

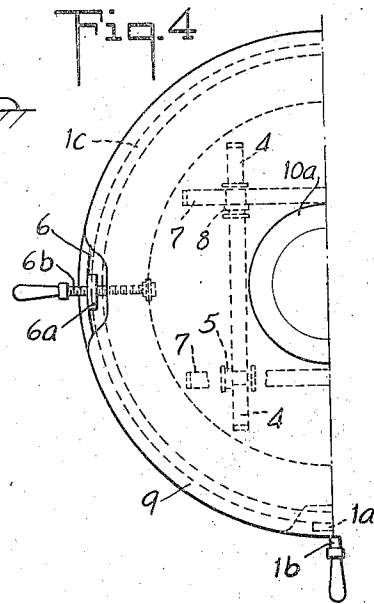
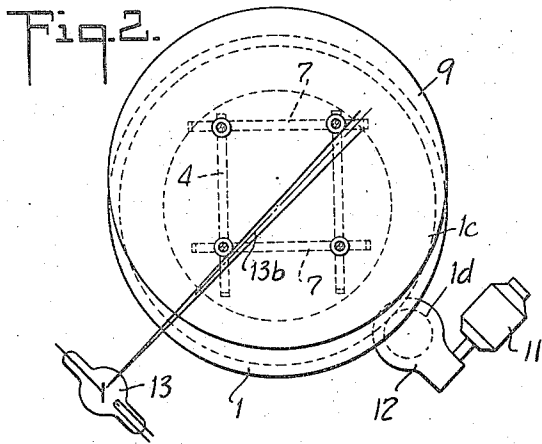
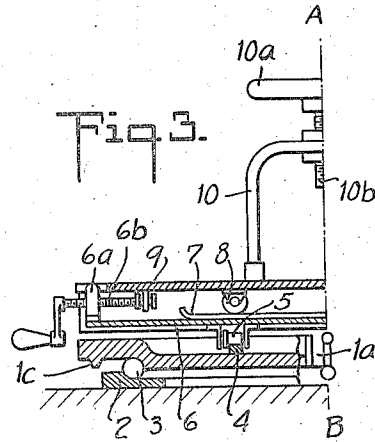
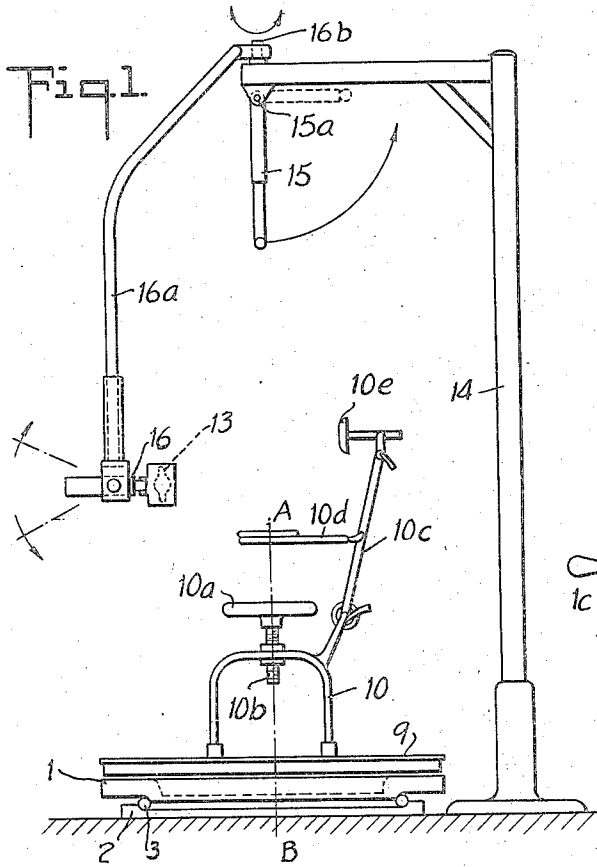
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ARRANGEMENT FOR THE EXECUTION OF DEEP X-RAY THERAPY

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## ARRANGEMENT FOR THE EXECUTION OF DEEP X-RAY THERAPY.

