

[54] MICROSURGICAL INSTRUMENT

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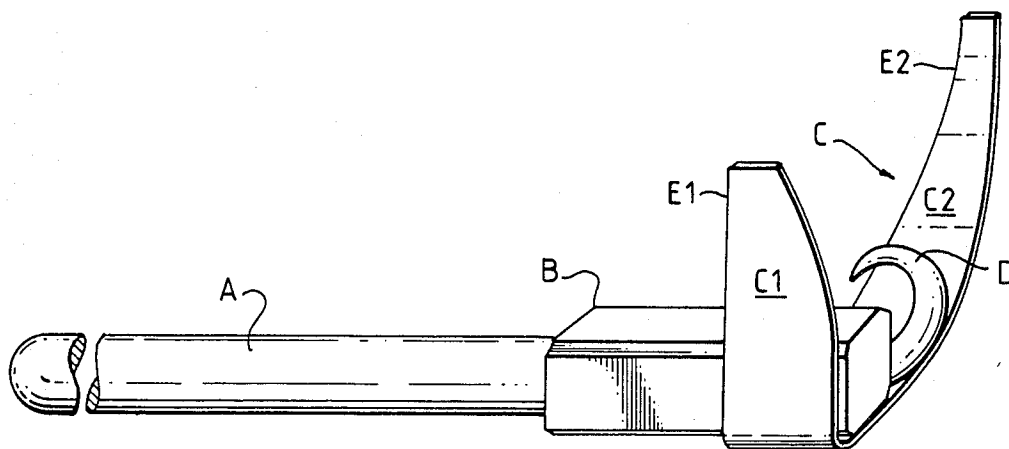
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[57] ABSTRACT

A microsurgical instrument for performing selective trabeculectomy in surgical treatment of glaucoma includes a flexible probe (A) and a cutting member (C) fixed to the same. The cutting member comprises two knife blades (C1,C2) protruding in different directions from the probe and each providing at least one sharp edge (E1,E2) turned towards a free end of the probe.

The instrument is designed to be pulled between two incisions in the eye wall with the probe foremost through the Canal of Schlemm at the transition between cornea and sclera, thereby cutting away the inner wall of the canal and the corresponding part of the trabecular meshwork located in the canal. The aqueous humour of the eye then gains access to the outer wall of the Canal of Schlemm with its drainage outlets leading out of the eye.

13 Claims, 5 Drawing Figures



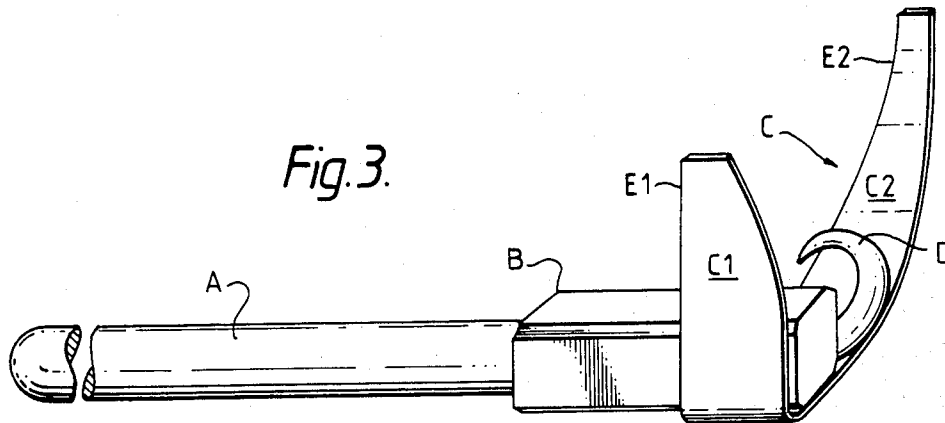
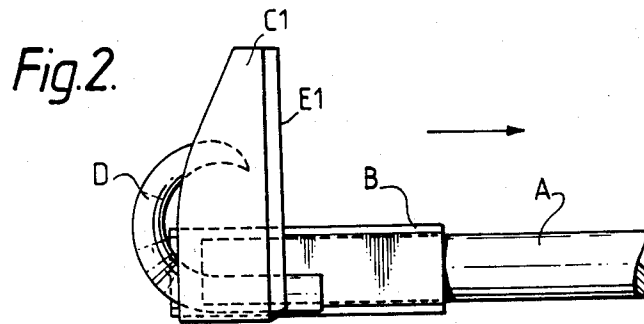
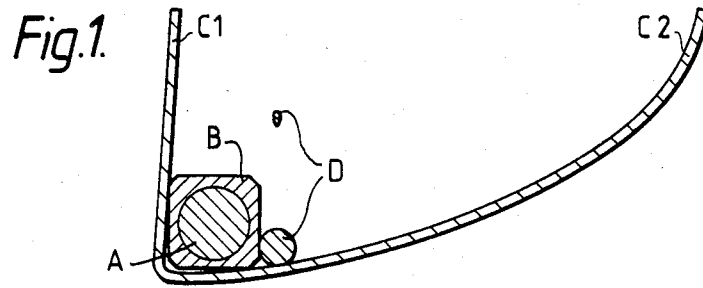


