

June 30, 1925.

1,543,859

E. D. LEMAN

RADIUM THERAPEUTIC DEVICE

Filed Oct. 27, 1922

Fig. 1,

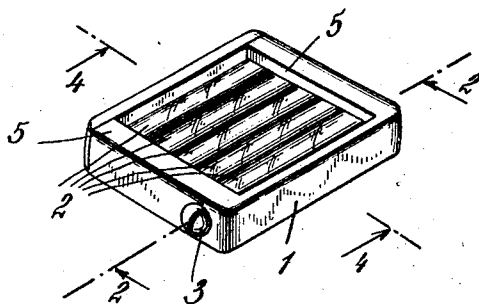


Fig. 2,

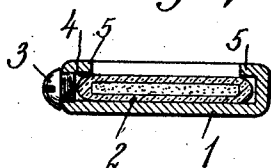


Fig. 3,

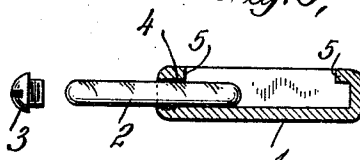


Fig. 4.

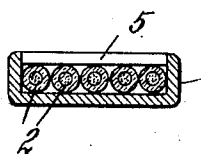


Fig. 5,

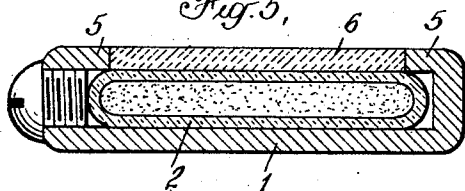
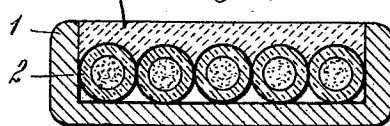


Fig. 6,



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UNITED STATES PATENT OFFICE.

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RADIUM CORPORATION, A CORPORATION OF DELAWARE.

RADIUM THERAPEUTIC DEVICE.

Application filed October 27, 1922. Serial No. 597,263.

To all whom it may concern:

Be it known that I, EDWIN DANIEL LEMAN, a citizen of the United States, residing at East Orange, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Radium Therapeutic Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a mounting or holder for radio-active material and has for one of its objects the provision of means for holding the radio-active material in a form adapted for utilization in exposing surfaces, such as skin surfaces, to the uniform action of radiations from radio-active material and adapted also to protect the radio-active material from injury and loss.

Holders or mountings for radio-active material adapted for applying radio-active radiations to diseased tissues of living organisms are ordinarily known as applicators and more commonly consist of sealed glass tubes containing the radio-active material surrounded by a metallic casing. Other forms consist of radio-active material incorporated in a suitable vehicle cemented or coated on rigid supports of various configurations, usually plates with more or less extended surfaces. Other forms of applicators comprise sealed glass tubes containing the radio-active material, supported and held in place by embedding them in plastic material such as bakelite or hard rubber.

Each of the foregoing types of applicators is open to various objections, especially when used for applying low-intensity radiations to extended areas of diseased or abnormal tissues on or near the surface of the skin. Thus the type of applicator which comprises a sealed tube enclosed in a metallic casing is open to the objection that in order to subject such tissues to uniform radiations of low-intensity, the applicator must be held at a considerable distance from the skin. This involves means for supporting the applicator at the required distance from the surface of tissues being treated and also frequently involves a calculation of the intensities of the radiation at different distances from the applicator. Other types are subject to equally serious objections. Thus the type of applicator compris-

ing a sealed tube or tubes embedded in a plastic mass is subject to unequal expansion due to heating or cooling, resulting oftentimes in the chipping of the mountings or the cracking of the sealed tubes and loss of radio-active material, whereas the types of applicators in which the radio-active material is incorporated in a suitable paint vehicle or cement attached or cemented to a rigid support are open to the objection that the radio-active material may be lost due to chipping off of the paint or cement from mechanical shock or unequal thermal expansion.

The applicator or mounting for radio-active material comprised within the present invention completely or largely overcomes the difficulties just referred to. In accordance with the present invention radio-active material, usually of low activity, is sealed in a plurality of tubes of glass or similar material and the tubes are mounted in a holder or shell in such manner that they present an extended effective radiating surface, as though mounted in the form of a thin layer or plate. By choosing radio-active material of the requisite low activity the applicator of the present invention may be placed directly upon the surface of the skin over the diseased tissue and held in place by a bandage or by hand for the appropriate period of time thus obtaining a uniform distribution of low-intensity radiations over a considerable surface without the necessity of supporting the applicator at a definite distance above the skin as with certain other types of applicators mentioned above. The shell or holder is constructed, preferably of metal and is provided with an opening through one side wall sufficiently large to allow the introduction into the shell or holder of a single tube at a time. The configuration of the interior of the shell or holder is such that each tube after being introduced into the shell may be rolled to one side of the opening by tipping the shell. The dimensions of the tubes in relation to those of the shell or holder are such as to allow for unequal expansion of the tubes and the holder so that no strain is imposed upon the former. The opening is provided with a suitable stopper or cover by means of which the opening may be closed after the introduction of the last tube (which will ordinarily lie opposite the opening) thus

preventing the latter from falling out through the opening when the tube is handled. The mounting or holder for the tubes, except for the opening, may be entirely enclosed, or a portion of one side wall parallel to the more extended surface of the layer of radio-active material formed by the tubes may be partially removed so as to interpose less obstruction to the passage of the radiation.

