

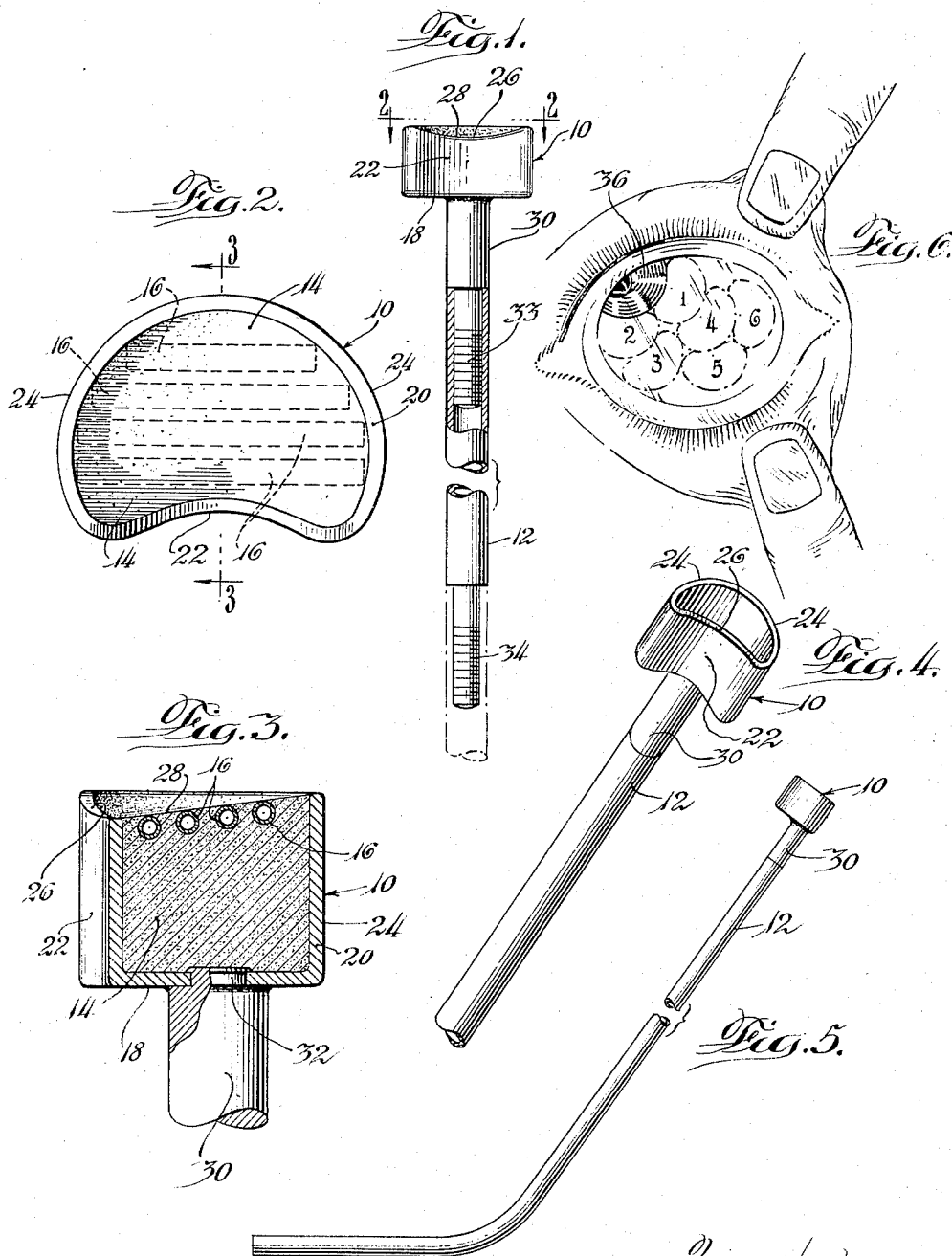
Aug. 8, 1950

J. R. HISSONG

2,517,568

EYE APPLICATOR

Filed Sept. 4, 1948



Inventor:
John R. Hisson
By *Hinkle, Horton, Alberg, Hansmann & Flapper*
Attorneys.

