DROP-FREE TROCARS FOR MINIMALLY INVASIVE SURGERY ESPECIALLY OPHTHALMIC SURGERY

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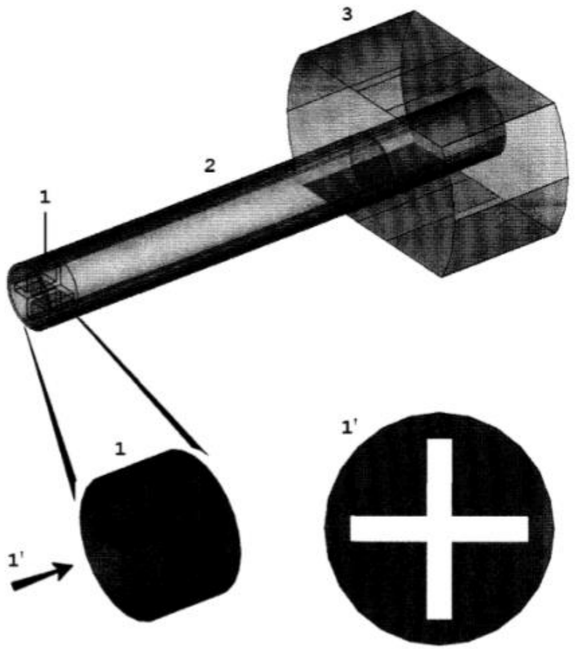
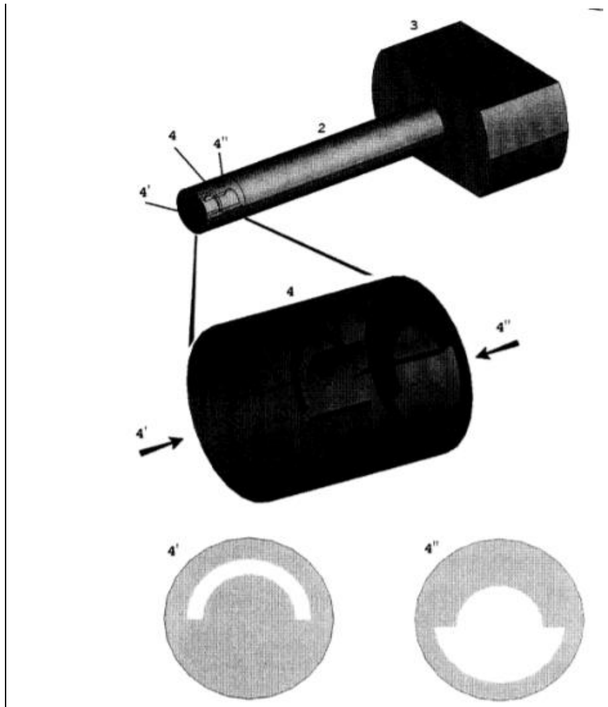
L'invenzione

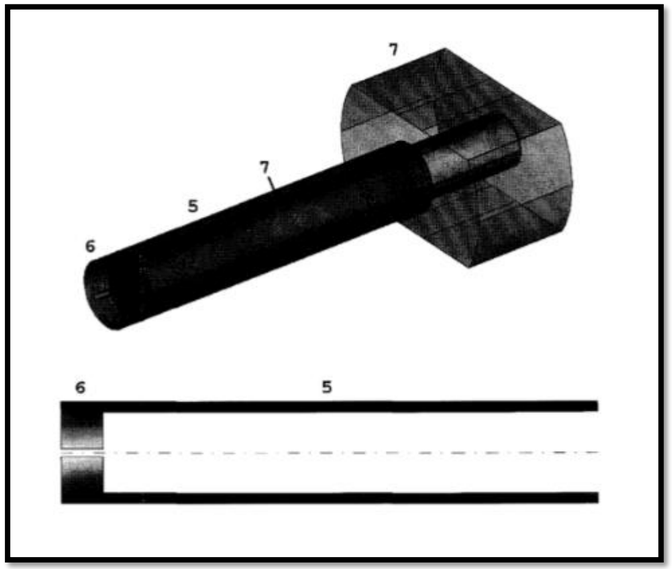
The present invention relates to a **newly developed trocar device**, referred to as a "drop-free trocar," for the **use in minimally invasive ophthalmic surgery**.

In minimally invasive ophthalmic surgeries, microcannulas, also known as trocars, are used to act as microchannels for inserting the necessary instrumentation inside the eye. The main issue with these surgical techniques is the **leakage of vitreous humor from the posterior chamber of the eye** with the formation of a drop of biological fluid, due to the pressure difference between the interior of the eyeball and the external environment. Faced with such a situation, the ophthalmic surgeon is faced with a choice between removing the part of the vitreous humor, that has emerged from the microcannula, or reinserting it inside the posterior chamber of the eye. In either case, there can be serious consequences for the patient, for example, retinal detachment or infection of the vitreous body, respectively.

Drawings
& pictures







Industrial applications

The applications of such a device are mainly in the field of **ophthalmic surgery**, but it can be applied to **all areas of minimally invasive surgery** and more generally to all systems that are interested in a total or partial flow stop involving millimeter to micrometer scale channels.

There is no commercially available device that limits the leakage of intraocular biological fluids during minimally invasive ophthalmic surgery and thus performed in the manner typical of the laparoscopic technique.

Currently **available ophthalmic trocars** are not equipped with any valvular device that would allow insertion of the instrumentation while maintaining separation between the intraocular and external environments. At times when the microcannula of the device is not crossed by the instrumentation, special microcaps are used, which obviously do not allow the insertion of the instrumentation.

Possible developments

The fabrication of the various types of newly developed trocar devices has made use of microfabrication techniques, preferably micromolding techniques, with a protocol optimized specifically for the characteristics required by microvalves. Fabrication techniques have been devised to allow the creation of a **single microtube-microvalve piece** with a better mechanical characteristics than the single valve assembled on commercially available microcannulas.
The material of the new trocar was a biocompatible polymer because of its mechanical characteristics and ease of processing.

The device made meets the following specifications, dictated by specialists in the field: **biocompatibility**, **resistance to wear and tear**, **sterilizable** by classic sterilization techniques found in the clinical setting, **reproducible** on a large scale by standard micro- or macrometric fabrication methods; the device is **inexpensive** and e**asy for the medical practitioner to use**.

The research team is interested in collaborating with industrial partners to produce increasingly customized micro-fluid dynamics products tailored to surgical needs. Possible licensing or assignment of the patent for commercialization by interested companies may be considered.

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