One embodiment of the present invention is illustrated in the accompanying drawing in which Fig. 1 is a view in perspective of the complete holder or applicator. Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1. Fig. 3 is a sectional view similar to Fig. 2 and illustrates the method of introducing and removing the tubes of radioactive material into and from the shell and shows the plug or stopper removed and one of the glass tubes partly removed from the casing, and Fig. 4 is a vertical sectional view taken on line 4—4 of Fig. 1. Fig. 5 is an enlarged view similar to Fig. 2 and Fig. 6 is an enlarged view similar to Fig. 4, the tubes of radio-active material being held in place by plastic material.

Referring to the drawing, 1 indicates the shell or rigid support adapted to contain the glass tubes 2, disposed parallel to each other and lying substantially in the same plane; 3 is a threaded plug or stopper adapted to close the opening 4 through which the glass tubes may be introduced into the shell, and 5 indicates a pair of oppositely disposed end flanges adapted to hold the tubes in position when the applicator is inverted as when applying the radiations to the surface of the skin.

It will be understood that the present invention is not restricted to the details of construction illustrated in the drawing but other constructions and arrangements of parts may be used in accordance with the broad features of my invention outlined above. The shell or container may be constructed conveniently of brass but other suitable material may be employed. It will be noted that in the form of the invention illustrated in the drawing, the walls and sides of the shell are constructed for the most part of a continuous sheet of material, but if desired the shell may be constructed in the form of lattice work or of wire netting or similar discontinuous support, the main function of the shell being to provide a means for supporting or holding the plurality of tubes of radio-active material in position so as to present an extended radiating surface in accordance with the main features of the invention already described.

In the modified forms of mounting illustrated in Figs. 5 and 6, the tubes of radio-active material are mounted in a shell in the ordinary manner, but it has been found in

many instances it is desirable to provide a mounting in which the tubes are more or less permanently held in position. It is found desirable also in some instances to provide such a mounting in which the surface of the applicator, which is to lie in contact with the skin, should be continuous rather than having an open face as is shown in Fig. 1. To accomplish this purpose a shell of the ordinary type, as has been previously described, will be employed. After the tubes have been placed therein, the open face of the shell will be filled with a plastic material indicated by the reference character 6, this material covering the upper surfaces of the tubes and being brought flush with the upper edges of the overhanging end flanges 5. Preferably the material employed for this purpose will be transparent so that the condition of the tubes may be ascertained readily and it has been found that a transparent bakelite or other plastic substance of that character is best adapted for the purpose. In the applicator so constructed, the tubes are firmly anchored against lateral movement and are protected from injury. At the same time, since that surface which is to be applied to the skin is smooth there is less likelihood of the patient suffering any discomfort. The tubes will be not only protected against injury from external sources but will be prevented from any possibility of lateral movement within the casing so that rubbing or other wearing contact is obviated. Should it be desirable to remove the tubes from the shell, the plastic material may be readily displaced by heating so that the old tubes may be withdrawn and new ones placed in position. It will be understood of course that the plastic material, which is selected for this purpose, will be of such a character as to yield, when the thermal expansion of the glass tubes occurs, thus insuring that the differences in the rate of expansion between the tubes and the shell will not result in injury to the tubes.

While the applicator of the present invention is peculiarly well adapted for the specific purposes hereinbefore mentioned it will be understood that it may be employed to advantage also for all the purposes and under all conditions for which applicators in general are used either in connection with radio-active material of high or of low activity as will be readily understood by those skilled in the art concerned.

I claim:

1. An applicator for applying radium radiations comprising a plurality of tubes containing radio-active material disposed side by side so as to present an extended effective radiating surface; and a flat casing supporting the said tubes and enclosing and protecting them, the applicator being adapted to have one flat side applied to

the body to be treated with the radiations.

2. A plurality of tubes containing radio-active material disposed side by side so as to present an extended effective radiating surface and supported in a loosely fitting substantially rigid casing adapted to allow for unequal thermal expansion of the tubes and the casing.

3. A plurality of tubes containing radio-active material disposed side by side so as to present an extended effective radiating surface and supported in a loosely fitting substantially rigid casing adapted to allow for unequal thermal expansion of the tubes and the casing, and provided with an opening for introducing the tubes into the casing and with means for closing said opening.

4. An applicator for applying radium radiations comprising a plurality of tubes containing radio-active material disposed side by side so as to present an extended effective radiating surface, and a flat casing supporting the said tubes and enclosing and protecting them, the casing being formed

to permit of removal of the tubes therefrom, the applicator being adapted to have one flat side applied to the body to be treated with the radiations.

5. A plurality of tubes containing a radio-active material disposed side by side so as to present an extended effective surface and supported in a loosely fitting substantially rigid casing having an open face, this opening being filled with a plastic material.

6. A flattened bundle of tubes containing a radio-active material disposed so as to present an extended effective surface and supported in a loosely fitting substantially rigid casing having an open face, this opening being filled with a mass of transparent plastic material lying flush with the external surface of said casing and having portions lying between the upper surfaces of the tubes.

In testimony whereof I affix my signature.

EDWIN D. LEMAN.