UNITED STATES PATENT OFFICE

2,517,568

EYE APPLICATOR

John R. Hissong, Chicago, Ill., assignor to Radium Chemical Company, Inc., New York, N. Y., a corporation of New York

Application September 4, 1948, Serial No. 47,896

6 Claims. (Cl. 128—1.2)

1

The present invention relates to therapeutic applicators and more particularly to an improved applicator capable of being used uniformly to expose a surface of the human body such as the eyeball to radiations from radioactive substances.

It has been found that certain afflictions of the eye, for example, conjunctivitis and papillomas may be effectively treated by subjecting the eyeball to radiations from radioactive materials. Heretofore instruments known as applicators have been devised for applying radiations to human tissue. In so far as I am aware, these applicators are so constructed that they present a flat surface from which the radiations emanate which surface is of rectangular or circular outline in cross section. Since the outer surface of the eyeball is spherical, it is impossible with applicators of the type heretofore devised to effect uniform exposure of the eyeball to radiations. Overlapping along certain areas is bound to occur if known applicators are used for this purpose with the consequent danger that portions of the eye will be overexposed and injured by burning.

Accordingly it is one of the primary objects of the present invention to provide an applicator for utilizing the curative effects of the radiations from radioactive substances which is particularly adapted for ophthalmic treatments.

Another object of the invention is the provision of a new and improved applicator for exposing surfaces to be treated to radium radiations, which has a surface from which radiations emanate conforming in contour to at least a portion of the surface to be treated so that direct contact between this emanating surface and the surface being treated may be had.

A further object of the invention is the provision of a new and improved shell or housing for holding radioactive materials in a form for utilization in exposing portions of the human body to radiations from the material. This housing is designed to protect the material from loss or injury and the person handling the same from harmful exposure, and it is capable of being so applied to the surface to be treated that uniform exposure of the surface to radiations is assured without any overlapping of the areas of exposure.

A still further object of the invention is to provide an applicator of the foregoing type having interchangeably usable handles to facilitate manipulation of the applicator so that it may be applied to arcuate or other curved surfaces without overlapping the areas of exposure and

2

without subjecting the operator to harmful exposure to the radiations.

A general object of the invention is the provision of a relatively simple and practical applicator that is durable in construction and inexpensive to manufacture and which makes use of a common and easily handled material as an imbedding agent for securing the radioactive substance in position so that it can readily be removed and replaced.

These and other objects, advantages and capabilities of the invention will become apparent from the following description wherein reference is had to the accompanying drawing, in which:

Fig. 1 is a side elevational view of the improved applicator of the present invention;

Fig. 2 is a plan view of the applicator housing on an enlarged scale taken in the direction of the arrows on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view of the applicator housing on an enlarged scale taken on the line 3—3 of Fig. 2;

Fig. 4 is a perspective view of the applicator;

Fig. 5 is a side elevational view of the applicator with a curved extension handle secured thereto; and

Fig. 6 is a more or less diagrammatic plan view of an eyeball illustrating the positions at which the applicator may be applied in effecting a treatment without overlapping.

Referring to Figs. 1 and 2 it will be observed that the applicator of the present invention comprises a protective shell or cuplike housing 10 having a generally rearwardly extending handle 12. The shell contains a mass of material 14 which forms a bed for supporting a plurality of tubes 16 containing a radioactive substance.

One of the features of the present invention is the improved shell or housing 10 above mentioned, the construction of which is best seen in Figs. 1 to 3. As there indicated, the shell has a rear wall 18 and a continuous peripheral side wall 20 which may be integral with the rear wall. All portions of the side wall are of arcuate shape in a plane normal to these walls, including an inner wall portion 22 and outer wall portions 24. The inner portion 22 of the side wall may be formed on a radius approximating that of the iris of a normal human eye which is in the neighborhood of 12 millimeters, and the outer portions 24 of the wall 20 are formed on a curve complementary to the curve of the inner portion of the wall for a purpose which will appear subsequently.

