July 21, 1936. D. P. REDDING 2,048,221

VIEW OR READING BOX

Filed March 4, 1935

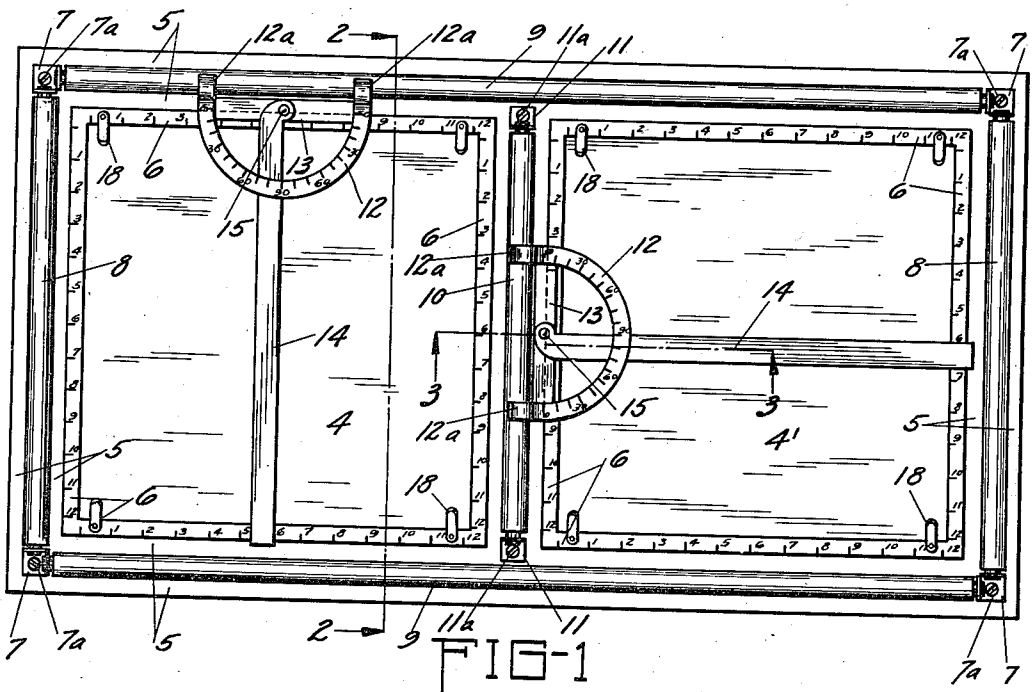


FIG-1

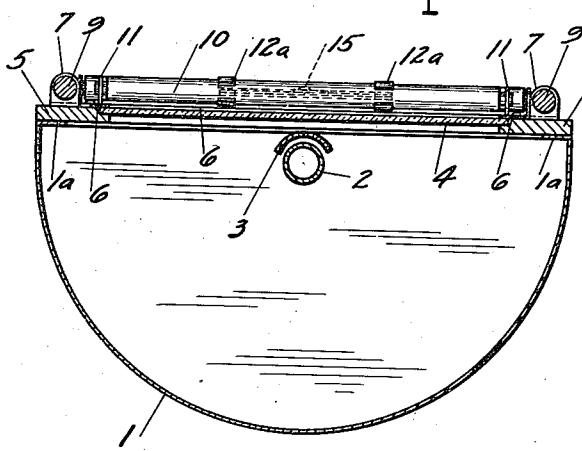


FIG-2

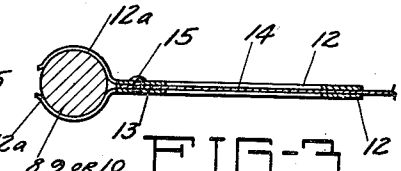


FIG-3

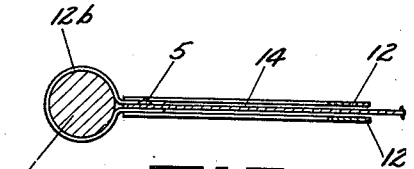


FIG-4

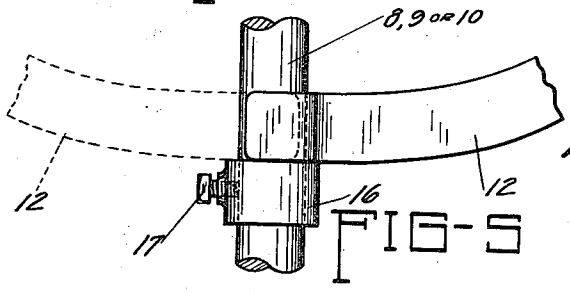


FIG-5

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UNITED STATES PATENT OFFICE

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VIEW OR READING BOX

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Application March 4, 1935, Serial No. 9,178

12 Claims. (Cl. 33—76)

My invention relates to improvements in view or reading boxes for the study of spinographs, skiagraphs or X-ray negatives of the human spine or vertebrae or other bony structures.

The objects of my invention are to provide improved means for lining up such graphs with reference to a given line to be utilized as a base line, for constructing or drafting base and other lines thereon and for determining the variation in angularity of the various lines so constructed or the angularity of imaginary lines to various points shown in the graphs, and for the ready comparison of angles and angular variation between various lines, either constructed or imaginary, between similar points on different graphs.

For convenience I use the term "graph" or "graphs" to include all kinds of pictures or representations of bony or other structures of the human body produced either by the use of X-rays with photographic negatives or plates or in any other way, including both negatives and positives, as well as prints, tracings, drawings and other reproductions of all kinds of parts of the human body, including particularly the spinal column and vertebrae.

I attain these objects by the means illustrated in the accompanying drawing, in which,—

Figure 1 is a front elevation of a reading-box with my improvement installed thereon;

Figure 2 is a cross-section on the line 2—2 of Figure 1;

Figure 3 is an enlarged sectional view of my hinged protractor and supporting rod showing the hinge on the line 3—3 of Figure 1, the hinge members being formed integral with the protractors.

