

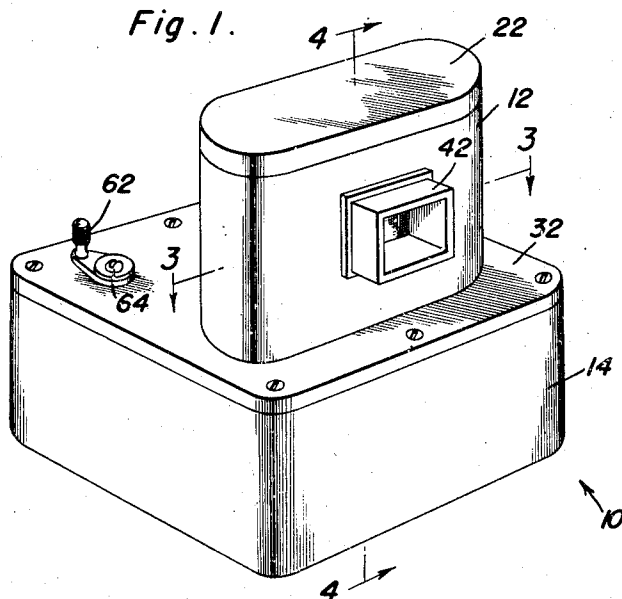
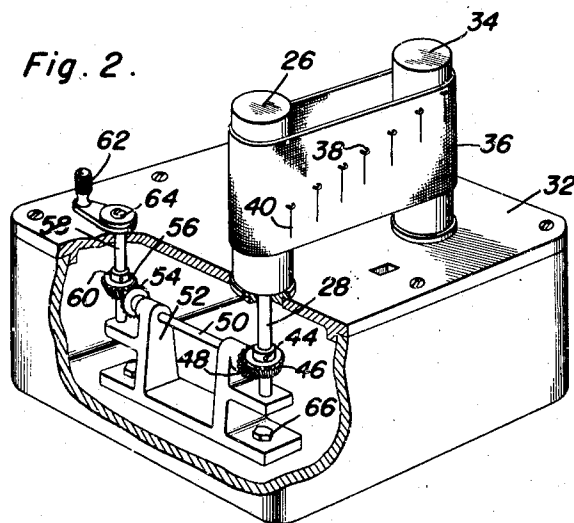
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RADIUM RAY APPLICATOR

2,484,433

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2 Sheets-Sheet 1



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Fig. 3.

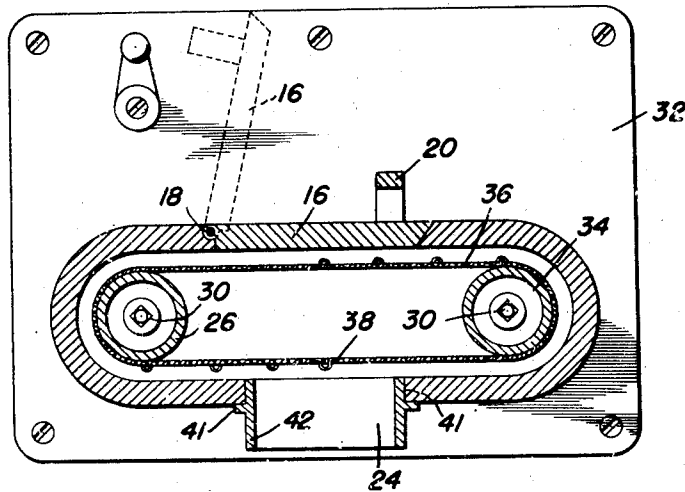
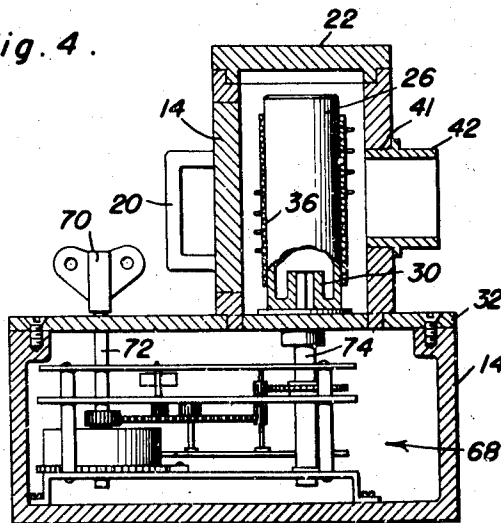


Fig. 4.



