May 8, 1951 F. H. PULS 2,551,703

DIRECTOR AND POINTER FOR RONTGEN MACHINES AND THE LIKE

Filed Feb. 11, 1948 2 Sheets-Sheet 1

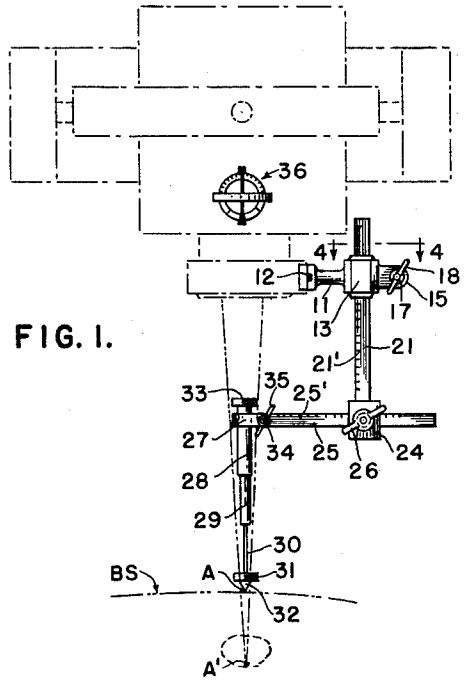


FIG. 1.

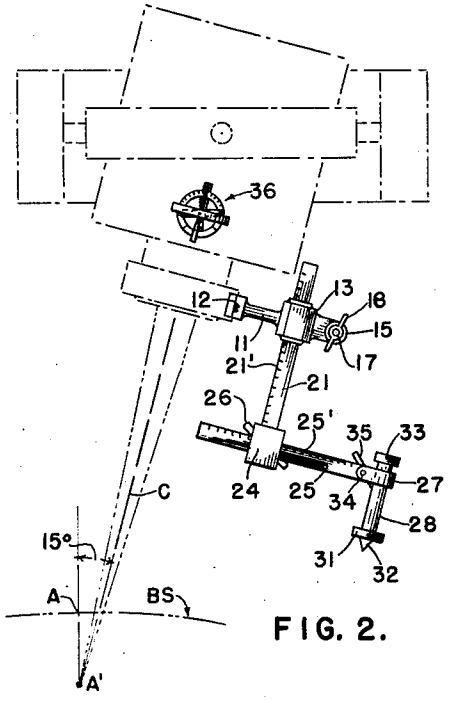


FIG. 2.

FIG. 3.

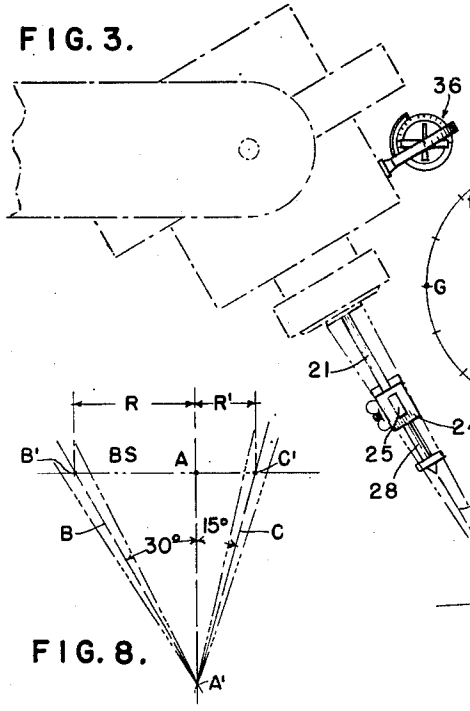


FIG. 7.

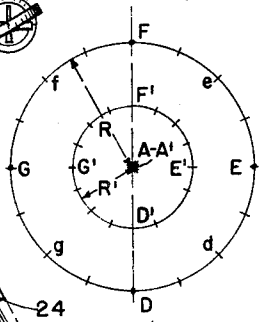


FIG. 4.

