

ERREQUADRO

Unlock the power of technical data

Design and Innovation through Patents

October 7th, 2025

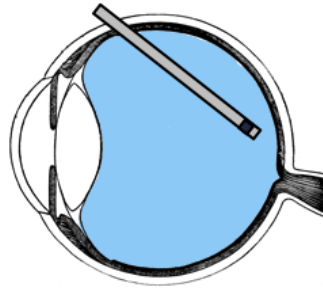
CSMT, Brescia



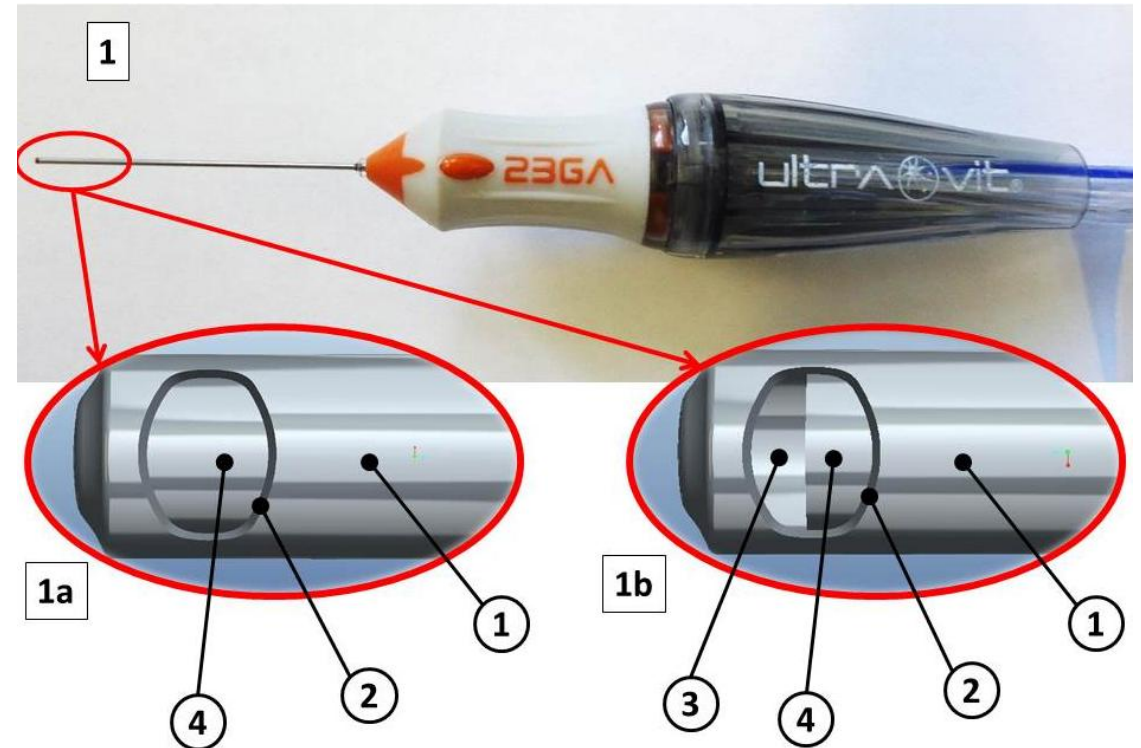
**Spotting the Right Problem
is the Solution**

Inventing & Designing around

Biomedical field



Vitrectomy probe: tool for simultaneously cutting and removing vitreous



Inventing & Designing around

Patent searches...

Problems to be solved

- Reduce the surgery time (increase the flow rate)
- Reduce the traction on the retina

Solutions

- ~~Increase the needle's diameter~~
- ~~Reduce the vacuum level~~
- Reduce the viscosity

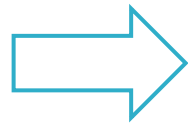
- Reduce the viscosity
- ?

Increase the cutting rate

Inventing & Designing around

Patent searches...