Figure 4 is a similar view but shows an alternate form in which the hinge members are of tubular form having flanges which are united to the protractors;

Figure 5 is an enlarged detail showing a supporting collar adjustably secured to the column, 10, to form a gauge to support the protractor at a predetermined height.

My device comprises a box having a rectangular front frame, 5, united to a semicircular reflecting back, 1. The back, 1, is formed with flanges, 1*a*, at the edges thereof, to which the front, 5, may be attached by rivets, spot-welding or other suitable means.

The back, 1, is preferably formed of lightcolored or white sheetmetal or painted white or otherwise coated to give it considerable light-reflecting power.

The front frame comprises side and end strips and the side strips are joined at the middle by an intermediate strip.

All of these strips may be formed integral or may be formed separately and united together by any suitable means and may be either wood or metal as desired.

The intermediate strip divides the entire front into two rectangles substantially equal in size and glass plates, 4 and 4', are suitably mounted in the front frames to occupy said rectangles respectively.

Upon the inner edges of the frame surrounding each rectangle, I form or mount identical scales, 6.

Near the four corners of the front frame I attach brackets, 7, by screws or bolts, 7*a*, or other suitable means. These brackets are formed with upstanding ears on the two inner sides thereof.

In the ears I mount rods, 8, 9 and 10, which extend substantially the full length or width of the box. The rods, 8, 9, and 10, may have their ends reduced and pivotally mounted in the brackets, 7, or they may be rigidly secured in the brackets, 7, as desired by any suitable means. The rods, 8, 9 and 10, are preferably round so as to afford pivots for the sliding protractor units mounted thereon as hereafter described.

Each protractor unit comprises a protractor, 12, with scales mounted on each side thereof and a ruling arm or straightedge, 14, preferably marked with a numbered scale, pivoted at the center point of the protractor; or a pair of protractors, 12, with the ruling arm movable between them upon its pivot.