Fig. 4.

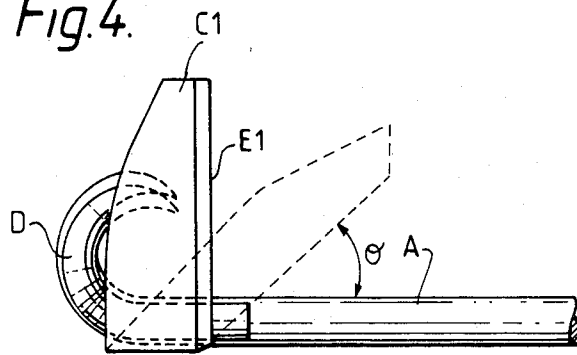
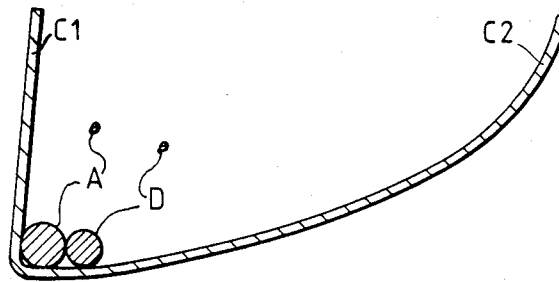
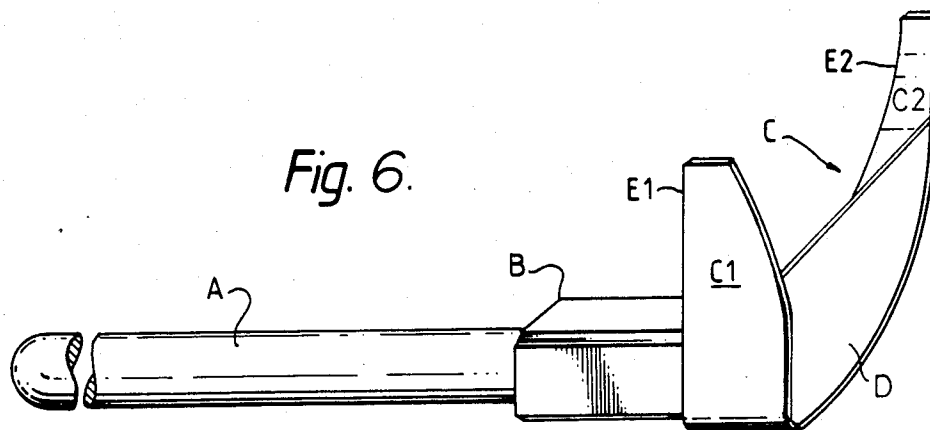


Fig. 5.





MICROSURGICAL INSTRUMENT

BACKGROUND OF THE INVENTION

The present invention relates to a microsurgical cutting instrument to be used in surgical treatment of glaucoma by means of a novel operational procedure, which significantly may be called "selective trabeculectomy".

Glaucoma is an ailment resulting in increased inner pressure in the eyeball. Within the eye, aqueous humor is produced at a fairly constant rate. This liquid is drained out through filterlike tissue (trabecular meshwork) in the area between iris and cornea into a collector canal running circularly along the transition between cornea and sclera (Canal of Schlemm), and from this canal through 20-30 drainage outlets in the eye wall into blood vessels (water veins).