In addition to its curvature above mentioned, the outer edge of the side wall 20 defining the

open front end of the housing is dished or curved in a plane normal to the plane of the side wall 20 along the inner portion 22 of this wall, as indicated at 26 in Figs. 1 and 3. This curvature preferably corresponds approximately in radius to the curvature of the outer surface of the eyeball along the rim of the iris. As a result of these two curvatures in the side wall of the housing, the housing may be applied to the eyeball with the inner portion 22 of the side wall lying along the periphery of the iris and the front edges of the side wall including the dished or curved portion 26 in close contacting engagement with the eyeball. The advantages of this construction will be described later.

In order to protect the user or the person handling an applicator from harmful exposure to radiations from the radioactive substances contained in the housing, it is preferably formed from a protective material capable of screening out or stopping most, if not all, of the radiations so that such radiations emanate only from the open front end of the housing. I have found that silver is an inexpensive but satisfactory material from which the housing may be made, and when this metal is used the walls should be at least .75 millimeter thick. Other metals such as gold, platinum, brass, stainless steel or Monel metal may also be used, but different wall thicknesses are required with these metals to give the same protection afforded by silver walls of the thickness mentioned.

A radio-active substance of relatively high activity, such as radon gas, preferably is used as the source of radiations. This gas is sealed in the relatively small glass tubes 16 which are approximately .50 millimeter in diameter. These tubes may vary in length from 7 to 9 millimeters depending on the position they are to occupy in the applicator and are tightly sealed at opposite ends to prevent escape of the gas.

The tubes 16 are secured in position in the housing 10 adjacent its open front end by imbedding the same in a mass of material indicated at 14 with which the housing is filled. Any suitable material may be used for this purpose which is plastic and moldable at a relatively low temperature so that the tubes may be removed and replaced without too much difficulty. I have found that beeswax is a particularly suitable imbedding material because it is rigid at normal body temperatures and therefore does not soften when the applicator is applied to human tissue but it may be softened by heating the same somewhat above body temperature, thus making the material easy to mold.

In order to secure close contact between the applicator and the eyeball the outer surface of the wax is made flush at its edges with the front edges of the housing. It is molded between these front edges to a contour complementary to the contour of the portion of the eyeball which the applicator is capable of covering in one application. A contact surface 28 is thus formed for presentation to and contacting engagement with the outer surface of the eyeball. The tubes 16 are positioned immediately below this contact surface so that direct and intimate contact between the surface of the eyeball and the contact surface 28 is possible.

To facilitate manipulation of the applicator and further protect the person handling the same from exposure, the housing is provided with an anchor pin or stud 30 to which the extension handle 12 may be detachably and rigidly

secured. This anchor pin 30 is provided with a reduced portion 32 which extends through an aperture in the rear wall 18 of the housing 10 and the pin is rigidly secured with respect to the housing by peening the end of the reduced portion against the inner side of the back wall 18 of the housing and additionally by soldering these parts together. The outer end of the pin 30 is also of reduced diameter and is threaded, as indicated at 33 in Fig. 1.

The handle 12 may be made in one or more sections and may be curved as indicated in Fig. 5 to facilitate manipulation of the applicator. As indicated in Fig. 1 these extensions are of tubular construction and are threaded internally at one end for detachably but rigidly connecting the same to the threaded end 33 on the anchor pin 30. At their opposite end the handle sections may be provided with a projecting stud or pin 34 which is threaded to receive the internally threaded end of another section of the extension handle. As many sections of handle as desired may be used but normally the handle need be only long enough so that the operator's hand is at least 6" from the housing 10.

In order more clearly to illustrate the use of my applicator and its advantages over applicators of conventional construction, reference is made to Fig. 6 which shows in plan and more or less diagrammatically a human eye with the lids drawn partly back and the eyeball turned inwardly so that the iris indicated at 36 is to one side of center. Treatment of the eye may start at any place but it is preferable to start at the periphery of the iris and work away from this area. The contact surface 28 can be brought into intimate contact with the surface of the eyeball due to the fact that the inner portion 22 of the side wall of the housing is formed on a radius approximating that of the periphery of the iris and the edges of the side walls defining the open front end of the housing and the outer surface 28 of the wax bed 14 are contoured complementary to the portion of an eyeball which they cover when engaged therewith.

