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PANOGRAPHIC X-RAY TUBEHEAD ASSEMBLAGE FOR INTRA-ORAL USE COMBINED WITH ALIGNING EAR PROBES

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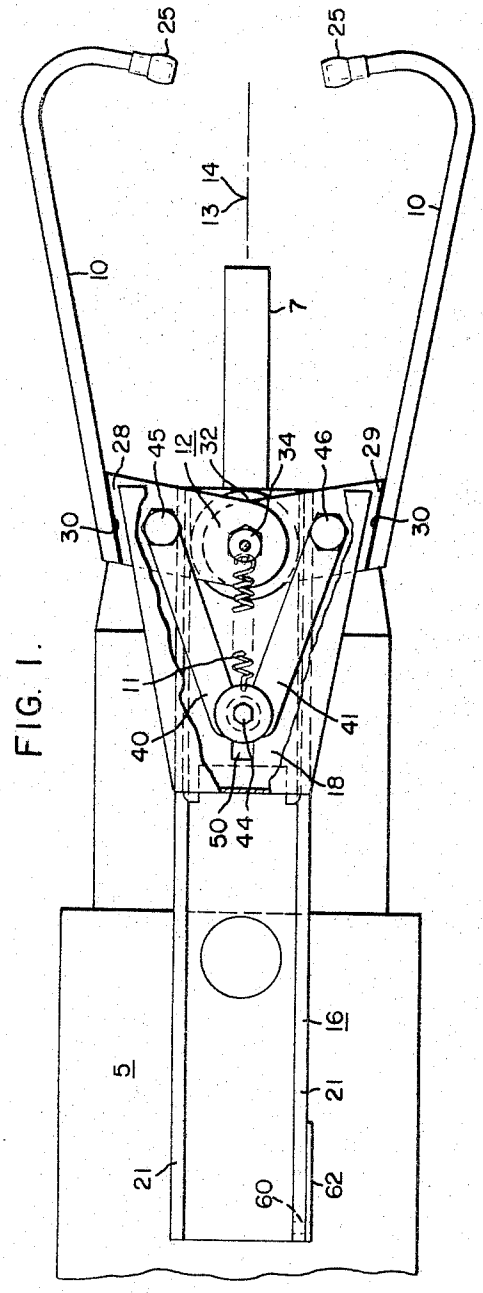


FIG. 1.

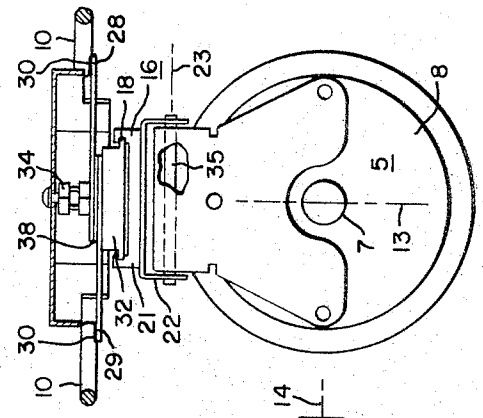


FIG. 3.

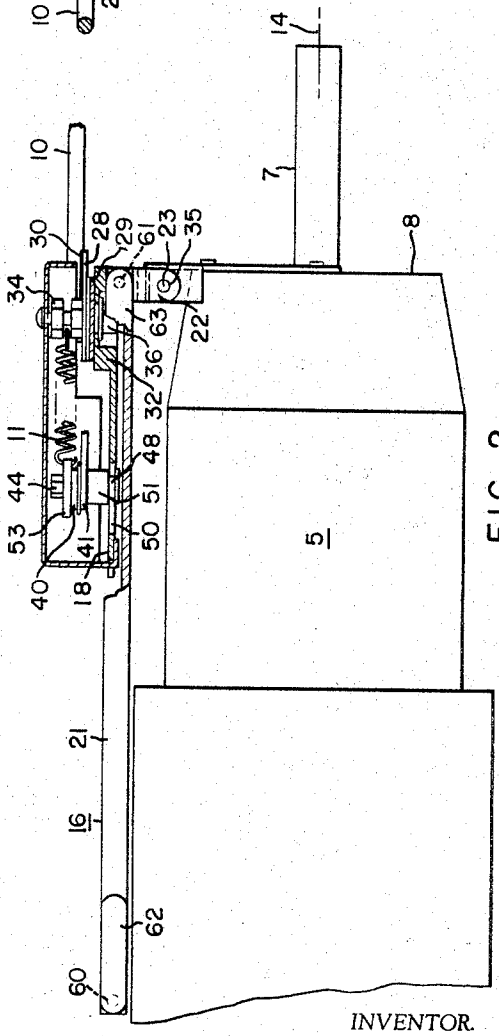


FIG. 2.

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PANOGRAPHIC X-RAY TUBEHEAD ASSEMBLAGE FOR INTRA-ORAL USE COMBINED WITH ALIGNING EAR PROBES

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ABSTRACT OF THE DISCLOSURE

A panographic X-ray tubehead assemblage for intra-oral use, having an anode rod for extension into the patient's mouth, and a pair of ear probes so coupled to the anode rod as to assure its alignment in a plane midway between the ear probes, hence along a vertical midplane of the patient's head while such probes occupy inserted positions in the patient's ears.