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RADIUM RAY APPLICATOR

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6 Claims. (Cl. 250-106)

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This invention relates to a device designed to increase to a maximum efficiency the emanation of radio-active rays and has as its primary object of the invention to provide a device that is capable of supplying radio-active rays of such elements or their isotopes, in a uniform intensity over a given area.

A further object of the invention is to vary the distance between the source of the radium rays to the patient in predetermined lengths and thereby vary the intensity of the rays emitted to desired amounts.

A still further object of the invention is to completely enclose the applicator in suitable materials, such as lead, so that there will be no escape or dissipation of the radio-active rays while an exposure area within the applicator serves to confine the therapeutic action to the limited area selected by the physician, and to incidentally protect the operator from the deleterious effects generally produced on continued unprotected exposure to radium rays.

Another object of the invention is to provide a device that is readily loaded and is simple in operation, durable in construction and inexpensive to manufacture.

Other objects and advantages of the invention will be apparent during the course of the following description.

Figure 1 is a perspective view of the device of the invention;

Figure 2 is a view similar to Figure 1 with the lead cover removed, and certain parts of the housing broken away to illustrate the rotating means;

Figure 3 is a horizontal view of the invention taken substantially along the lines 3-3 of Figure 1; and,

Figure 4 is a transverse sectional view of the invention taken along lines 4-4 of Figure 1 and illustrating a spring wound actuating means.

A major difficulty in the use of radio-active rays to combat disease is the difficulty in obtaining an even, intense radiation for a desired area through which the rays travel in the treatment of the patient. As a result, there is a tendency to over-expose parts of the surface being treated with the attendant danger of injuring the individual. This is true since the area of greatest intensity is at the mid-point with reference to the linear measurement of the radio-active material.

In order to overcome this difficulty, the radio-active needles used in the therapeutic treatment of an individual suffering from diseases such as cancer, which require the application of X-rays

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to destroy the malignant growth, are spaced so that the extremities thereof overlap and thus compensate for the reduced intensity at those points. This, of course, is determined by the particular materials used, although it has been found that a space between the radio-active materials of about 1 c. m. will give excellent results.

Referring to the figures, the device is shown generally at 10 and includes a lead housing 12, mounted on an actuating housing 14. Housing 12 may be of any desired thickness to assure proper protection of the operator, and it has been found that a lead housing of 8 mm. is adequate. Housing 12 is of oval shape and includes a door member 16 at the rear section thereof, pivoted at 18 by means of handle 20. A cover 22, also of lead, seals the rays produced within housing 12 except for a window 24 diametrically opposed to door 16. Thus, it is readily apparent that the only escape for the X-rays is through window 24.

A driven roller or cylinder 26 is mounted on a rotatable shaft 28 secured on bearing 30 of cylinder 26 and is supported on cover plate 32 of housing 14. In lateral alignment with roller 26 and spaced therefrom, as is clearly illustrated, is a drum roller 34. A relatively wide endless belt 36 is trained around cylinders 26 and 34 for a purpose soon to become apparent. Roller 34 is rotatively retained on plate 32 by suitable means similar to that used for roller 26, or in any desired manner. Belt 36 is of cotton or any desired material having a very low coefficient of absorption of X-rays. A plurality of cotton hooks 38 are fastened to, in staggered diagonal spacing, along the width of belt 36, and belt 36 is of such length as to allow only one complete set of diagonally arranged radio-active materials, or needles, 40 to depend therefrom. Thus, as is readily seen in Figure 2, the upper lengths of each needle 40 is adjacent the lower length of the next higher needles in the step-like or staggered arrangement of the radio-active material. In this manner the considerably weaker end portions of needles 40 are compensated gradually along their length by the adjacent end portions of similarly spaced needles so that a uniform intensity is obtained.