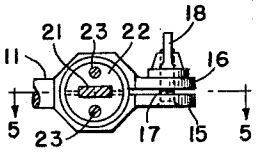
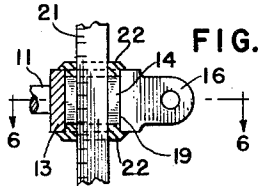


FIG. 5.



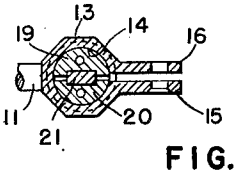


FIG. 6.

FIG. 8.

INVENTOR
FRED H. PULS,
BY Irving Seidman
ATTORNEY

May 8, 1951 F. H. PULS 2,551,703

DIRECTOR AND POINTER FOR RONTGEN MACHINES AND THE LIKE

Filed Feb. 11, 1948 2 Sheets-Sheet 2

FIG. 9.

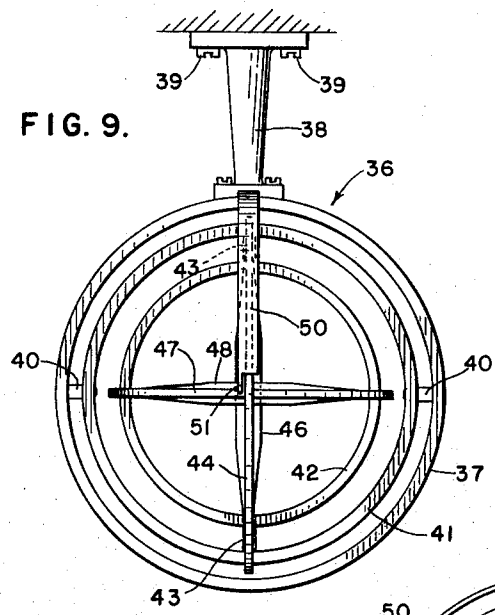


FIG. 10.

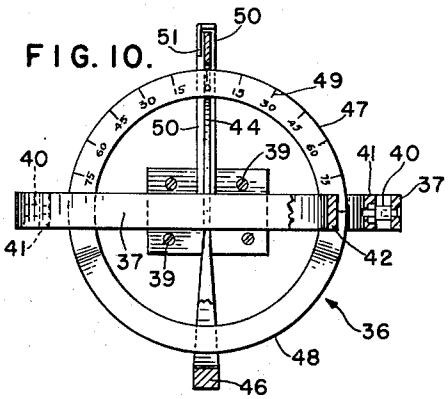


FIG. 11.

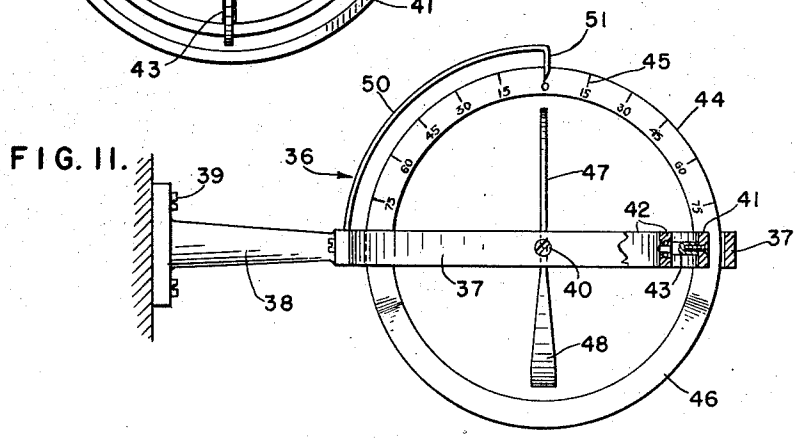


FIG. 12.