Panographic X-ray apparatus for intra-oral use exist which employ a panographic X-ray tube and casing construction having a target disposed in the end of a protruding anode rod capable of extension into the mouth of a patient to simultaneously irradiate forwardly from ear-to-ear for radiographic recording of tooth and bone structure on a single film strip wrapped about the patient's face; an exemplification of such an X-ray apparatus having such capability being disclosed and described in U.S. Patent 2,946,892 in which the cylindrical protective casing **11** therein is referred to herein as an anode rod.

In such intra-oral use of the panographic X-ray tube, uniformity of radiographs produced thereby is dependent upon uniform positioning of the anode rod within the patient's mouth. The prior practice of relying upon the sighting skill of the operator to obtain uniform anode rod positioning is less than desirable.

In view of the foregoing remarks, it is an object of the present invention to provide a panographic X-ray tubehead assemblage which enables uniform positioning of the anode rod in the patient's mouth with relative ease and simplicity and without dependence upon the sighting skill of the operator.

In general, the present invention obtains anode rod position uniformity by use of a locating means which readily couples into both auditory canals of the patient's ears to align such anode rod along the midsaggital plane of the head with a degree of accuracy not readily obtainable with the previous trial-and-error sighting technique.

Other objects, advantages and feature of the invention will become apparent from the following detailed description when taken in connection with the accompanying drawing, in which:

FIG. 1 is a plan view of a chosen exemplification of a panographic X-ray tube head assemblage embodying the invention;

FIG. 2 is a side elevation view, partly in outline and partly in section, of the assemblage of FIG. 1; and

FIG. 3 is an end elevation view of the FIG. 1 assemblage.

Referring to the drawings the novel tubehead assemblage of the present invention comprises a casing **5** of generally cylindrical configuration which encloses an X-ray tube (not shown) and includes a small diameter anode rod **7** protruding centrally from a flat circular end face **8** of the casing. Insertion of the anode rod **7** into a patient's mouth (not shown) and subsequent energization of the X-ray tube within the casing will produce an ear-to-ear radiograph on a film strip (not shown) wrapped over

the patient's face, as described, by way of example, in further detail in U.S. Patent 2,946,892.

In accord with novel features of the present invention, the tube head assemblage comprises a pair of bent, rod-like ear probes **10**, similar in appearance to those of a physician's stethoscope, which are biased one-toward-the-other by a helical tension spring **11** and are coordinated by a linkage **12** so that both probes when moved laterally will move equal distances with respect to a median plane **13** extending vertically therebetween. The probe, probe bias, and probe linkage assemblage is mounted on the top of the panographic X-ray tube housing **5** so that the axis **14** of the anode rod **7** lies in the median plane **13**. This is accomplished through the medium of a track member **16** extending symmetrically along such median plane at the top of tube housing **5** and an ear probe carriage in the form of a slider plate **18** which is slidably guided by grooves in opposite side walls **21** of the track member **16**. The forward end of the track member **16** is pivoted at a bracket **22** at the end face **8** of the tube housing to permit vertical tilting of the track member about a horizontal axis **23** and thereby enable adjustment of the vertical position of the ear probes **10** relative to the axis of the anode rod **7**. By sliding movement of the slider plate **18** along the track member **16** adjustment in effective length of the probes **10** may be made. The ends of the probes **10** are provided with ear pieces **25** to fit into each aural canal of the patient's ears.

In use of the apparatus of the present invention, assume that the X-ray tubehead assemblage is supported in any suitable manner (not shown) to permit its conventional movement horizontally, vertically, about its longitudinal axis **14**, or about different pivot axes perpendicular to the axis **14**. The ear probes **10** will be separated to their maximum extent and disposed in a generally horizontal plane. The anode rod **7** will be introduced into the patient's mouth to the desired degree by appropriate movement of the tubehead. The operator then adjusts the position and attitude of the ear probes to bring the earpieces **25** into introduction to the patient's auditory canals of both outer ears. In so doing the housing **5** of the X-ray tube will be caused to assume a position which aligns the center line of the anode rod **7** with a plane passing centrally between the patient's aural cavities along the midsaggital plane, irrespective of the degree of insertion of the anode rod **7** into the patient's mouth, of the forward or sideward tilt of the patient's head, or of the vertical angular attitude of such rod.