Belt 36 is so spaced from the outer edge of window 24 that the distance therebetween is equal to a predetermined length and, in this particular embodiment, is of 1 c.m. Window 24 includes edges 41 so constructed that they will readily receive in frictionally retained engagement, lead cone 42, of predetermined length. Thus, by the insertion of similar cones 42 of different lengths, generally in multiples of 1

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c.m., the area between radio-active needles 40 and the patient is varied according to the intensity of treatment needed.

Referring to Figure 2, shaft 28 has mounted thereon a collar 44 containing a bevel gear 46 meshing with a pinion 48 mounted on shaft 50 secured in bearings 52. Bearings 52 include pinions 54 mounted on the other end thereof, in engagement with a bevel gear 56, retained on shaft 58 by means of a collar 60. Shaft 58 extends through plate 32 and includes a rotating lever 62 suitably secured at 64. Bearings 52 are fixed to the base of housing 14 by means of bolts 66 or the like.

Figure 4 is drawn to the invention described above, except that instead of a manually operated means for rotating cylinder 26, a spring wound clock means, shown generally as 68 and of usual construction, is wound by means of a key 70 retained on a suitable shaft 72 and in cooperation with a shaft 74 by suitable gears, upon which cylinder 26 is rotatably mounted, in a manner similar to shaft 28 of Figure 2.

From the above description, the operation of the device becomes readily apparent. The radio-active materials 40 are mounted on belts 36, in the staggered relation disclosed in Figure 2, thereby obtaining a field of uniform intensity. Needles 40 are inserted by opening door 16 in the manner of the dotted lines shown in Figure 3, and when secured on hooks 38, the door is again closed and all radio-active rays produced are confined to housing 12. Window 24 is the only source of emission of these rays, and when an intense treatment is desired, the patient is brought directly into contact with window 24. However, should it be desired to reduce the intensity of the produced radio-active rays, lead cones 42 of correct dimensions, are frictionally secured within the edges 41 of window 24. The patient is thereby moved a predetermined distance from the source of the X-rays, as is desired. The device is then either rotated manually as shown at 62 or automatically as shown at 68.

It thus becomes readily apparent that the objects of the invention have been obtained in that the emitted radio-active rays are confined to a limited area of emission and are adjustable to reduce or increase the intensity desired. It is to be understood that the invention is not to be limited to the identical construction disclosed in the drawings, since it is obvious that various changes and modifications might be made therein without departing from the spirit and scope of the invention as defined in the claims.

Having described the invention, what is claimed as new is:

1. In a device controlling emission of radio-

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active rays, a lead housing, rotatable support rollers mounted in said housing, a belt low in radio-active ray absorption power retained on said rollers and means to rotate one of said rollers, said belt being made of cotton and having means received thereon to hold radio-active materials.

2. In a device controlling the emission of radio-active rays, a housing, a belt low in radio-active ray absorption power rotatably supported in said housing to secure ray producing materials, a window in said housing through which said rays emit, said housing including means to support spacing inserts to vary the distance between a patient and the source of rays.

3. The combination of claim 2, wherein the distance between the belt and the window is 1 c.m.

4. In a device controlling the emission of radio-active rays, a lead housing, a pair of spaced vertically extending rotatable support rollers mounted in said housing, an endless belt low in radio-active ray absorption power entrained over said rollers, means to rotate one of said rollers, means carried by said belt for retaining radio-active materials, a window in said housing through which the rays emit, and means in said housing to support spacing inserts to vary the distance between a patient and said belt.

5. In a device controlling the emission of radio-active rays, a lead housing, a pair of spaced vertically extending rotatable support rollers mounted in said housing, an endless belt low in radio-active ray absorption power entrained over said rollers, means to rotate one of said rollers, radio-active needles, hook means carried by said belt for retaining said needles in spaced relation on said belt, a window in said housing through which the rays emit, and means in said housing to support spacing inserts to vary the distance between a patient and said belt.

6. The combination of claim 5 wherein said belt is made of cotton and the distance between said belt and said window is 1 c.m.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
831,103	Ripperger	Sept. 18, 1906
1,352,198	MacLagan	Sept. 7, 1920
1,806,375	Tiedeman	May 19, 1931