The cause of glaucoma is believed to be a type of "clogging" of the trabecular meshwork, so that the outflow resistance increases. Then, also the pressure increases to allow the same volume of liquid to be drained out per time unit. All treatment aims at reducing the eye pressure. Such treatment is primarily medical, but when this is intolerable and/or insufficient, surgical treatment is used.

The surgical treatment may be subdivided according to three principles, namely:

1. Operations aiming at reduced production of aqueous humour.

2. Fistulizing procedures, i.e., surgical provision of artificial slits in the eye walls through which the liquid may seep out of the eye.

3. Operations on the trabecular meshwork. Existing procedures of this kind are of two types, i.e.:

(a) Approach through the anterior chamber of the eye by means of goniotomy or cautery of the trabecular meshwork with laser beams.

(b) Approach through the Canal of Schlemm. Such approach consists in opening this canal through a radial incision in the eye wall above the canal and insertion of a blunt probe or probe means with a cutting edge (trabeculotome). This instrument is then manipulated in such a way that it tears open or cuts through the trabecular meshwork into the anterior chamber of the eye. With such procedure a narrow slitlike opening is formed through the trabecular meshwork. Such slits exhibit, however, a considerable tendency to close.

SUMMARY OF THE INVENTION

In order to inhibit such closure it is an object of the present invention to provide a microsurgical instrument which through appropriate use may form a permanent opening from the anterior chamber of the eye to the Canal of Schlemm by selective removal of the inner wall of this canal along a certain sector. In this manner the aqueous humour gains direct access to the outer wall of the Canal of Schlemm, which has outlets or drainage canals, so that normal drainage of aqueous humour may be reestablished.

Thus, the invention concerns a microsurgical instrument for performing selective trabeculectomy in surgical treatment of glaucoma, the instrument including flexible probe means and a cutting member fixed to the same. With this background the general inventive feature of the instrument is that the cutting member comprises two knife blades protruding in different directions from the probe and each providing at least one sharp

cutting edge turned towards a free end of the probe means.

This instrument may be called a trabeculectome, as it is designed to be pulled through the Canal of Schlemm along a certain peripheral sector of the eye. By this the inner wall of the canal and the corresponding portion of the 0.1 mm thick trabecular meshwork are cut away.

As indicated, the trabeculectome consists of probe means and a cutting member. The probe means is preferably knob-shaped at the extreme end and made of flexible material, but this still sufficiently rigid to be inserted into and directed through the Canal of Schlemm. The cutting member has a double-cutting knife, the two cutting edges of which are angularly separated to such extent that the issuing V-form fits into the scleral groove in the eye wall, in which the trabecular meshwork is embedded. Advantageously, the cutting member is asymmetrical in such a manner that the knife blade that projects perpendicularly into the anterior chamber towards the iris is short, whereas the blade that projects obliquely into the anterior chamber and forms a small angle with the back side of the cornea is longer. This feature stabilizes the correct position of the knife.

The probe means of the trabeculectome is directed through an incision in the eye wall into and along the Canal of Schlemm, and is pulled out through another incision at a certain distance from the first one. The cutting member of the trabeculectome is pulled after the probe means through the Canal of Schlemm with the two knife edges projecting into the anterior chamber of the eye and thereby cutting away a strip of the trabecular tissue and the inner wall of the Canal of Schlemm which are located between the cutting edges. This tissue strip is preferably removed together with the trabeculectome when it is pulled out through the second incision in the eye wall. Such removal of the tissue strip may be secured by mounting one or more hooks in the angle between the two knife edges in order to catch the cut away strip and carry it out of the eye.

The microsurgical instrument according to the invention allows a surgical procedure which secures a permanent, broad opening between the anterior chamber of the eye and the outlets from the Canal of Schlemm by removing the trabecular meshwork and the inner wall of the canal. Tissue removal together with maintained cell casing on the outer wall of the Canal of Schlemm make a closure of this opening improbable, even after a long period of time.

Experiences with this method up to now suggest a low rate of complications, so that the operational indications probably may be extended. This means that the patients may be operated at an earlier stage and thus expensive and troublesome medical treatment is avoided.

The invention will now be explained in more detail with reference to exemplified embodiments as shown in the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a first embodiment of the instrument in a cross-section through the cutting member at a right angle to the longitudinal axis of the probe means.

FIG. 2 is a side elevation of the instrument shown in FIG. 1.

FIG. 3 shows the instrument in FIGS. 1 and 2 in perspective view.

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