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In the case of deep X-ray therapy it is intended to direct a certain dose of rays to the seat of a morbid centre situated in the interior of the body, whereby the sound organs lying within the path of the rays are to be harmed as little as possible by the radiation. In order to achieve this end one proceeds in such a manner that the angle of incidence of the central ray of the tube for therapy is altered from time to time in such a way that the ray-beam, while always reaching the seat of the morbid centre, on its way to it penetrates various sound parts of the body, so that not one and the same part of the body is exposed during the whole duration of the treatment to the injurious action of the radiation. This procedure, is however, rather complicated and difficult to execute. Furthermore, within its execution exists the danger that in various positions of the central ray of the tube for therapy the ports of entry of the radiation cut one another. In order to obviate this hindrance it seemed advisable to create a continual turning or rotating motion between the tube for therapy and the seat of the morbid centre either by moving the tube in relation to the stationary seat of the morbid centre, or by moving the seat of the morbid centre in relation to the stationary tube. With such an arrangement the tube for therapy and the carrier of the patient are arranged in such a way in relation to one another, that the axis of rotation around which the motion is effected lies during the whole motion substantially in the centre of the useful ray-beam of the tube for therapy. The patient is placed on the carrier serving for his reception in such a manner that his seat of the morbid centre lies approximately and as exactly as possible within the crossing point of the axis of rotation and the central beam of the tube for therapy. In fact arrangements of the above mentioned kind, whereby a continual turning relative motion between tube and seat of the morbid centre is effected have already been proposed. They incorporated, however, such important hindrances, that they failed to find acceptance or approval. With the present invention these hindrances are obviated. It essentially consists in the fact that the carrier of the patient is arranged rotatable or turnable around a vertical axis and carries a treatment chair, and that this chair is shiftable in relation to the vertical axis of rotation along two horizontal guides forming a system of coordinates, that chair being adapted to be firmly secured in any desired position. The arrangement has the advantage that the tube for therapy remains stationary in the

chosen position, that the mechanical drive for operating the turning motion may be executed or designed in a very simple manner, that the putting in place of the seat of the morbid centre in respect of the axis of rotation as well as the focussing of the Röntgen-ray tube in respect of the seat of the morbid centre implies no difficulties whatever and that the carrier of the patient can at will either be turned in complete circles or only to and fro within a restricted arc angle.

The drawing shows a preferred embodiment of the invention.

Fig. 1 is a front view and

Fig. 2 is a top view of the complete arrangement, several details being omitted for sake of clearness.

Fig. 3 shows on a larger scale in front view the carrying means for the patient and

Fig. 4 is a top view corresponding to Fig. 3.

The carrier 1 of the patient has the form of a circular disk which is turnable or rotatable around the geometrical axis A—B. The base for the carrier 1 is formed by a circle-like rail 2. The carrier 1 is supported by roller bodies 3, either balls or rollers, towards the base ring 2. On the carrier 1 rests the pair of rails 4 which serves as support for the rollers 5. The rollers 5 are fitted to a plate 6, which carries the pair of rails 7 on which the rollers 3 are mounted. The rollers 3 support the plate 9 on which the treatment chair 10 rests. To plate 6 the support 6a is fitted carrying a spindle 6b. One end of the spindle 6b is anchored to the plate 9 in such a way as to enable it to be rotated and that its longitudinal shifting thereby sets plate 9 in motion in relation to plate 6. The opposite end of spindle 6b is fitted with a crank. A spindle 1b is fitted to the plate 6 equally to spindle 6a on the plate 9. The spindle 1b is carried by the support 1a which is fitted to the carrier 1 and it enables the shifting of plate 6 in relation to carrier 1, in the same way in which plate 9 may be shifted in relation to plate 6. Thus the treatment chair 10 is slidable relative to carrier 1 along two slide guides crossing normally one another and is carried by rollers 5 and 3. The whole arrangement corresponds in its construction with a cross-support. The screw spindles 1b and 6b enable not only an exact shifting of the treatment chair 10 along the two straight guide paths 4 and 7 forming a system of coordinates, but also the fixing of the chair exactly in the desired position. The carrier 1 is provided with a toothed ring 1c into which a spur wheel 1d engages. The

