THE SIEMENS & HALSKE NEW ELECTRIC HAND-DRILL.

Siemens & Halske's new electric hand-drill does away with the inconveniences inherent to the drill with flexible shaft and, at the same time, has the advantage over the crank drill in being of greater efficiency although of sensibly the same weight. In other electric drills the motor that actuates the drill properly so called through a flexible transmission is generally established upon a portable frame. In consequence of such an arrangement the manipulation of the apparatus is relatively complicated, and the working parts are more difficult of access than practice necessitates. Moreover, the vibrations of the shaft render any accurate work very difficult. The use of the flexible transmission greatly reduces the efficiency, so that with an equal power the motor has to be larger. Finally, the flexible shaft and the frame of the motor are relatively costly.

In the new hand-drill illustrated, the mechanical and electric parts are united in a single apparatus. The current is led to the motor by a flexible cable that in no wise interferes with the mobility of the drilling machine. The arch of the electro-magnets of the motor is wrought iron. The core of the armature, as well as the poles, is laminated. The collars, handles, and center plate are of aluminium. In the posterior collar is formed an aperture, which is closed by an aluminium cover, which, when removed, permits of easy access to the collector and brushes. The interrupter is placed in the handle. Upon pressing upon this the motor is put in circuit, and, upon freeing it, is put out of circuit. The machine is made in two sizes for actuation by a continuous current of 110 or 220 volts. The smaller type is used for delicate work. It is capable of drilling holes of 0.24 of an inch in diameter, and has a net weight of 12 pounds and a gross weight of 33. The larger type, shown in our illustration, is capable of boring holes 0.64 of an inch in diameter and has a net weight of 21 pounds and a gross weight of 44. A lengthening piece for certain special purposes may be inserted by screwing it in between the collar and center plate. The method of using the machine is shown herewith.

The convenience and simplicity of this drill, along with the economic qualities resulting therefrom, will soon make of it an instrument indispensable in all shops in which drilling has to be done and in which electricity is available.

THE ORTHODIAGRAPH. AN APPARATUS FOR DETERMINING THE TRUE SHAPE AND SIZE OF INTERNAL ORGANS.

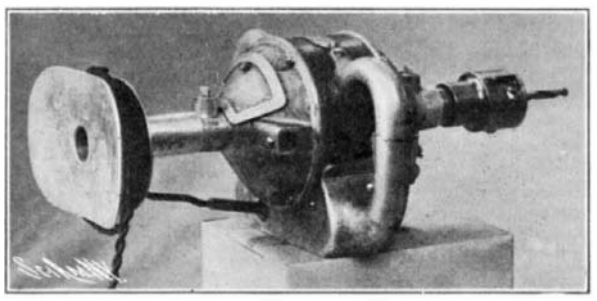
BY OUR BERLIN CORRESPONDENT.

The orthodiagraph, just brought out by the Berlin Allgemeine Elektricitäts-Gesellschaft, is a Röntgen apparatus allowing of the true image of any object being obtained in any desired position of the drawing plane.

Röntgen rays, as is known, are propagated from a point on the anticathode of the Röntgen bulb in straight lines radiating in every direction, and the image of a body projected on a phosphorescent screen or a photographic plate is a silhouette, the outline of which coincides with the places where the Röntgen rays touching the edge of the body strike the screen. This outline therefore is the periphery of the base of a cone, the point of which coincides with the luminous spot on the anticathode. As in any case the object to be projected is located between the Röntgen bulb and the screen, its image on the latter will be magnified, this magnification being the stronger the greater the ratio of the distance of the object from the image plane to the distance of the object from the Röntgen bulb. The image projected by a stationary Röntgen bulb, so far from recording the true dimensions of the object, will show the latter in a magnified shape apart from more or less considerable deformations.

There is only one possibility of obtaining the object in its true shape and size; the Röntgen rays touching the body and forming on the plate an image of its outline have to be made parallel and strike the plate at right angles. In other words, the projection from a centrum will have to be replaced by a parallel projection. Endeavors in this line have been made as far back as 1898; devices have even been invented allowing of such projections being obtained in the case of the objects to be projected lying on horizontal surfaces. The orthodiagraph, as above stated, is free from this restriction, allowing of projections in true shape and size being obtained in any desired position of the drawing plane.

HOW THE ELECTRIC DRILL IS MANIPULATED.



THE ELECTRIC DRILL.

The luminous screen, which also carries the drawing stylus, is rigidly connected with the Röntgen bulb by a U-shaped frame. This frame is made up of a number of jointed sections, which permit of any desired adjustment of the screen with the bulb. A rod extending from the screen is longitudinally adjustable in a split sleeve on the end of a tube lying parallel with the axis of the drawing stylus. The tube is provided with a telescoping member, on the projecting end of which a second split sleeve is adapted to slide. This sleeve is formed on the end of an arm which is thereby supported at right angles to the telescoping member. The clamp which holds the Röntgen bulb has ball-and-socket connection with a member which may be adjusted to any position along this arm.

When properly adjusted the propagating joint of the Röntgen rays should lie on an extension of the axis of the stylus. This may be approximately done by adjusting the bulb clamp and other members of the U-shaped frame.

In order to obtain perfect adjustment of the bulb, i.e., such an adjustment as would permit working with accurately perpendicular rays, the screen may be adjusted in one plane, by moving its supporting rod longitudinally in the split sleeve above referred to, and in a plane at right angles thereto by adjustment of the screen within its holder. By noting the shadow cast on the screen by the end of the stylus projecting therethrough, the operator can readily ascertain when accurate adjustment has been obtained.

