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3,154,683

APPARATUS FOR POSITIONING THE HEAD FOR X-RAY EXAMINATION

Filed Jan. 16, 1961

2 Sheets-Sheet 1

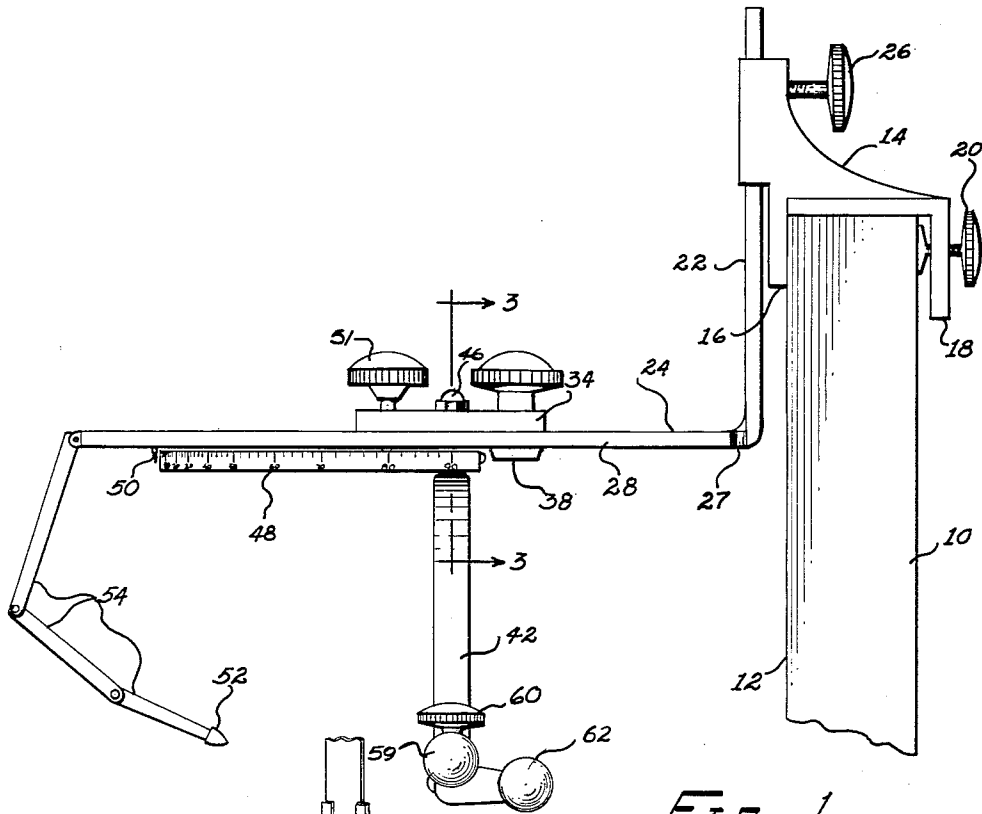


Fig. 1

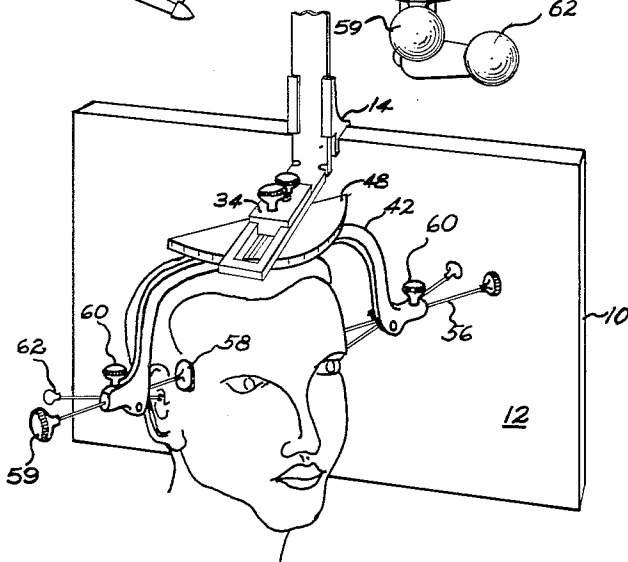


Fig. 2

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2 Sheets-Sheet 2

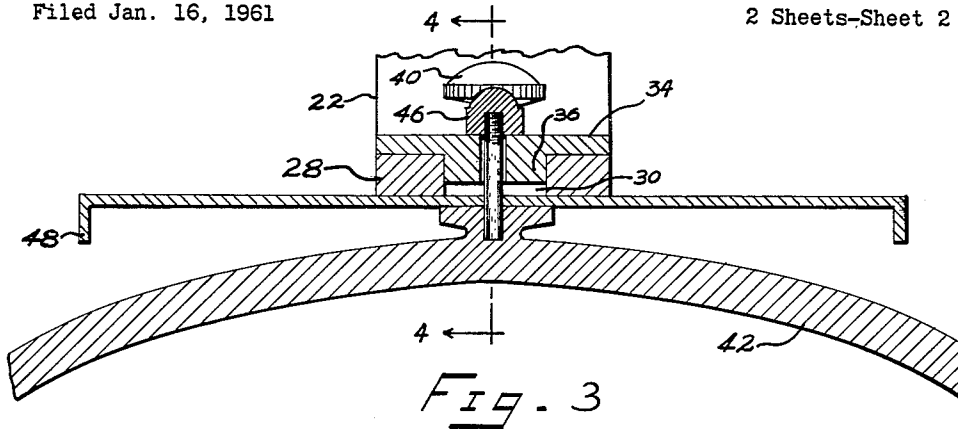


Fig. 3

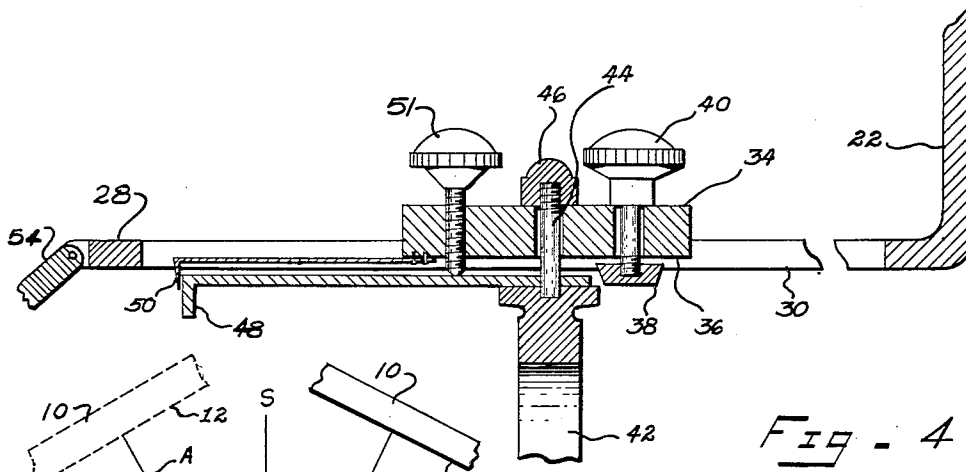


Fig. 4

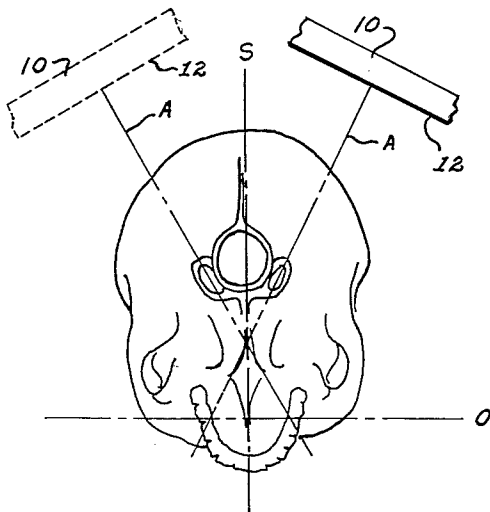


Fig. 5

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APPARATUS FOR POSITIONING THE HEAD FOR X-RAY EXAMINATION

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1 Claim. (Cl. 250-50)

This invention pertains to radiographs and more particularly to radiographs of the atlanto-occipital articulation (articulatio atlantooccipitalis).

In investigating subluxation of the atlanto-occipital articulation I have found it best to have a radiograph with the X-rays aligned with the longitudinal axis of the occipital condyle. To this end, I have developed techniques and invented equipment by which these radiographs may be taken.

An object of this invention is to provide a method of investigating subluxation of the atlanto-occipital articulation.

Another object of this invention is to provide apparatus for investigating such subluxation.

