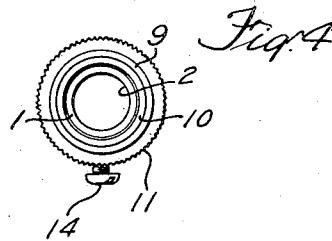
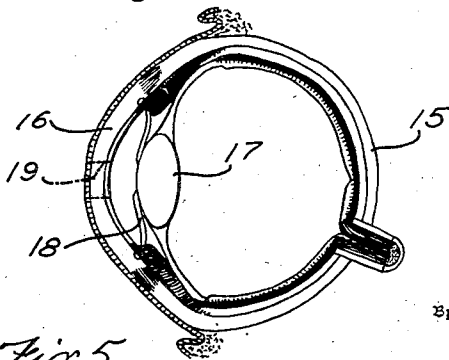
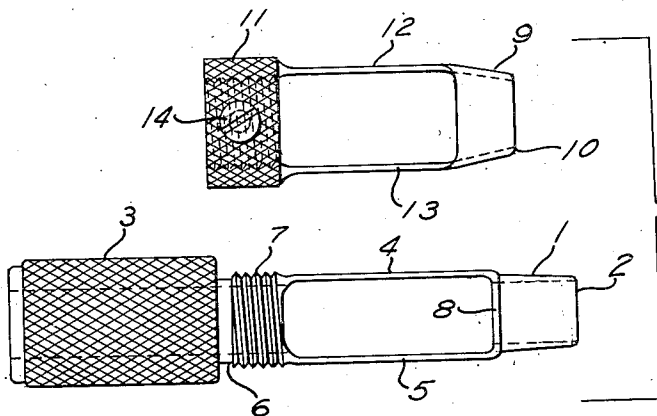
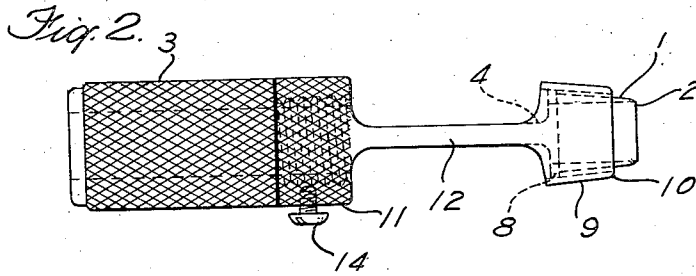
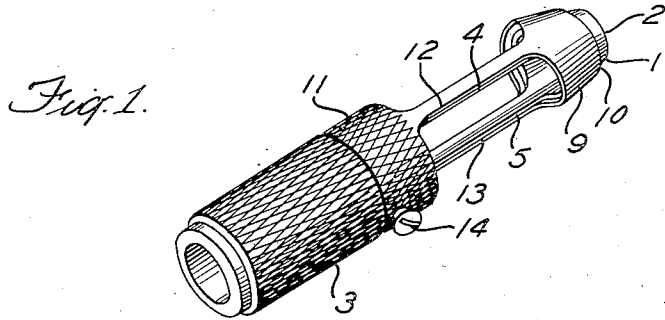


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CORNEAL TREPHINE
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CORNEAL TREPHINE

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8 Claims. (Cl. 128—310)

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The invention herein disclosed relates to a corneal trephine that is particularly adapted for removing a section of the cornea of the human eye.

In transplanting the cornea of the eye of a donor to that of a recipient, a section of the cornea of each eye is removed. The section taken from the donor's eye is inserted in the opening made in the cornea of the recipient's eye and held therein by stitches. In performing such an operation care must be taken that the section removed from the donor's eye will fit the opening made in the eye of the recipient, and also that the lens and iris of the recipient's eye is not injured in cutting through the cornea.

By the invention herein disclosed, there is provided a corneal trephine that is provided with an adjustable stop that helps to prevent cutting through the cornea of the eye a sufficient distance to injure the lens or the iris of the eye; that protects the cutting edge of the trephine while it is being sterilized; and that is removable for maintenance and cleaning. In accordance with the invention, a trephine is provided with a hollow end section having a circular cutting edge with which an adjustable stop is associated, the stop forming a circumambient shoulder about the hollow end section spaced from the cutting edge thereof. The stop is adjustable to vary the distance of the shoulder from the cutting edge of the end section. In addition, the stop protects the cutting edge of the trephine from contact with hard surfaces such, for example, as when the trephine is placed in a sterilizer.