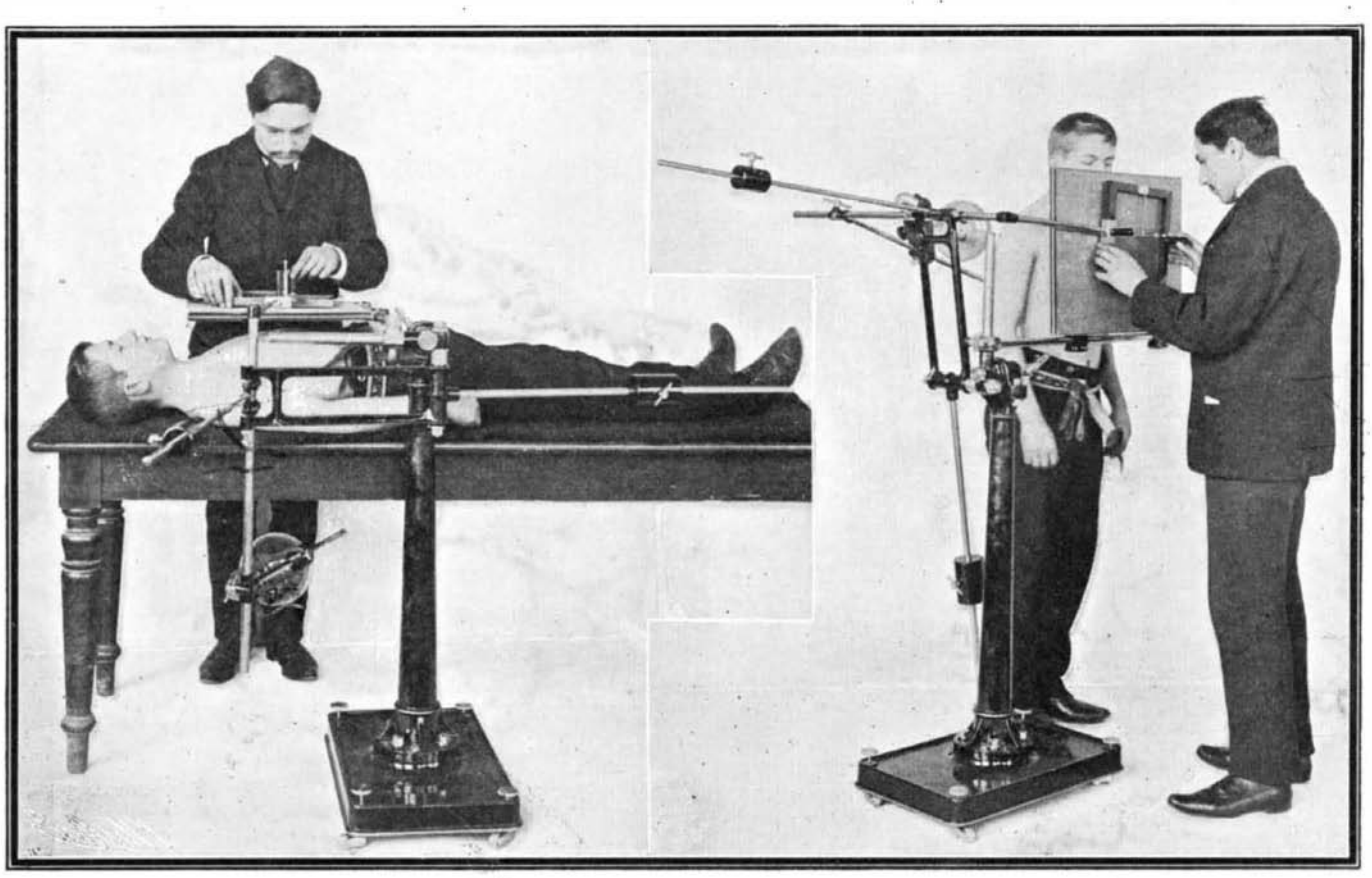
Parallel movement of the bulb with the screen is obtained by means of two levers, one pivoted to the other. A lever which supports at one end the U-shaped frame is hinged to a second lever, which in turn is pivoted to a bracket on the head of the supporting column of the apparatus. Each lever is provided with a counterweight movable along its outer arm, and these weights serve to hold the parts in equilibrium.

The bracket just mentioned also carries a rod to which by means of a universal joint the drawing frame is attached. The drawing frame is adapted to be covered with heavy bristol-board held therein by holders at the sides, and on this surface the drawing stylus is softly pressed by a spiral spring.

Now the whole system so far described is movable round the axis in the head of the main supporting column and may be clamped in any position by means of a milled nut; an additional fixing lever may be grasped to prevent this system from suddenly dropping on loosening the nut. At the same time, the accurately vertical and horizontal position of the system is indicated by a spring catch. The length of the supporting column is such that on turning the system round its axis into a horizontal position, the drawing plate will just be at a convenient distance above a person lying on an ordinary table about 30 inches in height. The heavy base plate is provided with four rollers allowing of the drawing apparatus being readily moved. By operating special screws these rollers may be removed and the apparatus placed on the points of the screws, which in addition will allow of the column of the apparatus being given an accuratelyvertical position even on oblique or uneven floors.

When a drawing is to be made directly on the body, the bristol-board is removed from the drawing frame, and a dermatograph stylus should be inserted into the drawing stylus instead of a pencil. The drawing frame is provided with three pencil holders or "plotters," as they are called, which are movable in the plane of the screen or that of the drawing plate and provided with scales in both coordinates; the position of a person with regard to the central ray may be thereby ascertained, so that on the examination being repeated, the same position of the person may be accurately secured. A fourth auxiliary plotter has been provided which slides on a scale projecting from the extended axis of the lower supporting lever.

In addition to reproducing the true shape and size of organs, the apparatus may be used advantageously to ascertain the depth of foreign objects. This can be done by meas-



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