To the feet or outer ends of the protractors I mount hinged members which may be composed of two spring members, 12*a*, as in Figure 3 or of a tubular member, 12*b*, as shown in Figure 4.

When the spring members, 12*a*, are utilized, they should be of sufficient resilience to be readily snapped upon or removed from the rods, 8, 9 and 10, but when the tubular form, 12*b*, is utilized, it may be mounted upon the pivot rod before the pivot rod is secured in the brackets. In either case it is intended that the sliding members shall fit tightly enough upon the rods so that they will stay at any particular point at which they are left and so that the weight of gravity will not tend to move them therefrom.

The sliding protractor units may be mountable upon any of the rods, 8, 9 or 10, but in practice I prefer to provide one such unit to be retained permanently upon the rod, 10, and a removable unit to be mounted upon the upper rod, 9, or upon the lower rod, 9, or upon either of the end rods, 8, as desired.

The supporting rods, 8, 9 and 10, and the hinges, 12*a*, of the protractors, 12, are so proportioned that the straightedged arms, 14, will lie at a convenient distance above the surface of the glass or transparent fronts, 4 and 4', either for drawing lines or for adjusting the position of the films thereon, and it should be noticed that when constructed as described, the straight arm, 14, when carried by the intermediate rod, 10, will

lie at the same relative distance from the transparent front plate on either side of the box so that it may be easily reversed from one side to the other side and the carriage of the arm, 14, may thus properly be described as "reversible".

Clips, 18, are united to the upper strips of the rectangular face projecting downwardly so as to grip the X-ray negatives or graphs and secure them in adjusted position upon the glass plates, 4 and 4'.

Base lines may be established on the films by drawing a line from one point to another on the film and then placing the films or negatives in the necessary position upon the glass plates of the reading box so that lines drawn on the film will line up with corresponding figures or marks on the scales on the inner edges of the frame. Or if preferred the films or graphs may be placed upon the glass plates, 4 or 4', in any desired position and a base line established as mentioned above. Then by moving the protractor unit and arm, 14, until it is parallel with the line on the film, a reading on the protractor may be noted establishing the position of this line in degrees.

The arm may also be used as a guide or rule for drawing a line between desired points to be utilized as a base. The protractor unit may then be moved so that the arm, 14, may be used as a ruler to draw a line between the desired points upon any vertebra the angularity of which it is desired to obtain with reference to the base. The angles indicated by the protractor may then be compared and the difference computed.

In cases where it is desired to compare a given film or spinograph with an X-ray film, of the same area taken say thirty days before, the comparative changes are easily noticed. One film can be mounted upon one of the glass plates, 4 or 4', and the comparative film or a standard chart mounted upon the other one in the same relative position. The protractor unit on the rod, 10, may then be turned into contact with the chart or film used as a standard or comparative film, and the desired comparisons and observances made and noted. It can then be rotated on the rod, 10, and comparative observations made with the film or graph under observation on the other side and the variations computed.

My apparatus may also be used by utilizing a protractor upon the top rod for use in squaring the film, by drawing a line from the center of the odontoid of the axis, to the junction of the spinous process on the seventh cervical vertebra.

Also the film may be squared by placing the film so the base line is in line with the figure six, for instance, on the upper scale of the reading box and on the figure six of the lower scale. Another line may then be drawn from the junction of the spinous process of the axis to the center of the odontoid of the axis, and then by placing the protractor arm on the upper rod on this line, the reading on the protractor will show the amount of misalignment, if any, in degrees which represents the difference in these two lines.

The scales on the sides of the box may be used to advantage in squaring the base line on the atlas. This line is drawn from one inferior border or tip on the lateral mass to the other thus establishing the base line. When this line is so established, the protractor may be lined up with the base line established in a similar way on the occipital bone, and the reading of the protractor made to indicate the degree of side slipping of the atlas.