A corneal trephine constituting one specific embodiment of the invention is illustrated in the accompanying drawing and described in detail below, from which description a clearer understanding of the invention may be had.

The drawing includes:

Fig. 1 which is a perspective view of a trephine embodying the invention;

Fig. 2 which is a side elevation of the same showing the trephine of Fig. 1 rotated about its longitudinal axis through substantially ninety degrees;

Fig. 3 which is an enlarged, side elevation of the two parts making up the trephine;

Fig. 4 which is an end view from the cutting edge of the trephine; and

Fig. 5 which is a sectional elevation of a human eye.

In general, the trephine illustrated in the drawing includes a hollow cylindrical end or cutting section 1, having a razor-sharp knife edge

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2, and a finger piece or handle 3 united to the cylindrical end section and by means of which the trephine may be manipulated. The outer surface of the cutting section of the particular trephine illustrated is tapered slightly from the knife edge toward the handle for the purpose of ease in resharpening the knife edge. Desirably, the handle is spaced axially from the end section. Spaced, uniting elements 4 and 5, formed integral with the end section 1 and the handle 3, unite the handle and the end section.

The handle 3 is hollow and knurled on its outer surface. A portion 6 of reduced diameter is formed at the end of the handle, the end toward the end section 1, and it has a thread 7 formed thereon. The uniting elements 4 and 5, which are diametrically opposite each other, extend from the end of the portion 6 to the adjacent end of the cutting section 1. As illustrated, these uniting elements are rather narrow and thin. The inner and outer surfaces thereof are respectively cylindrically concaved and convexed. A slight circular shoulder or ring 8 is formed at the cutting section with which the uniting elements are integral. The distance between the inner surfaces of the uniting elements 4 and 5 is equal to the diameter of the bore through the portion 6 and the hollow cylindrical end section 1. The bore through the handle is made slightly larger to reduce the weight of the trephine. By providing a bore through the trephine and the opening provided by the uniting elements 4 and 5, particles are readily removed and the instrument is readily cleaned.

The trephine illustrated in the drawing is provided with a stop. Primarily, this consists of a circumambient shoulder surrounding the cutting section and spaced the required distance from the knife edge 2 which is adjustable with respect to the knife edge. The particular stop illustrated includes a cylindrical portion 9, slightly tapered, which surrounds a part of the cutting section 1 and forms a circumambient shoulder 10 around the cutting section spaced from the cutting edge 2; a hub 11 spaced from the portion 9; and two spaced longitudinal uniting elements 12 and 13 uniting the portion 9 and 11. The hub is threaded internally and screwed on to the portion 6 extending from the handle. By means of this threaded engagement, the stop may be adjusted to vary the distance of the shoulder 10 from the cutting edge 2. A set screw 14 serves to secure the hub 11, when positioned, against relative movement with respect to the handle.

The uniting elements 12 and 13 are of the same

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length as the uniting elements 4 and 5. Like the uniting elements 4 and 5 they are diametrically opposite and their inner surfaces are cylindrical on a radius substantially equal to the radius of the convexed outer surfaces of the elements 4 and 5. In addition, the elements 12 and 13 are of the same width as the elements 4 and 5.

In Fig. 5 of the drawing a human eye is represented in general form. The eye ball, so called, consists of a sclerotic coat 15 that is extended in front as a transparent coat 16 which constitutes the cornea. A lens 17 of transparent, elastic substance is behind the cornea, spaced therefrom. Within the space between the cornea and the lens, there is aqueous fluid. Extending over the front of the lens is the iris 18.