spur wheel 1*d* is driven by an electric motor 11 by means of a gear 12.

The tube for therapy is shown schematically in Fig. 2. It is arranged with respect to the carrier 1 in such a way that the axis of rotation A—B, around which the carrier 1 turns, lies substantially in the centre of the useful ray-beam 13*a* of the X-ray tube 13. The central ray 13*b* cuts exactly or approximately the axis of rotation A—B in a certain angle.

The X-ray tube 13 is placed in the usual manner inside of a protecting hood. The head of the hood, from which the rays emanate carries a screening device which makes it possible to conveniently vary the size of the useful ray-beam and to adapt it to the size of the seat of the morbid centre to be treated.

The seat 10*a* of the treatment chair 10 may be raised or lowered by means of a screw spindle 10*b*. The screw spindle 10*b* is arranged coaxially to the axis of rotation A—B. The back support 10*c* of the treatment chair is reversible and movable. It is fitted with arm supports 10*d* as well as with an adjustable head support 10*e*. If required the treatment chair 10 can easily be removed completely from plate 9.

The electric motor 11 may be controlled by a switch gear, by which the automatic operation of a periodical to and fro turning motion of carrier 1 is effected. Since automatic reversible switch gears of this kind are well known, it has been thought unnecessary to show it in the drawing.

A stationary column-like stand 14 is arranged adjacent to the carrier 1 and to the treatment chair 10. This stand is provided with a centering device 15, the adjusting axis of which is arranged coaxially to the axis of rotation A—B of the carrier 1. The centering device serves to bring the seat of the morbid centre of the patient within the axis of rotation A—B. In Fig. 1 a centering device is shown that may be telescoped, i. e. consisting of several members which may in the manner of a telescope be drawn out or pushed together. The centering device 15 may be rotated around the horizontal axis 15*a* and out of the space destined for the location of the patient. Fig. 1 shows the centering device in dotted lines in pushed together and out of the way position.

The stationary stand 14 carries furthermore an optical sighting device 16 which serves to adjust the direction of the central ray 13*b* of the Röntgen-ray beam 13. The sighting device consists for instance of a tubular body being provided with crossed threads or hairs. A diopter may equally serve as sighting device. The sighting device could also be supplied with a source of visible light, in order to be able to adjust by its aid the direction of the central ray of the Röntgen tube 13 by means of a screened beam of light rays. The sighting device is mounted adjustably on an arm 16*a*. The arm 16*a* is rotatable and its axis of rotation 16*b* is arranged coaxially with the axis of rotation A—B of the carrier 1 of the patient.

The centering arm 15 and the optical sighting device 16 could, instead of being mounted on a mutual stand 14, also be mounted on separate stands. The first named construction is however preferable. Furthermore, the column 14 could be readily joined to the base 2 of the carrier 1.

In using the arrangement the seat of the morbid centre of the patient is first of all brought within the axis of rotation A—B of the carrier 1 with the aid of the centering arm 15 by correspondingly shifting the treatment chair 10 along

its guides forming a system of coordinates. Thereupon the seat of the morbid centre is sighted by the aid of the optical sighting device 16 and thereupon the Röntgen tube 13 worked in such a way that the central ray 13*b* of the ray-beam 13*a* coincides exactly with the sighting line. After removal of the sighting device 16 the electric motor 11 is switched on. The seat of the morbid centre within the interior of the body of the patient is then turning on the spot and is continually exposed to the useful ray-beam 13, whereas the sound organs are reached by it only in passing by, obviating thereby any danger of their excessive irradiation.