This apparatus is also useful to determine the line of drive to be used on a subluxated atlas, axis or other vertebrae.

Many other uses will suggest themselves to the competent chiropractor in actual use of the apparatus in connection with spinograph or X-ray films and I do not limit my apparatus to any particular uses but claim the apparatus described for any use to which it is applicable.

I claim:

1. A reading-box for X-ray or similar films, comprising an illuminated chamber having a pair of transparent plates secured in a rectangular front frame, an intermediate frame member secured in the frame parallel with the ends thereof, supporting rods mounted upon the respective side, end and intermediate frame members and parallel thereto each adapted to support a sliding carriage, a reversible carriage mounted upon the intermediate frame member and embodying a protractor with hinge members united thereto adapted to hinge the protractor upon the intermediate rod and to slide longitudinally thereon, a straight-edged arm pivoted upon and at the center point of the protractor, and means adapted to hold a negative or graph upon either of the transparent plates in position to have lines drawn thereon by the aid of the arm.

2. A reading-box for X-ray or similar films, comprising an illuminated chamber having a pair of transparent plates secured in a rectangular front frame, an intermediate frame member secured in the frame parallel with the ends thereof, supporting rods mounted upon the respective side, end and intermediate frame members and parallel thereto each adapted to support a sliding carriage, a reversible carriage removably mounted upon the intermediate frame member and embodying a protractor with hinge members united thereto adapted to hinge the protractor upon the intermediate rod and to slide longitudinally thereon, and a straight-edged arm pivoted upon and at the center point of the protractor.

3. A reading-box for X-ray or similar negatives, comprising an illuminated chamber having a pair of transparent plates secured in the front of a rectangular front frame, an intermediate frame member secured in the frame parallel with the end thereof, supporting rods mounted upon the respective side, end and intermediate frame members and parallel thereto each adapted to support a sliding carriage, a carriage removably mounted upon the intermediate frame member and embodying a protractor with hinge members united thereto adapted to hinge the protractor upon the intermediate rod and to slide longitudinally thereon, a straightedge pivoted upon and at the center point of the protractor adapted to serve as a ruler, corresponding numbered scales united to the frame members severally, and means adapted to hold a negative or graph upon either of the transparent plates in position to have lines drawn thereon by the use of the straightedge.

4. A reading-box for X-ray or similar negatives, comprising an illuminated chamber having a pair of transparent plates secured in the front of a rectangular front frame, an intermediate frame member secured in the frame parallel with the ends thereof, a supporting rod mounted upon the intermediate frame member and extending lengthwise thereof, a reversible carriage slidingly

mounted upon said supporting rod having formed integral therewith hinge members adapted to hinge said carriage upon the supporting rod and to slide longitudinally thereon, a protractor formed integral with said carriage and a straight-edged arm pivotally mounted upon the carriage and pivoted at the center point of the protractor, corresponding numbered scales united to the frame members severally at the inner edges thereof, and means secured to the frames adapted to hold a negative or graph upon either of the transparent plates.

5. A reading-box for X-ray or similar negatives, comprising an illuminated chamber having a pair of transparent plates secured in the front of a rectangular front frame, an intermediate frame member secured in the frame parallel with the ends thereof, supporting rods mounted upon the respective side, end and intermediate frame members and parallel thereto each adapted to support a sliding carriage, a slidable carriage removably mountable upon any one of the supporting rods and embodying a protractor with hinge members united thereto adapted to slide longitudinally thereon, a straightedge pivoted upon and at the center point of the protractor adapted to serve as a ruler, corresponding numbered scales united to the frame members severally at the inner edges thereof, and means adapted to hold a negative or graph upon either of the transparent plates in position to have lines drawn thereon by the use of the straightedge.