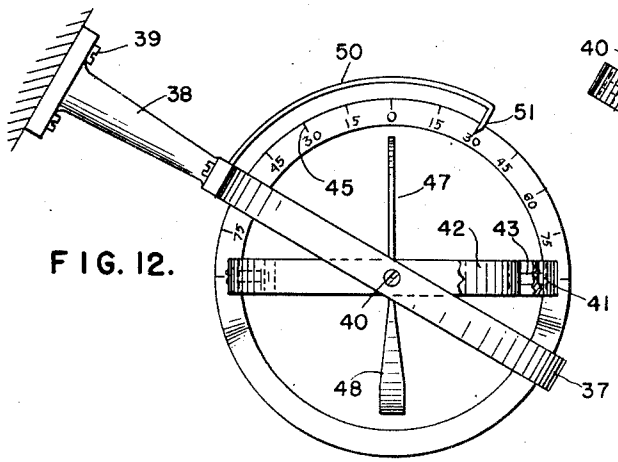
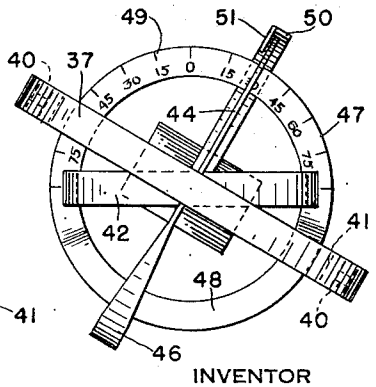


FIG. 13.



INVENTOR
FRED H. PULS,
BY Irving Seidman
ATTORNEY

Patented May 8, 1951

2,551,703

UNITED STATES PATENT OFFICE

2,551,703

DIRECTOR AND POINTER FOR RÖNTGEN MACHINES AND THE LIKE

Fred H. Puls, Richmond Hill, N. Y., assignor of one-third to Bernard Roswit, New York, N. Y.

Application February 11, 1948, Serial No. 7,593

1 Claim. (Cl. 250—64)

1

This invention relates to an attachment for an apparatus for treating parts of the body with Röntgen, radium or like rays and has particular reference to attachments for such apparatus whereby the rays from same may be positively directed to diseased portions of the human body without subjecting the sound and healthy adjacent tissues of the body to a prolonged exposure to the said rays.

An object of this invention is the provision, in an apparatus of the type described, of attachments thereon adapted to enable an operator to set the machine at previously determined angles so that the rays may be directed to diseased tissues, from various points, thereby avoiding the repetitious passage of the rays through the sound and healthy tissues adjacent to the diseased part of the patient's body.

Another object of this invention is the inclusion therein of an adjustable pointer and finder attached to the apparatus to positively locate the diseased spot which is to be treated by the rays.

A still further object of this invention is the provision of an organization in which the constituents elements are so arranged structurally and functionally as to assure improved results with materials and members which may be manufactured at reasonable cost, may be easily assembled and which will be efficient in operation with minimum wear to the parts.

The invention possesses other objects and features of advantage some of which, with the foregoing, will be set forth in the following description and in the claim wherein parts will be identified by specific names for convenience but they are intended to be as generic in their application to similar parts as the art will permit. In the accompanying drawings there has been illustrated the best embodiment of the invention known to me, but such embodiment is to be regarded as typical only of many possible embodiments, and the invention is not to be limited thereto.

The novel features considered characteristic of my invention are set forth with particularity in the appended claim. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

Figure 1 is a front elevational view of an X-ray apparatus having the direction finder and locating attachments thereon, the X-ray apparatus and part of the stand being shown by dot-dash lines.

2

Figure 2 is a similar view showing the X-ray apparatus slightly tilted.

Figure 3 is a side view showing the X-ray apparatus tilted forward.

Figure 4 is a detail sectional view taken along line 4—4 of Figure 1.

Figure 5 is a vertical sectional view taken along line 5—5 of Figure 4.

Figure 6 is a sectional plan view taken along line 6—6 of Figure 5.

Figures 7 and 8 are diagrams of charts used to determine the set of the machine and will hereinafter be described.

Figure 9 is an enlarged plan view of an angle gauging unit attached to the X-ray apparatus.

Figure 10 is a front elevational view of same.

Figure 11 is a side elevational view of same.

