skiagraph upon the plate, he locates the exact position

patient only being displaced, and the source of the X-Ray not having been moved, it is evident that the shadow of the bullet has been displaced. Now this displacement of the shadow can be exactly measured, and through this measure the depth to which the bullet lies in the body is accurately determined, by means of a special slide-measurer invented recently.

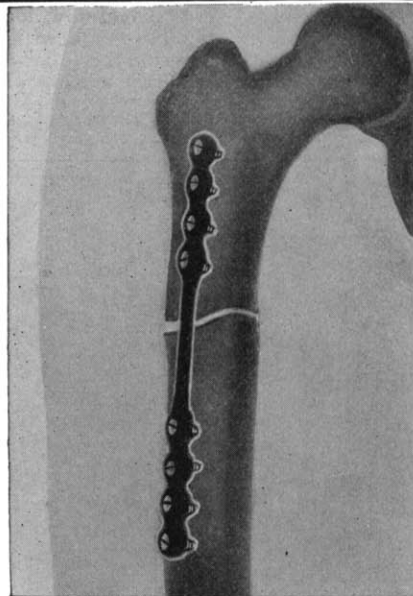
The accompanying illustrations show the fracture of a leg (at the upper left) before the operation, and (at the upper right) after the operation. The unusual point is

Very inexpensive X-Ray outfits can be bought for experimental purposes. It is an easy matter to make skiagraphs similar to these shown, and to help those who are interested in this subject some simple directions are given.

The most important part of taking the photographs is the regulation of the distance between the plate and the tube. The correct distance is a compromise between two conflicting advantages. When the space is increased, a longer exposure is necessary, but the skiagraph is less distorted. Since the rays proceed in straight, radial lines from a single point, it is easy to see why an unnatural picture results from bringing the bulb too near the plate. In photographing the hand, the distance

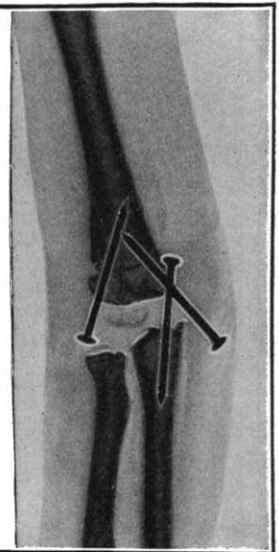
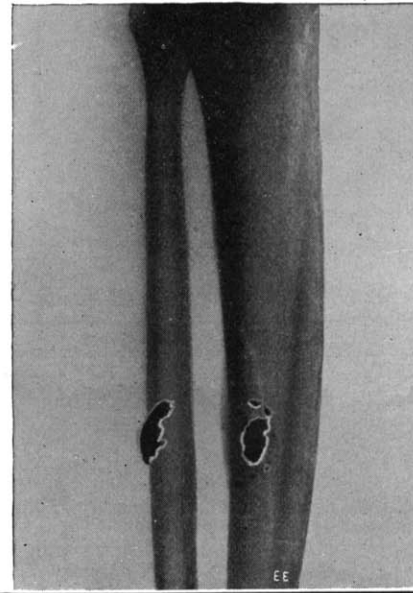
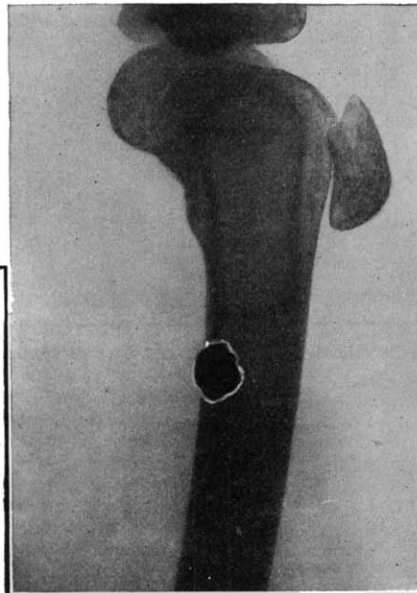
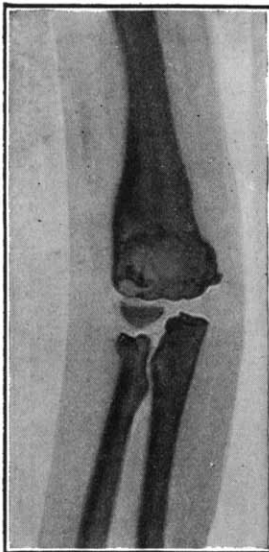
At Right: Fractured Thighbone Before Being Screwed Together (see adjoining view)

Below: Fracture of Joint Before Surgical Treatment



At Left: Broken Thighbone Screwed Together with Metal Brace

Fellow: Same Fracture As at Extreme Left "Nailed" Together



At Right: Skiagraph of a Bullet Imbedded in Bone Without Fracturing It.

Skiagraph at Left Shows Splintered Bone Due to Shrapnel Bullet.

of the bullet by means of a fluoroscope. After this is done he takes the X-Ray photograph upon a plate which is only exposed to half its size. Now the couch with the patient is slid along its rails for exactly two and one-half inches and the other half of the plate is exposed and a second picture is taken. The operator obtains in this manner a stereoscopic photograph. It has been found that these stereoscopic pictures are of great aid to the surgeon, as he is enabled by them to *actually see into* his patient, so that he can determine exactly before the surgical operation the location of the fractures and the direction of the bullet. Furthermore, as the two photographs have been taken on the same plate, the

that the fracture is held together by an ordinary steel brace fastened by means of regular iron screws. The next illustrations (extreme left and right) show a disjuncted elbow, held together with three common eight penny nails (these will be removed after the bone has knitted properly). The lower left skiagraph shows a bullet imbedded in the bone and the one to the right shows shrapnel fragments imbedded in the bone, without causing a fracture although the bone was slightly splintered.

should be at least 6 inches, but preferably 10 inches to 12 inches, and 10 inches is the minimum for the leg. Ten inches is a satisfactory distance for simple work. To make a trial exposure, put the plate in the holder on the table directly under the bulb. Place the hand on the plate holder and turn on the current. At the end of half a minute cover about two inches of the hand with a flat plate of lead. In thirty seconds more move the plate another two inches. When the plate is developed, it will be easy to determine the proper exposure. For the comparatively small cost of the apparatus extremely interesting work can be done and almost as satisfactory pictures can be made as with the army sets.