A further object of this invention is to provide a device to hold the subject's head in a fixed angular position while being radiographed.

Still further objects are to achieve the above with a device that is sturdy, compact, durable, simple, and reliable, yet inexpensive and easy to manufacture.

The specific nature of the invention as well as other objects, uses, and advantages thereof will clearly appear from the following description and from the accompanying drawings, the different views of which are not necessarily to the same scale, in which:

FIG. 1 is a side elevational view of a device according to this invention as would be used with some associated equipment.

FIG. 2 is a perspective view showing the head of a subject as would be used in connection with this equipment with the nasal pointer omitted for clarity.

FIG. 3 is a sectional view taken on line 3-3 of FIG. 1.

FIG. 4 is a sectional view taken on line 4-4 of FIG. 3.

FIG. 5 is an axial view or tracing of a skull illustrating the longitudinal axis of the occipital condyle.

As may be seen in the accompanying drawings, the apparatus according to this invention is designed to be attached to bucky 10. The bucky, inter alia, is a holder for a cassette within which radio sensitive film is placed. The bucky will be independently supported by means not shown. The bucky has vertical surface 12 which will be parallel to the radio sensitive film upon which the radiograph will be taken.

Clamp 14 has a downward facing slot defined by arms 16 and 18 which set over the bucky. The clamp is securely attached to the bucky by means of tightening screw 20 threaded through the arm 18.

Forward of the vertical surface 12, the clamp has a rectangular opening therethrough. Vertical rectangular portion 22 of bar 24 passes through this opening. As may be seen, the bar is held in place by screw 26 fastened to the clamp and bearing against the vertical portion 22 of the bar. As this portion of the bar is non-round it will be understood that this limits the movement of the bar to a pure translational movement parallel to the surface 12 of the bucky. Notch 27 is cut from horizontal portion 28 of the bar 24 at or adjacent the point of juncture to the vertical portion 22. If it is desired to raise the bar to a greater elevation, the notch 27 will be between said side bars of the rectangular opening in the clamp 14.

The horizontal portion 28 of the bar has an elongated slot or groove 30 extending axially thereof. Carriage 34 is mounted on the horizontal portion for pure translational movement relative to the bar. The carriage 34

has tongue 36 which fits within the slot 30 preventing rotational movement. The carriage may be clamped any distance from the bucky by the use of nut 38 which is below the bar and which can be tightened to a holding position to the bar by screw 40. The screw 40 passes through a vertical hole in the carriage near one end thereof.

Yoke 42, in the shape of an inverted U, depends from the carriage by bolt 44. The bolt is made secure by nut 46 above the carriage. Thus, the yoke is mounted for rotation about a vertical axis, that being the axis of bolt 44. The bolt is held to the yoke by a shrink fit or by welding or threads or otherwise, which is not pertinent to this invention.

Sector 48 is attached to the yoke. Pointer 50 is attached to the carriage. By cooperation of the pointer and indicia on the sector the degrees of rotation of the yoke relative to the carriage (and hence to the bucky) may be determined. Screw 51 is threaded through the carriage and bears against the sector to maintain the yoke in selected rotated position.

A nasal pointer 52 is hinged to the front of the horizontal portion of the bar by a plurality of links 54. They are so hinged that the nasal pointer always is aligned with a vertical plane of the bar 24.

Temple pressure bar 56 is mounted at the extreme end of each arm of the yoke 42. Upon one end of each bar is temple pressure pad 58 and on the other end is hand knob 59. The bar 56 may be locked in adjusted position by screw 60. The head of the subject may be securely clamped to the yoke by pressing the temple pressure pads 58 against the temples and locking them in place by the screws 60. The pressure pads 58 are mounted by universal ball socket joints to the bars. If the subject has a natural tilt to his head, he may be clamped securely in place even with the natural tilt. Also tragus pointer 62 is mounted at each end of the yoke. The tragus pointers are adapted to be aligned with the tragus or other part of the ear indicating the auditory meatus so it will be known that the yoke is aligned in a plane parallel to the orbital plane of the subject. For the purposes of this invention it is assumed that the auditory meatus lie in a plane parallel to the orbital plane.

Also for the purpose of this invention it is assumed that the sagittal plane (line S of FIG. 5) is normal to the orbital plane (line O of FIG. 5) and the Frankfurt horizontal (not shown) is normal to both the orbital and sagittal planes.