Figure 12 is a side elevational view of same showing the X-ray machine tilted rearwardly to an angle of 30° from the vertical.

Figure 13 is a view similar to that of Figure 10 but shows the X-ray machine tilted to the left to an angle of 30° from the vertical.

Referring in detail to the parts, 11 designates a bracket member which is attached to the X-ray machine by screws 12 and is formed with a block 13 having a circular central opening 14 and clamping flanges 15 and 16. A threaded pin 17 is fixed in one flange 15, engages through a perforation in the flange 16 and is provided with a thumb nut 18 to afford a means for clamping the said flanges 15 and 16 together. A swivel comprising two semi-circular members 19 and 20 (Figure 6) is adapted to rotate in the said central opening 14 and embraces a shaft 21 slidable through the said semi-circular members 19 and 20. Top and bottom shoulder members 22, through which the said shaft 21 engages, are attached, by means of screws 23, to the said semi-circular members.

The lower end of the said shaft 21, terminates in a block 24 having a central opening through which a shaft 25 slidably engages and is locked in any desired position by means of a thumb nut 26 threaded into the block 24. To the outer end of said shaft 25 there is pivotally attached, a collar or split ring 27 which holds, vertically movable therein, a telescopic unit comprising an upper tubular member 28, an intermediate tubular member 29 telescopically engageable within the said upper member 28 and a lower bar 30 in turn telescopically engageable within the said

intermediate member 29. To the lower end of the bar 30 there is attached a knob 31 to which a pointed button 32 of rubber or other suitable material is secured. A knob 33 is secured upon the upper end of the tubular member 28 and acts as a finger hold for adjusting the said tubular member 28 in the split ring 27. The said ring, as above stated, is pivotally attached, at 34, to the end of the shaft 25 and is held against movement by a thumb nut 35 which when loosened allows the telescopic pointer member to be folded back under the shaft 25.

A two way, self balancing protractor, angle measuring unit 36 comprising an outer ring 37 is secured to a bracket member 23 which is in turn fastened to an X-ray machine by means of screws 39. Pivotally attached, at 40, to the said outer ring 37 is an intermediate ring 41 while an inner ring 42 is pivotally attached to the said intermediate ring 41 at 43, the bearings 43 being in the same plane as the bearings 40 but arranged at right angles thereto. The said intermediate ring 41 carries upon it an annular or flat ring member 44 the upper half (both sides) of which is graduated and suitably marked, as at 45 to indicate degrees, the zero indication being manually at the top center of said ring 44. The lower part 46 of the said ring 44 is thickened sufficiently to overbalance, in weight, the upper half of said ring and the ring 44 is secured to the ring 41 in such manner that the plane of each ring is fixed at right angles to one another.

A second smaller ring 47 is fixed at a right angle upon the said inner ring 42 and is thickened at its lower half 48 to overbalance, in weight, the upper half of said ring 47. The said ring 47 has a right angular connection with the said ring 47. Graduations and numeral markings 49 upon both sides of the upper half of said ring indicate various degrees ranging from 0° at the upper center down each side to 90° at each quadrant. An arm 50 having a pointer 51 is attached, at one end, to the bracket 38 and extends over and part way around the ring 44.

Preliminarily to setting the apparatus to direct the X-ray to the diseased tissue upon the body to be treated, the physican in charge, prepares a chart (Figures 7 and 8) to plot the location of the diseased tissue and determine the angle at which the X-ray apparatus must be set and its distance from the tissue to be treated. The distance from the surface of the body to the exact location in the body of the diseased tissue is readily determined by X-ray photos taken in the usual manner. With these factors known the physician prepares a chart (Figure 7) in the form of a plan where A represents a point upon the body surface directly over the diseased tissue A^1 and in a vertical line which passes through the point A and the diseased tissue A^1. The distance from A to A^1 (Figure 8) being known, the physician determines the angle of the ray penetration which is indicated by ——- - - lines in the drawings. The long dash lines indicate the axis of the ray and in Figures 3 and 8 this axis line shows a ray projection of 30° from the vertical. In Figures 2 and 8 the line C indicates an angle of 15° from the vertical. Having determined the angle of direction in which to project the rays the physician, selecting the 30° angle for the ray penetrations inscribes a circle D, E, F, G (Figure 7) having a radius corresponding to the distance R of Figure 8. The reference letters D, E, F and G indicate the points of ray penetration when

the X-ray machine is set for a ray penetration of 30° to the vertical.

