

March 13, 1951

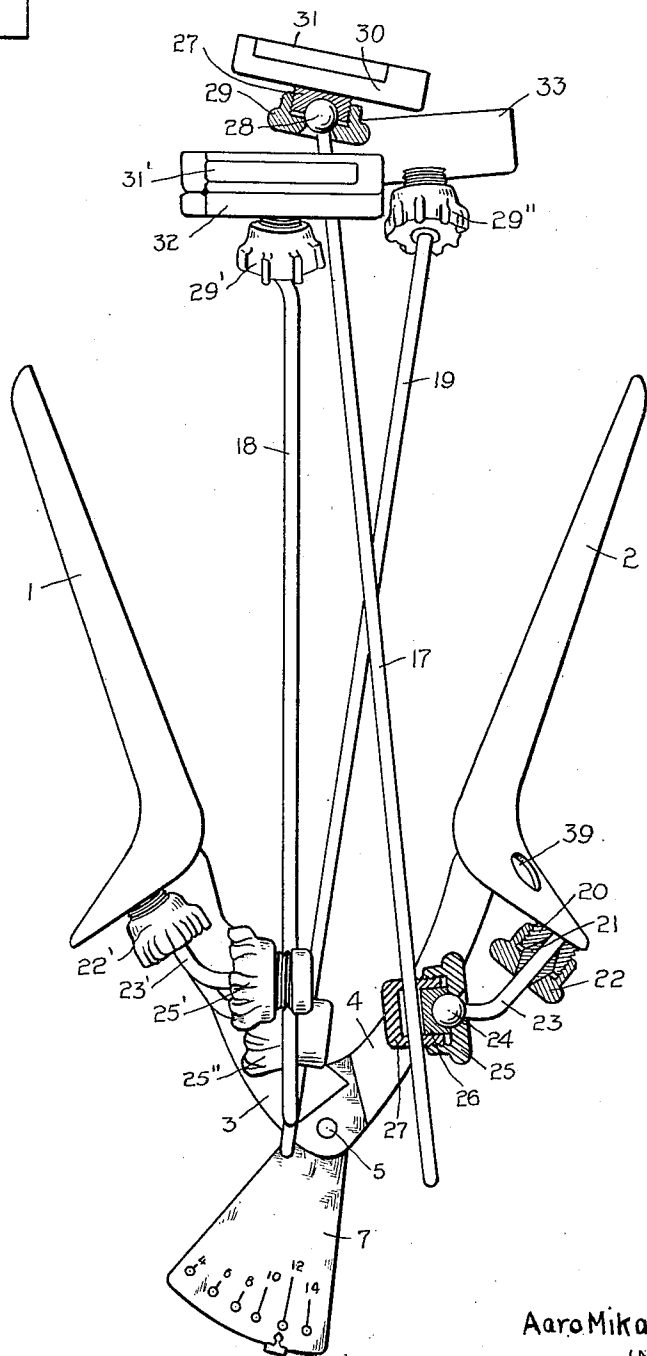
A. M. RITALA
APPARATUS FOR RADIUM THERAPY APPLIED
IN THE CAVITY OF THE BODY

2,544,939

Filed Aug. 22, 1946

3 Sheets-Sheet 1

Fig. 1.