It will be understood that any other device adapted to fix the patient in desired position may be substituted for the chair 10. Also, it will be apparent that the patient may be treated while in standing position as well as while seated. In all cases, however, it is desirable to provide some means for holding the patient in the desired position, or for guiding him in holding the proper position for treatment. Any number of such arrangements will suggest themselves to persons skilled in the art. Moreover, while the plate 9, and hence the chair 10, have been illustrated and described as being adjustable in two directions in a horizontal plane, it will be understood that adjustment in more than two directions may be provided if desired. To effect such adjustment, the perpendicular sets of rails 4 and 7, and intermediate plate 6, might be eliminated, plate 9 then being adjustably mounted on carrier 1 by means of ball bearings, or the like. These ball bearings are preferably mounted in such manner that their centers are fixed with respect to plate 9, so that the ball bearings and plate 9, and hence the patient-holding means, may all be desirably positioned with respect to carrier 1, and hence with respect to the axis of rotation.

Since many changes may be made in the invention without departing from the scope thereof, it is intended that applicant's disclosure be regarded as illustrative only, and not in a limiting sense, applicant limiting himself only as indicated in the appended claims.

I claim:—

1. In an arrangement for the execution of deep X-ray therapy, the combination of a tube for therapy, a treatment chair, a carrier supported by roller bodies for said chair, said carrier being adapted to be turned around a vertical axis, a motor for driving said carrier around said axis, said axis and said tube being arranged so that said axis is intercepted by the centre of the useful ray-beam of said tube, members providing straight guide paths substantially normal to said vertical axis for said chair in one direction, members providing straight guide paths substantially normal to said vertical axis for said chair in another direction at right angle to said before mentioned direction, roller bodies on both said guide paths for supporting said chair and means for shifting said chair along both said guide paths and fixing it in any required position with respect to said axis within both said guide paths.

2. In an arrangement for the execution of deep X-ray therapy, the combination of a rotatable carrier for a treatment chair, means for shifting said chair with respect to said carrier in longitudinal direction normal to the axis of rotation of said carrier, means for shifting said chair with respect to said carrier in transverse direction, an X-ray tube, the vertical axis of rotation of said carrier being arranged to be crossed by the central

ray of said X-ray tube, a stand carrying a vertical centering arm arranged coaxially with the said axis of rotation and an optical sighting device adapted to sight the said axis of rotation to facilitate the adjustment of said X-ray tube.

3. In an arrangement for the execution of deep X-ray therapy, the combination of a tube for therapy, a treatment chair, a carrier supported by roller bodies for said chair, said carrier being adapted to be turned around a vertical axis, a motor for driving said carrier around said axis, members providing straight guides for said chair in one direction normal to the axis of rotation of said carrier, members providing straight guides for said chair in a transverse direction normal to the axis of rotation of said carrier, roller bodies on both said guides, screw threaded spindles adapted to shift said treatment chair along both said guides, a stand carrying a vertical centering arm arranged coaxially with the axis of rotation of said carrier and an optical sighting device carried by said stand and being adapted to sight the said axis of rotation.

4. In an arrangement for the execution of deep X-ray therapy, the combination of a tube for therapy, a treatment chair, a carrier supported by roller bodies for said chair, said carrier being adapted to be turned around a vertical axis, a motor for driving said carrier around said axis, members providing straight guides for said chair in one direction normal to the axis of rotation of said carrier, members providing straight guides for said chair in a transverse direction normal to the axis of rotation of said carrier, means for shifting said chair along and fixing it in any required position within said guides, a stand carrying a vertical centering arm arranged coaxially with the axis of rotation of said carrier and comprising a plurality of members adapted to be telescoped and an optical sighting device carried from said stand by means of a rotatable arm, the axis of rotation of said arm being arranged coaxially with the axis of rotation of said carrier.