As to further details of the illustrative embodiment of the invention exemplified herein, the biasing of the two ear probe rods **10** together by the spring **11** is accomplished through the medium of the linkage **12** which equates the movement of such probes. Included in such linkage are two flat, thin, relatively-wide probe arms **28** and **29** arranged one above the other in oppositely directed extension and to which the supported ends of the probe rods **10** are attached as by weldments **30**. The inner ends of the flat probe arms are connected for pivotal movement about the center of a raised cylindrical hub portion **32** extending upwardly at the center of the forward end of slider plate member **18**. Such pivotal connection is established by a vertically-extending pin means **34** which is retained in place by a self-locking nut **36** disposed in a cavity opening upwardly from the bottom of the slider plate member **18**. A washer member **38** is sandwiched between the pivot-connected ends of the flat arms **28** and **29** to facilitate the turning of such arms and hence the ear probe rods **10** horizontally about the vertical axis of the pin means **34**. To coordinate such pivotal movement of the two ear probe rods **10**, two members **40** and **41** are employed which, at one end, overlap and are pivotally

connected together by a pin means **44** and at their opposite ends are pivotally connected to the probe arms **28** and **30**, respectively, by pin means **45** and **46**. The pin means **44** has a reduced cross-section portion **48** at its lower end which is slidably guided along the longitudinal center line of the slider plate member **18** by the side walls of a slot **50** through which the pin means **44** extends. A spacer sleeve **51** encircles the pin means **44** and slidably supports the adjacent end of the link member **41**. Spacer sleeve **51** straddles the slot **50** and is slidably supported by the upper surface of the slider plate member **18**. The helical tension spring **11** is anchored at one end to the pin means **44** via a loosely fit washer member **53** and at the opposite end is anchored to the pin means **34**. The spring **11** urges the pin means **44**, hence one end of the link members **40** and **41** in the direction of the pin member **34**, which link members **40** and **41** in turn act through pin members **45** and **46** to urge the probe arms **28** and **29** forwardly about the pin means **34**, thereby urging the ear probe rods **10** together to assure retention of ear pieces **25** in the ears of the patient during use of the apparatus. During movement of the ear probe rods toward or away from one another, it will be seen that the forward ends of link members **40** and **41** will rock toward and away from one another while the pin means **44** slides in the slot **50** and cooperates with its side walls to assure that the angular movement of such members, hence the corresponding angular movement of arms **28** and **29**, hence also the corresponding angular movement of the ear probe rods **10**, all occur symmetrically with respect to the centerline of the slider plate member **18**. Slider plate member **18** being somewhat accurately located laterally of the track member **16** by the side walls **21**, and the track member **16**, being symmetrically aligned vertically with the centerline of the tubehead housing **5** and anode rod **7**, such lateral movement of the ear probe rods **10** will be symmetrical with respect to a vertical median plane of such tubehead and anode rod.

The manner of so locating the track member as well as for permitting its vertical tilting while maintaining its alignment with the vertical median plane of the anode rod, is by way of the bracket **22** and a pin **35** which extends along the horizontal axis **23** and pivotally joins such bracket to a flat, vertical-extending, thin mounting plate secured to the circular end face **8** of the tube housing **5**.

To define the limit of travel of the slider plate member **18**, hence of the ear probe rods **10** and linkage means, on the track member **16** along the longitudinal axis of the tubehead, stop pins **60** and **61** are held by leaf springs **62**, **63** in a position of projection through one side wall **21** fore and aft of such member, respectively.

From the foregoing remarks it should be appreciated that the photographic X-ray tubehead assemblage of the present invention provides for rapid and accurate location of the anode rod in a patient's mouth along a reference plane which can readily be re-established repeatedly, so that a series of radiographs of the same patient can be related to a common observation plane. Furthermore, the present invention provides for location of the anode rod along a medically-recognized reference plane of the skull.

While there has been shown and described an illustrative embodiment of the invention, modifications thereto will readily occur to those skilled in the art. It is not desired, therefore that the invention be limited to the specific details shown and described and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

I claim as my invention:

1. A panographic X-ray tubehead assemblage for intraoral use, comprising an anode rod for extension into the patient's mouth, a pair of ear probes extending in the general direction of extension of said anode rod, and having inwardly-facing probe tips for insertion in the patient's ears, and means coupling said ear probes to said anode rod so constructed and arranged as to permit adjustment of the separation distance between said probe tips and of the position thereof extendedly and proximately of said anode rod, while maintaining said tips aligned and equally spaced from a median plane passing through the centerline of said anode rod irrespective of the degree of their separation or of their proximate or extended position relative to such rod.

2. A panographic X-ray tubehead assemblage for intraoral use, comprising an elongated housing having an anode rod at one end for extension into the patient's mouth, a pair of stethoscope-shaped ear probes having inwardly-directed tips at a projecting end for insertion into the patient's ears, a probe mount carriage means supporting inner ends of said probes while permitting adjustment in relative angular positions thereof in a common plane, bias spring means on said carriage means arranged to urge said probes one toward the other, linkage means on said carriage constructed and arranged to maintain the angular attitudes of said probes equal with respect to a median plane between the two probes which is prependicular to the aforesaid common plane in which they may be moved pivotally, a track member on which said carriage means is slidably mounted on straight linear movement therealong, and track mounting means mounting the foreward end of said track member to said housing for extension backwardly therealong from a plane of origin of the anode rod and for so aligning the probes that their median plane contains the centerline of the anode rod, said track mounting means being so constructed and arranged as to permit pivotal movement of said track member about an axis parallel to the plane in which said probes are disposed.

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