The trephine of this invention, described in detail above, is primarily for the purpose of removing a section 19, circular in configuration, from the cornea of the eye. With the recipient in readiness, and the donor's eye available, the surgeon, using the trephine, removes one or more sections of the cornea of the donor's eye and a similar sized section of the recipient's eye. This is accomplished by rotating the trephine forcing the knife edge 2 of the cutting section 1 of the trephine through the cornea of the donor's eye and subsequently through the cornea of the recipient's eye. If a complete round section is not obtained, the section is completed by means of specially made scissors. The corneal section so removed from the donor's eye will exactly fit the opening made in the cornea of the recipient's eye in which it is placed and therein held by stitches. The shoulder 10 formed by the stop helps to prevent cutting through the cornea a sufficient distance to cut or injure the lens 17 or the iris 18 of the eye.

Due to the hollow construction of the trephine and the fenestration defined by the uniting elements thereof a section of a cornea cut by the trephine is readily removed from the trephine without injury thereto. In addition, the trephine is readily cleaned of particles of any nature and is completely accessible for sterilization. The cylindrical portion 9 of the stop serves to protect the cutting edge of the trephine when the trephine is not in use.

It will be obvious that various changes may be made by those skilled in the art in the details of the trephine illustrated in the drawing and described above within the principle and scope of the invention as expressed in the appended claims.

I claim:

1. A corneal trephine of the kind described comprising in combination a hollow, cylindrical end section having a knife edge, a handle spaced from the hollow end section, an adjustable stop associated with said hollow, cylindrical end section, and means for positioning the stop at different distances from the knife edge.

2. A corneal trephine of the kind described comprising in combination a hollow, cylindrical end section having a knife edge, a handle spaced from the hollow end section, an adjustable stop associated with said hollow, cylindrical end section and interengaging means on said stop and said handle for positioning the stop in various positions with respect to knife edge of said hollow end section.

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3. A corneal trephine of the kind described comprising in combination a hollow cylindrical end section having a knife edge, a handle secured to the hollow cylindrical end section, and a removable element having a shoulder adjacent the knife edge of the hollow cylindrical section and constituting a stop.

4. A corneal trephine of the kind described comprising in combination a hollow cylindrical end section having a knife edge, a handle axially spaced from the hollow cylindrical end section, circumferentially spaced uniting elements extending between and uniting the hollow cylindrical end section and the handle, a stop including a cylindrical portion surrounding the hollow cylindrical end section and forming a circumambient shoulder, a portion united to the handle, and spaced uniting elements extending between the cylindrical portion and the portion uniting with the handle.

5. A corneal trephine of the kind described comprising in combination a hollow cylindrical end section having a knife edge, a hollow cylindrical handle axially spaced from said hollow cylindrical end section, a pair of diametrically opposite uniting elements extending between and uniting the hollow cylindrical end section and the handle, a removable stop including a cylindrical portion surrounding the hollow cylindrical end section and forming a circumambient shoulder spaced from the knife edge thereof, a portion threaded on the handle, and diametrically opposed uniting elements extending from the cylindrical portion of the stop to the portion on the handle, said uniting elements of the stop being of the same width as the first mentioned uniting elements.

6. A surgical instrument for cutting a circular opening in the eyeball comprising a tubular knife having at its outer end a circular cutting edge, an elongate carrier on the outer end of which said knife is fixed and having on its opposite end a portion manipulable twirlingly to rotate said knife for cutting into the eyeball, and means on the carrier variably conditionable to limit the maximum depth of such cut.

7. A surgical instrument for cutting a circular opening in the eyeball comprising a tubular knife having at its outer end a circular cutting edge, an elongate carrier on the outer end of which said knife is fixed and having on its opposite end a portion manipulable twirlingly to rotate said knife for cutting into the eyeball, and means on the carrier variably conditionable to limit the maximum depth of such cut, said means comprising an elongate tubular member sleeved on said carrier.

8. A surgical instrument for cutting a circular opening in the eyeball comprising a tubular knife having at its outer end a circular cutting edge, an elongate carrier on the outer end of which said knife is fixed and having on its opposite end a portion manipulable twirlingly to rotate said knife for cutting into the eyeball, means on the carrier variably conditionable to limit the maximum depth of such cut, said means comprising an elongate tubular member sleeved on said carrier, and spirally adjustable thereon.

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No references cited.