5. In an apparatus for the execution of deep X-ray therapy, an X-ray tube for therapy, patient supporting means, means for rotating said patient supporting means about a predetermined vertical axis, means for adjusting said patient supporting means in at least two directions in a horizontal plane with respect to said vertical axis, an indicating arm arranged above said patient supporting means, said indicating arm being stationary with respect to the horizontal adjusting movements of the patient supporting means and adapted to indicate the position of said patient supporting means with respect to said vertical axis, and means for securing the proper position of the X-ray tube for therapy with respect to said vertical axis so that its central ray will substantially intercept said vertical axis as long as the patient supporting means are rotated about same.

6. In an apparatus for the execution of deep X-ray therapy, an X-ray tube for therapy, patient supporting means, means for rotating said patient supporting means about a predetermined vertical axis, means providing horizontal guide paths for said patient supporting means in one direction, means providing horizontal guide paths for said patient supporting means in another direction, means for shifting said patient supporting means along said first mentioned paths and said second mentioned paths, an indicating arm arranged above said patient supporting

means, said indicating arm being stationary with respect to the horizontal adjusting movements of the patient supporting means and adapted to indicate the position of said patient supporting means with respect to said vertical axis, and means for securing the proper position of the X-ray tube for therapy with respect to said vertical axis so that its central ray will substantially intercept said vertical axis as long as the patient supporting means are rotated about same.

7. In an apparatus for the execution of deep X-ray therapy, an X-ray tube for therapy, patient supporting means, means for rotating said patient supporting means about a predetermined vertical axis, means providing horizontal guide paths for said patient supporting means in one direction, means providing horizontal guide paths for said patient supporting means in another direction, means for shifting said patient supporting means along said first mentioned paths and said second mentioned paths, a stand being arranged stationary with respect to said patient supporting means, a longitudinal indicating arm carried vertically by said stand and arranged above said patient supporting means and in alignment with said vertical axis, and means for securing the proper position of the X-ray tube for therapy with respect to said vertical axis so that its central ray will substantially intercept said vertical axis as long as the patient supporting means are rotated about same.

8. In an apparatus for the execution of deep X-ray therapy, an X-ray tube for therapy, patient supporting means, means for rotating said patient supporting means about a predetermined vertical axis, means providing horizontal guide paths for said patient supporting means in one direction, means providing horizontal guide paths for said patient supporting means in another direction, means for shifting said patient supporting means along said first mentioned paths and said second mentioned paths, a stand being arranged stationary with respect to said patient supporting means, a longitudinal indicating arm carried vertically by said stand and arranged above said patient supporting means and in alignment with said vertical axis, and optical sighting means for securing the proper position of the X-ray tube for therapy with respect to said vertical axis so that its central ray will substantially intercept said vertical axis as long as the patient supporting means are rotated about same.

9. In an apparatus for the execution of deep X-ray therapy the combination with rotatable patient supporting means and an X-ray tube, of members providing guide paths forming a system of coordinates for said patient supporting means, means for shifting said patient supporting means along said guide paths and fixing the same in any desired position within said guide paths whereby the morbid center to be treated may be brought into alignment with the axis of rotation of said patient supporting means, said X-ray tube being arranged to discharge its beam upon said morbid center and to intercept at said morbid center said axis of rotation.

10. In an apparatus for the execution of deep X-ray therapy the combination with patient supporting means, means for rotating said patient supporting means about a predetermined vertical axis and an X-ray tube, of means for adjusting said patient supporting means in a horizontal plane with respect to said vertical axis whereby

the afflicted body portion to be treated may be brought into alignment with said vertical axis, optical sighting means adjustably mounted to provide for sighting upon or toward said afflicted body portion when brought into alignment with said vertical axis, and means for directing the center beam emanating from said X-ray tube along the line indicated by said optical sighting means.