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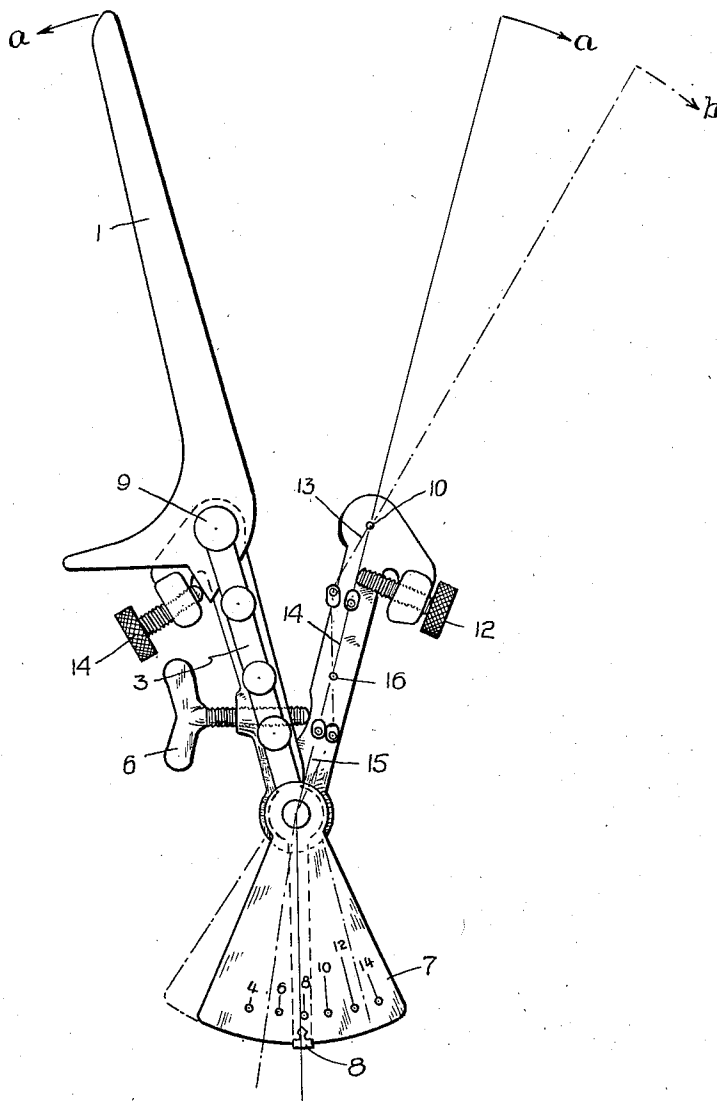
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FIG. 2.



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FIG. 3.

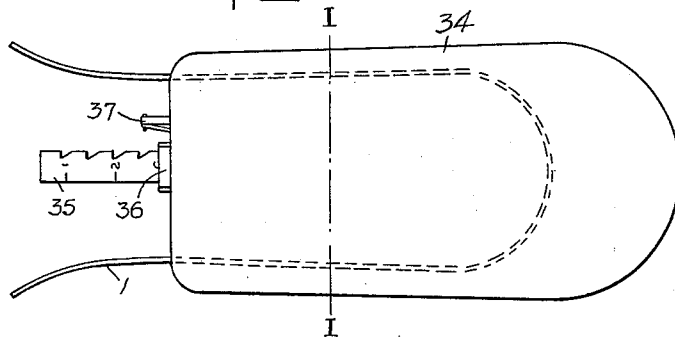


FIG. 4.



FIG. 5.

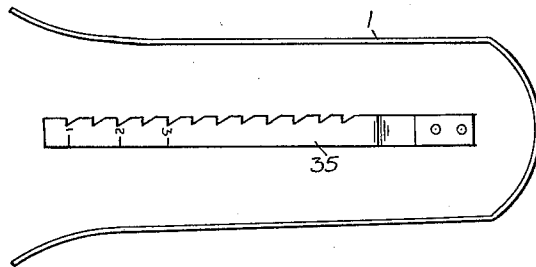


FIG. 6.

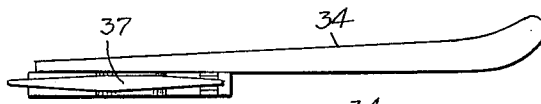


FIG. 7.

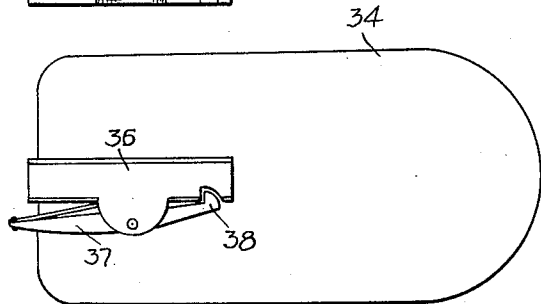
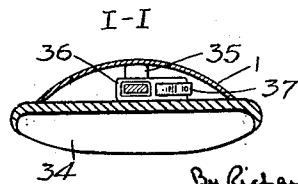


FIG. 8.