Operation

To use this equipment according to my invention, first an axial (submento-vertical) or base posterior or vertex radiograph of the cranium is made. Since the techniques and instruments for making such a radiograph are well known they will not be discussed here. From this radiograph or from a tracing thereof, the longitudinal axis (line A of FIG. 5) of the occipital condyle is determined and sketched thereon. The angle between the axis of the occipital condyle and the sagittal plane is determined.

After the angle is determined, the subject is placed in a chair below the yoke. As the first step, the yoke is rotated to the same angle as the occipital condyle makes with the sagittal plane and clamp by tightening the screw 51. Then the chair in which the subject is seated is rotated until his head is in approximate alignment with the yoke. Thereafter, the bucky is adjusted vertically (by means not shown) so that the center of the film is at approximately the same elevation as the occipital condyle. After this has been done, the bar 24 is adjusted vertically in the clamp 14 until the temple

pressure bars are about the same level as the temples of the subject. The carriage 34 carrying the yoke is adjusted horizontally along the bar 24 until the tragus pointers align with the tragi. During this latter adjustment it may be necessary to again rotate the chair carrying the patient to the proper angle. Thereafter, it may be necessary to again make a final adjustment on any of the other adjustments outlined above except the yoke is left clamped at the angle of the occipital condyle.

The chair is sufficient distance in the preliminary adjustment so that the body of the subject at no time touches the bucky so as to disturb or cause him to change the normal carriage of his head relative to the body.

After the proper angular alignment has been made, the chair in which the subject is sitting is moved toward the bucky until the shoulder of the subject touches the bucky. The carriage is moved back along the bar until the tragus pointers align with the tragi. All the time the above adjustments are being made, the subject is carrying his head in his natural and habitual carriage whether it be erect, tilted or otherwise. After all adjustments have been made so that the subject's head is angled to the bucky at the correct angle, and the body is in the relationship to the head so that the head is at the natural carriage; the carriage and yoke are firmly clamped into position and the head of the subject is firmly clamped to the yoke by the temple pressure bars and pads as described before.

As may be seen, the longitudinal axis of the occipital condyle is aligned normal to the surface 12 of the bucky. The X-ray target (not shown) is positioned so it lies in a vertical plane containing the longitudinal axis of the occipital condyle (line A in FIG. 5). Stated otherwise, the central ray from the target will be parallel to the longitudinal axis of the condyle and vertically above it. The target is about the elevation of the top of the orbit so that the angling rays will cause the shadow of the occipital condyle to appear on the film below the base of the occipital bone.

It will be understood that it is necessary to take a separate radiograph of each condyle and therefore, two positions of the bucky have been shown in FIG. 5.

It will be apparent that the embodiment shown is only exemplary and that various modifications can be made in construction, materials, and arrangement within the scope of the invention as defined in the appended claim.

I claim as my invention:

An apparatus for making radiographs for investigat-

ing sublaxation of the atlanto-occipital articulation comprising:

- (a) a bucky having a vertical surface so that film may be supported in a vertical plane,
- (b) a clamp attached to the bucky,
- (c) a horizontal bar attached to said clamp,
- (d) said bar being adjustable vertically,
- (e) said bar having a horizontal portion extending normal to said vertical surface of said bucky,
- (f) said horizontal portion having an elongated slot therein,
- (g) said elongated slot extending normal to the surface of said bucky,
- (h) a carriage mounted for translational movement along said slot,
- (i) said carriage having a tongue fitted within said slot to prevent rotational movement of the carriage to the bar,
- (j) a clamp on said carriage for clamping said carriage in a fixed position along said bar,
- (k) a yoke depending from said carriage,
- (l) said yoke mounted for rotation about a vertical axis,
- (m) means for clamping the yoke to said carriage in adjusted rotary positions,
- (n) a sector carried by said yoke,
- (o) a pointer carried by said clamp co-operating with the sector whereby the angle of rotation of the yoke may be measured,
- (p) said yoke having tragus pointers extending therefrom,
- (q) said tragus pointers being means for indicating the auditory meatus of the subject, and
- (r) pads adjustably clamped to said yoke,
- (s) said pads being adapted to press against the temples of the subject; so that the subject may be seated before the bucky with his head in the natural and habitual carriage with the longitudinal axis of the occipital condyle aligned normal to the vertical plane of the bucky.

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