11. In an apparatus for the execution of deep X-ray therapy the combination with patient supporting means, means for rotating said patient supporting means and an X-ray tube, of means for adjusting said patient supporting means in a horizontal plane with respect to a predetermined vertical axis about which said patient supporting means is rotated, means for adjusting said patient supporting means in a vertical direction, and optical sighting means for sighting along said vertical axis to facilitate the adjustment of said patient supporting means in such manner that the afflicted body portion to be treated may be brought into alignment with said axis, the X-ray tube being arranged whereby its center beam may impinge upon said afflicted body portion and intercept said vertical axis.

12. In an apparatus for the execution of deep X-ray therapy the combination with patient supporting means, means for rotating said patient supporting means and an X-ray tube, of means for adjusting said patient supporting means in such manner that the afflicted body portion to be treated may be brought into alignment with the axis about which said patient supporting means is rotated, a centering device to facilitate the adjustment of said afflicted body portion into alignment with said axis, and an optical sighting device adjustably positioned and adapted to be trained upon the afflicted body portion and to intercept said axis, said X-ray tube being arranged to discharge its center beam in accordance with the adjustment of said optical sighting device so as to impinge constantly upon the afflicted body portion during rotation of said patient supporting means.

13. In an apparatus for the execution of deep X-ray therapy the combination with patient supporting means, means for rotating said patient supporting means and an X-ray tube, of means for adjusting said patient supporting means in such manner that the afflicted body portion to be treated may be brought into alignment with the axis about which said patient supporting means is rotated, a centering device to facilitate the adjustment of said afflicted body portion into alignment with said axis, an optical sighting device adjustably positioned and adapted

to be trained upon the afflicted body portion and to intercept said axis, supporting means for said optical sighting device, and means for mounting said X-ray tube upon said supporting means in such manner that the center beam emanating from said tube will be discharged in accordance with the adjustment of said optical sighting device to impinge upon the afflicted body portion constantly during rotation of said patient supporting means.

14. In an apparatus for the execution of deep X-ray therapy the combination with patient supporting means, means for rotating said patient supporting means and an X-ray tube, of means for adjusting said patient supporting means in such manner that the afflicted body portion to be treated may be brought into alignment with the axis about which said patient supporting means is rotated, a centering device to facilitate the adjustment of said afflicted body portion into alignment with said axis, said centering device comprising an elongated member lying along and in said axis, an optical sighting device adjustably positioned and adapted to be trained upon the afflicted body portion and to intercept said axis, supporting means for said optical sighting device, and means for mounting said X-ray tube upon said supporting means in such manner that the center beam emanating from said tube will be discharged in accordance with the adjustment of said optical sighting device to impinge upon the afflicted body portion constantly during rotation of said patient supporting means.

15. In an apparatus for the execution of deep X-ray therapy the combination with patient supporting means, means for rotating said patient supporting means and an X-ray tube, of means for adjusting said patient supporting means in such manner that the afflicted body portion to be treated may be brought into alignment with the axis about which said patient supporting means is rotated, a centering device to facilitate the adjustment of said afflicted body portion into alignment with said axis, an optical sighting device adjustably positioned and adapted to be trained upon the afflicted body portion and to intercept said axis, supporting means for said optical sighting device, and means for mounting said X-ray tube upon said supporting means in such manner that the center beam emanating from said tube will be discharged in the direction determined by the adjustment of said optical sighting device, whereby the discharge from said X-ray tube will continuously impinge upon the afflicted body portion during rotation of said patient supporting means.

FRIEDRICH DESSAUER.

CERTIFICATE OF CORRECTION.

Patent No. 2,145,686.

January 31, 1939.

FRIEDRICH DESSAUER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 73, claim 2, after the word "direction" and before the comma insert normal to the axis of rotation of said carrier; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of May, A. D. 1939.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.