6. A reading-box for X-ray or similar negatives, comprising an illuminated chamber having a pair of transparent plates secured in the front thereof in a rectangular frame, an intermediate frame member secured in the frame parallel with the ends thereof, a supporting rod mounted upon the intermediate frame member and parallel thereto adapted to support a sliding carriage, a carriage slidably mounted upon the supporting rod and embodying a protractor with hinge members united thereto adapted to hinge the protractor upon the straightedge pivoted upon and at the center point of the protractor adapted to serve as a ruler, corresponding numbered scales united to the frame members severally, and means adapted to hold a negative or graph upon either of the transparent plates in position to have lines drawn thereon by the use of the straightedge.

7. A reading-box for X-ray negatives comprising an illuminated chamber having a pair of transparent or translucent front plates secured in a rectangular frame, an intermediate frame member secured in the frame between the plates and parallel with the ends of the frame, a supporting rod mounted upon the intermediate frame member and extending lengthwise thereof, a reversible carriage slidingly mounted upon said supporting rod having formed integral therewith hinge members adapted to hinge said carriage upon the supporting rod and to slide longitudinally thereon, a protractor rigidly united to said carriage and comprising a pair of semi-circular plates having a straightedged arm pivoted at their center point and slidable between said plates.

8. A reading-box for X-ray negatives comprising an illuminated chamber having a pair of transparent or translucent front plates secured in a rectangular frame, an intermediate frame member secured in the frame between the plates and parallel with the ends of the frame, a supporting rod mounted upon the intermediate frame member and extending lengthwise thereof, a reversible carriage slidingly mounted upon said supporting rod having formed integral therewith hinge members adapted to hinge said carriage upon the supporting rod and to slide longitudinally thereon, a protractor rigidly united to said carriage and comprising a pair of spaced semi-circular plates having a straight-edged arm pivoted at their center point and slidable between said plates, and means adapted to hold a negative or graph upon either of the plates.

9. A reading-box for X-ray negatives comprising an illuminated chamber having a pair of transparent or translucent front plates secured in a rectangular frame, an intermediate frame member secured in the frame between the plates and parallel with the ends of the frame, a supporting rod mounted upon the intermediate frame member and extending lengthwise thereof, a reversible carriage slidingly mounted upon said supporting rod having formed integral therewith hinge members adapted to hinge said carriage upon the supporting rod and to slide longitudinally thereon, a protractor rigidly united to said carriage and comprising a pair of spaced semi-circular plates having a straight-edged arm pivoted at their center point and slidable between said plates, and corresponding numbered scales united to the frame members severally.

10. In an apparatus for drafting, the combination with a flat plate adapted to form a support for one or more sheets of paper, celluloid films or similar objects, a transverse supporting rod mounted adjacent the plate at the middle thereof, a reversible carriage slidingly and pivotally mounted upon the supporting rod, a protractor united to the carriage comprising a pair of spaced semi-circular plates carrying suitable scales marked thereon, having a straightedged arm adapted for use as a ruler interposed between the plates and pivoted at their center points.

11. In an apparatus for viewing, comparing or marking X-ray negatives and graphs, a frame carrying a pair of flat plates, a supporting rod united to the frame mounted transversely thereof intermediate the plates, a reversible carriage slidingly and pivotally mounted upon the supporting rod, a protractor united to the carriage comprising a pair of spaced semi-circular plates carrying suitable scales marked thereon, having a straightedged arm adapted for use as a ruler interposed between the plates and pivoted at their center points.

12. In an apparatus for viewing, comparing or marking X-ray negatives and graphs, a frame carrying a pair of flat plates, a supporting rod united to the frame mounted transversely thereof intermediate the plates, a reversible carriage slidingly and pivotally mounted upon the supporting rod, a protractor united to the carriage comprising a pair of spaced semi-circular plates carrying suitable scales marked thereon, having a straightedged arm adapted for use as a ruler interposed between the plates and pivoted at their center points, and means for securing negatives or graphs upon the flat plates.

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