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UNITED STATES PATENT OFFICE

2,544,939

APPARATUS FOR RADIUM THERAPY APPLIED IN THE CAVITY OF THE BODY

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2 Claims. (Cl. 128—1.2)

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In giving radium treatment to patients with cancer it is often difficult to prevent the injurious effect of radium on healthy tissues and simultaneously treat the cancer with the radium as effectively as possible. This of course is the more difficult the deeper the cancer to be treated lies in some part of the human body. Up until now treatment of vaginal cancerous condition by means of radium packings surrounded by a lead casing 3 mm. thick, tamponed into place and radiating in all directions equal amounts of γ -rays per unit-area, have been usually used. The edges of the packing easily come into too close contact with the healthy, sensitive organs, e. g. in the case in question too close to the bladder or rectum or both, whereby the danger of injuring the last mentioned organs is very great, especially if the vagina is dilated laterally.

Research work done in this field has proven that while the effect of radium is directly proportional to the quantity of radium used and to the radiating surface area and to the length of radiation time it is inversely proportional to the radiation distance and to the thickness of the filtering medium that is used. In order to obtain an effective treatment of the carcinoma, the radium quantity, the area of the radiating field and the length of the radiation time should be increased as much as possible, while the injurious effect of the rays on healthy tissues is best avoided by increasing the radiation distance, while in other work the distance between the radium and the healthy tissues is effected by using a suitable filtering medium. The fulfillment of these conditions implies that the radium packing can be placed as precisely as possible into its specified position.

This invention relates to an apparatus for radium treatment applied in a cavity of the body, especially for vaginal carcinoma therapy, and the apparatus consists of a dilator (also called a distancer in the dorso-ventral direction) to which one or more adjustable supporters for the radium packing is detachably attached. In order that the apparatus be practical the provision of a scale is advisable, whereby the centre distance of the dilator arms can be read in centimeters. The arms of the dilator can be moved separately in such a way that the increase or decrease of the centre distance caused by the movement can be read, according to the invention, from the scale. In this way the centre distance of the outer dilator arms is always known.

The supporters, equipped with casings for the radium packings, are constructed in such a way that the length thereof, in other words the distance of the casing containing the radium pack-

ing from the fixing point in the back portion of the dilator, and the clearance angle thereof can be regulated. The casing for the radium packing is made of material absorbing γ -rays, e. g. lead, in such a way that one side or part of the casing is open thus forming a "window" where-through radiation is free. Thus the radium rays are directed towards the carcinoma itself in the most accurate and practical way. The heavy, lead casing keeps in place during the treatment because the position thereof is not dependent on certain tampons. During the whole treatment pus can flow away freely. After the dilator has been placed into the vagina and the dilation thereof has been effected dorso-ventrally (not laterally) the supporters of the radium casing or casings are fixed into position. For protecting the adjacent healthy tissues (the bladder and the rectum) a protective slab made of lead or some other suitable material can be attached to the arms of the dilator. These slabs vary in size and thickness and are used as the case may be.

The accompanying drawings illustrate a preferred embodiment and accessories pertaining thereto of the invention. Fig. 1 illustrates the dilator carrying three supporters for the casings containing the radium packings, the adjustment and fixing means being attached, and shown partly in section. Fig. 2 illustrates parts of the dilator not shown in Fig. 1, viz. the screws for moving the arms and the lever system, by means of which every movement of the arms is registered on a scale, for clearness sake partly schematically. Fig. 3 illustrates an arm of the dilator equipped with the protective slab, viewed from the inside of the dilator. Figs. 4 and 5 are side and plan views respectively of the arm of the dilator equipped with a locking device by means of which the protective slab is fixed. Figs. 6 and 7 are side and bottom plan views respectively of the protective slab and Fig. 8 is a cross section along line I—I of Fig. 3.

The arms 1 and 2 of the dilator are attached in a well known manner to handles 3 and 4 and turn around a common pivot 5 in such a way that the distance between said arms can be decreased or increased. This is achieved by means of screw 6 (Fig. 2). In order to adjust and fix the centre distance in a predetermined degree the one handle 4 of the dilator is provided with a scale 7 projecting from the pivot 5 while the extension of the other handle 3 is shaped into an indicator 8. The numerals on the scale indicate directly the centre distance of the arms of the dilator in centimeters. In addition to the fact that the arms 1 and 2 are able to turn around pivot 5, said arms may also be turned each

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around its own pivot 9 and 10 by means of screws 11 and 12 and also this movement affects scale 7 or indicator 8 by means of levers 13, 14 and 15 in the following manner: As an extension to the arm of the dilator there is a lever 13, the end of which is joined by means of a pin to lever 14. This lever is fixed by means of screw 16 to handle 4. The other end of lever 14 is joined by means of a pin to scale 7 and the end of the corresponding lever on the other handle is joined to the indicator 8. When the arms turn around pivot 5, lever 14 is out of operation, and both arms open at the same time in the directions indicated with arrows *a*. The dash lines and arrow *b* illustrate another opening position of the one arm and another position of the lever system pertaining thereto when screw 12 is turned.