When, however, the physician selects the lesser angle of penetration, shown in Figure 8 where the axis line C of the ray indicates an angle of 15° he inscribes a circle D^1, E^1, F^1 and G^1 (Figure 7) having a radius equal to the distance R^1 of Figure 8, the markings D^1, E^1, F^1 and G^1 in this circle indicating the points of ray penetration at 15°. The distances from the point B^1 upon the axis B to the point A^1 or the distance upon the ray axis C from the point C^1 to A^1 may be readily determined by simple mathematical computation. The line BS in the various figures represent the outer surface of the body of the patient.

At this point the X-ray machine is set at the selected 30° angle and the shaft 25 carrying the telescopic pointer 28 is permanently set so that same alines with the axis of the ray from the X-ray machine. The shaft 21 may be adjusted to the required length the machine is to be set from the point A. Graduations 21' and 25' representing distances are provided upon the shafts 21 and 25 respectively. The distance of the X-ray machine is fixed by the cross-sectional area of the ray where it strikes the surface of the body at B^1. This cross-sectional area must coincide with the area, marked upon the body, indicated by the converging lines of the X-ray (Figure 8). The angle of inclination for the X-ray machine is readily established by the readings upon the swinging rings 44 or 47 depending upon the direction of the tilt.

With the apparatus adjusted as above set forth the pointer 32 is brought into contact with the body at a point D corresponding to the chart of Figure 7. The shaft 25 is swung about, in its swivel mounting 13, to a position approximately as shown in Figure 2 and the telescopic pointer 28 closed as shown when the machine is set for treatment.

Assuming that the first X-ray application is made at the point D, the second application is made at E, the third at F and the fourth at G, all at an angle of 30°. The next or fifth treatment may be made at A. This application, however is not made at an angle but in a vertical line directly above the diseased tissue as is clearly shown in Figure 1. After this fifth treatment the operator applies the next or sixth treatment at the point *d*, again at an angle of 30°. The following or seventh treatment is applied at *e*, the eighth at *f*, the ninth at *g* and the tenth treatment again at A in a direct vertical line. If further treatments are to be applied to the patient the ray is directed at the intermediate points in a consecutive order. It will be observed that, by the method above described, the healthy tissues which have been partially seared by the passage therethrough of the rays, will have ample time for restoration to a normally healthy condition before being again subjected to X-ray exposure.

The number of treatments applied to a patient is determined by the physician in charge and the actual application of the X-rays is made by an X-ray technician who operates the apparatus in accordance to the charts supplied.

I claim:

A bracket member comprising a member for attachment to an X-ray machine at a right angle to the axis of the ray of said X-ray machine, a split block having a circular central opening, clamping flanges on said block, a swivel

in said central opening adapted to rotate therein, clamping flanges having a tightening screw therein on said split block for tightening said block upon said swivel to prevent rotation of said swivel, a slidable graduated shaft adapted to slide in said swivel at right angles to said attaching member, a terminal block at the lower end of said slidable shaft, said terminal block having a central rectangular bore at right angles to the axis of said graduated shaft, a second graduated shaft slidably engagable through said opening in said terminal block, said second shaft at right angles to said first mentioned graduated shaft, a tightening screw upon said terminal block for tightening said second shaft against movement, a split ring upon an end of said second shaft, a tubular pointer having a multiplicity of retractable telescopic members the upper member of which is engageable through said split ring, said ring having tightening means for rigidly holding said upper member, the lowermost member of said telescopic members being tapered to a point.

FRED H. PULS.

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