Furthermore, due to the fact that the inner portion 22 and outer portions 24 of the side wall are complementary, it is possible to treat the eye without overlapping any of the areas which have previously been exposed. For example, after treatment of the areas marked 1 and 2 in Fig. 6, the applicator may next be moved to the position marked 3 with the inner portion 22 of the side wall 20 lying along the boundary of the area enclosed by the outer wall portion 24 during the time the applicator was in No. 2 position. Since the curves of these inner and outer wall portions are complementary, the applicator may be so positioned that substantially the entire eyeball is treated without any overlapping of the areas to which the applicator is applied. This is further illustrated by subsequent location of the applicator at the positions marked 4, 5 and 6 in Fig. 6.

While I have illustrated and described a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention and I do not wish to be limited to the precise details set forth but desire to avail myself of all changes within the scope of the appended claims.

I claim:

1. An applicator for applying radiations from radioactive substances to an eyeball, comprising a hollow casing having an open front side bounded by an eye-contacting edge, said edge in

the general plane thereof being concave in one portion and convex in the remainder, said concave portion having a curvature in said general plane substantially the same as that of the corneal margin, said concave portion also being dished below said general plane so as to possess a curvature substantially complementary to the sphericity of an eyeball at the corneal margin, said casing forming a housing for radioactive material.

2. An applicator for applying radiations from radioactive substances to an eyeball, comprising a hollow casing having an open front side bounded by an eye-contacting edge, said edge in the general plane thereof being concave in one portion and convex in the remainder, said concave portion having a curvature in said general plane substantially the same as that of the corneal margin, said concave portion also being dished below said general plane so as to possess a curvature substantially complementary to the sphericity of an eyeball at the corneal margin, said convex portion having a part thereof formed with the same curvature as the curvature of said concave portion, said casing forming a housing for radioactive material.

3. An applicator for applying radiations from radioactive substances to an eyeball, comprising a hollow casing having an open front side bounded by an eye-contacting edge, said edge in the general plane thereof being concave in one portion and convex in the remainder, said concave portion having a curvature in said general plane substantially the same as that of the corneal margin, said concave portion also being dished below said general plane so as to possess a curvature substantially complementary to the sphericity of an eyeball at the corneal margin, said casing being elongated and having a convex front and convex ends of the same curvature as said concave front, said casing forming a housing for radioactive material.

4. An applicator for applying radiations from radioactive substances to an eyeball, comprising a hollow casing having an open front side bounded by an eye-contacting edge, said edge in the general plane thereof being concave in one portion and convex in the remainder, said concave portion having a curvature in said general plane substantially the same as that of the corneal margin, said concave portion also being dished below said general plane so as to possess a curvature substantially complementary to the sphericity of an eyeball at the corneal margin, said casing forming a housing for radioactive material, and a handle on said casing for manipulating said applicator.

ricity of an eyeball at the corneal margin, said casing forming a housing for radioactive material, and a radioactive substance located in said casing.

5. An applicator for applying radiations from radioactive substances to an eyeball, comprising a hollow casing having an open front side bounded by an eye-contacting edge, said edge in the general plane thereof being concave in one portion and convex in the remainder, said concave portion having a curvature in said general plane substantially the same as that of the corneal margin, said concave portion also being dished below said general plane so as to possess a curvature substantially complementary to the sphericity of an eyeball at the corneal margin, said casing forming a housing for radioactive material, means for securing a radioactive material in said casing to effect maximum radiation therefrom, including a readily moldable material filling said casing to the edges of said open front side, said material being adapted to be formed between said edges to present an exposed contact surface complementary to at least a portion of the surface to be treated, and radioactive material imbedded below said surface.

6. An applicator for applying radiations from radioactive substances to an eyeball, comprising a hollow casing having an open front side bounded by an eye-contacting edge, said edge in the general plane thereof being concave in one portion and convex in the remainder, said concave portion having a curvature in said general plane substantially the same as that of the corneal margin, said concave portion also being dished below said general plane so as to possess a curvature substantially complementary to the sphericity of an eyeball at the corneal margin, said casing forming a housing for radioactive material, and a handle on said casing for manipulating said applicator.

JOHN R. HISSONG.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,406,488	Pugh	Feb. 14, 1922
1,525,158	Viol	Feb. 3, 1925
1,543,859	Leman	June 30, 1925