Between the arms 1 and 2 there are three supporters with casings for the radium packings. The supporter rods 17, 18 and 19 (Fig. 1) are joined to the dilator by means of special screws. At the end of both arms 1 and 2 there is a conical screw 20 equipped with male threads and at said screw there is a clamping wedge 21. By tightening nut 22 the fixing pin 23 passing through said screw is fastened to the same. The cross section of fixing pin 23 is square and said pin is provided with a ball 24 at the other end. In socket 27 there are holes wherethrough the supporter rod 17 is run. When nut 25 is tightened the supporter rod 17 is fixed to fixing pin 23. Ball 24 makes possible the fixing of rod 17 into a quite determined position with regard to fixing pin 23. The other supporter rods 18 and 19 can be fixed in the same way by means of screws 25' and 25'' to the respective fixing pins. The third conical screw, not shown in the drawing, can e. g. be fixed to the handle 3 of the dilator.

The supporters for the radium packings themselves consist of casings fixed to the supporter rods 17, 18 and 19 by means of ball joints identical with the ones previously described. At the end of rod 17 there is a ball 28, fitting into a screw piece 27 fixed to the supporting case 30. Nut 29 fixes the ball to the screw. The supporter casings may vary in shape depending on the radium packing used, but all have a "window" opening to a certain direction or directions.

The cross section of casing 30 is a right angled box with walls and bottom made of lead or some other suitable material absorbing radium rays leaving "window" 31 free for radiation. By right angled box is meant casing 30, the parietal portions whereof lie in mutually substantially perpendicular planes. Casings 32 and 33 are intended for radium packings of a generally cylindrical or semi-cylindrical configuration and therefore have the form of half a cylinder with bottom or lid that can be opened and closed for inserting the packing therein.

If protection of the sensitive organs lying under the arms of the dilator from the rays be desired, protective slabs 34 (Figs. 3-8) made of lead or some other suitable material absorbing radium rays are fixed to the one or both arm or arms of the dilator. For fixing such a slab the inside of arm 1 is provided with a notched rod 35 where on cap 36 on the back side of the protective slab fits. A cog 38 on the lock 37 attached to the cap fits into the notch of rod 35. The protective slab can thus be fixed by pressing the lock and pushing the slab 34 along rod 35. The scale on rod 35 indicates the centre-distance of the slab 34 from the tip of the arm 1. The protective slab can thus be placed into po-

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sition after the dilator has been positioned and the protective slabs may vary in size and thickness. The aperture 39 on the other arm 2 of the dilator is for the canulizer of the bladder.

In detail the dilator can be constructed in a different manner without departing from scope and spirit of the invention. So e. g. the arms of the dilator can be of different shape. In the drawings the cross-sections of said arms are curved, but they can also be straight. The protective slabs can vary in size and be attached in a different manner. The casings for the radium packing may be of any desired shape that will afford the requisite "window" opening into one direction for the rays. The walls of the casing may vary in thickness in different directions. The casings may be attached to the rods in a different manner e. g. by placing the ball at the end of the arm into a spring socket provided in the casing wherein said ball can freely turn but where from it simply cannot detach itself.

I claim:

1. A therapeutic instrument for vaginal irradiation, comprising in combination a dilative portion and an applicative portion, said two portions being cooperatively mechanically interconnected so that separate and discrete control of the respective functions thereof is readily obtainable, the dilative portion including a plurality of interconnected arms mutually pivoted at a point situated without the body cavities when the instrument is in use, and provided with an arcuate scale adjacent said point and serving to indicate relative positioning of the dilative arms, and the applicative portion thereof including a plurality of arms situated between and directly supported by said dilative arms, means adjacent the extremity of each applicative arm within the body cavities for holding an irradiative instrumentality, and means for adjusting said applicative arms independently, whereby location of said irradiative instrumentalities may be determined at respective points remote with relation to the position of said dilative arms.

2. An instrument according to claim 1, wherein a radiation shield is located upon at least one of said dilative arms.

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