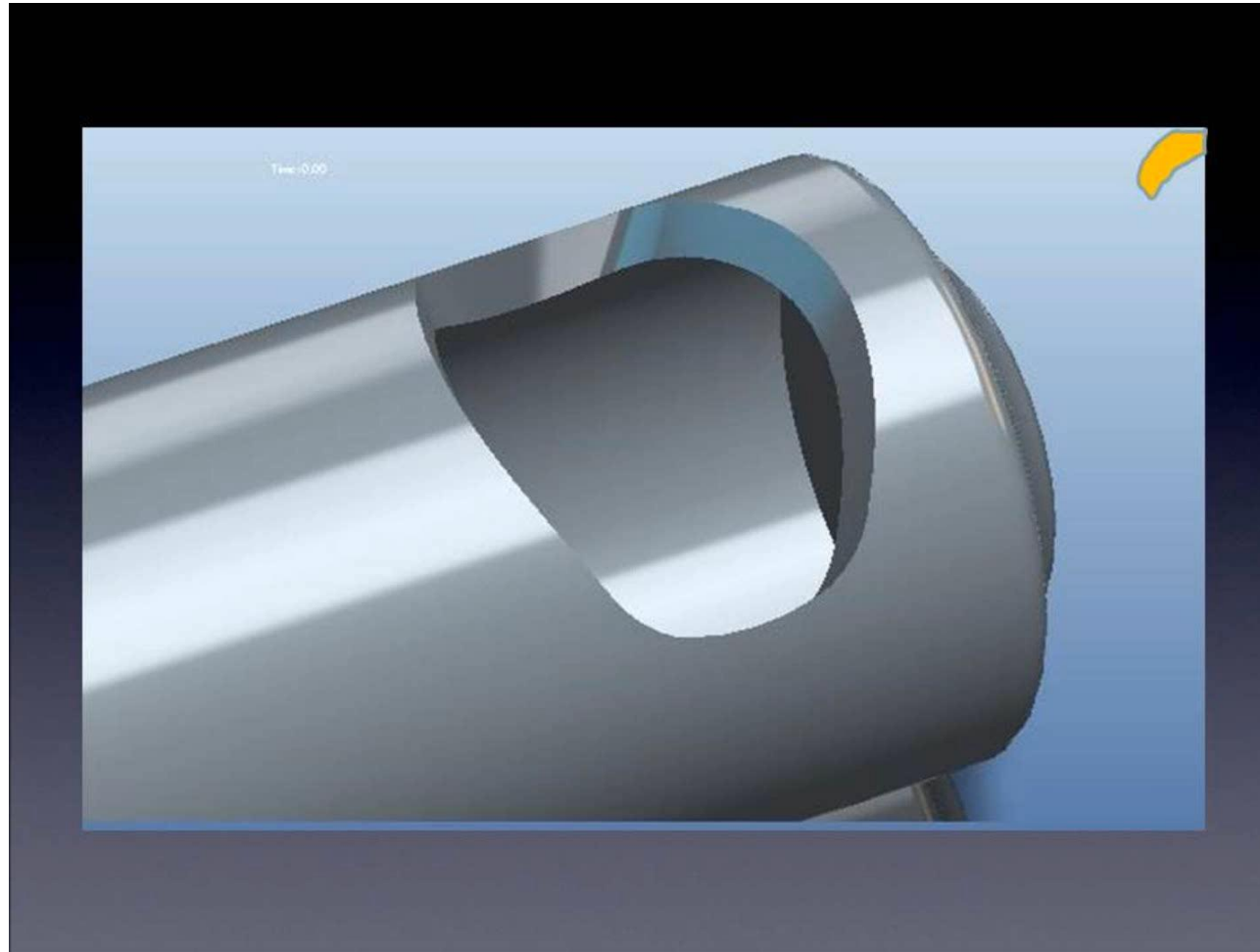
- Increase the cutting rate



- Increase the speed of the inner tube
- Increase the number of cutting edges

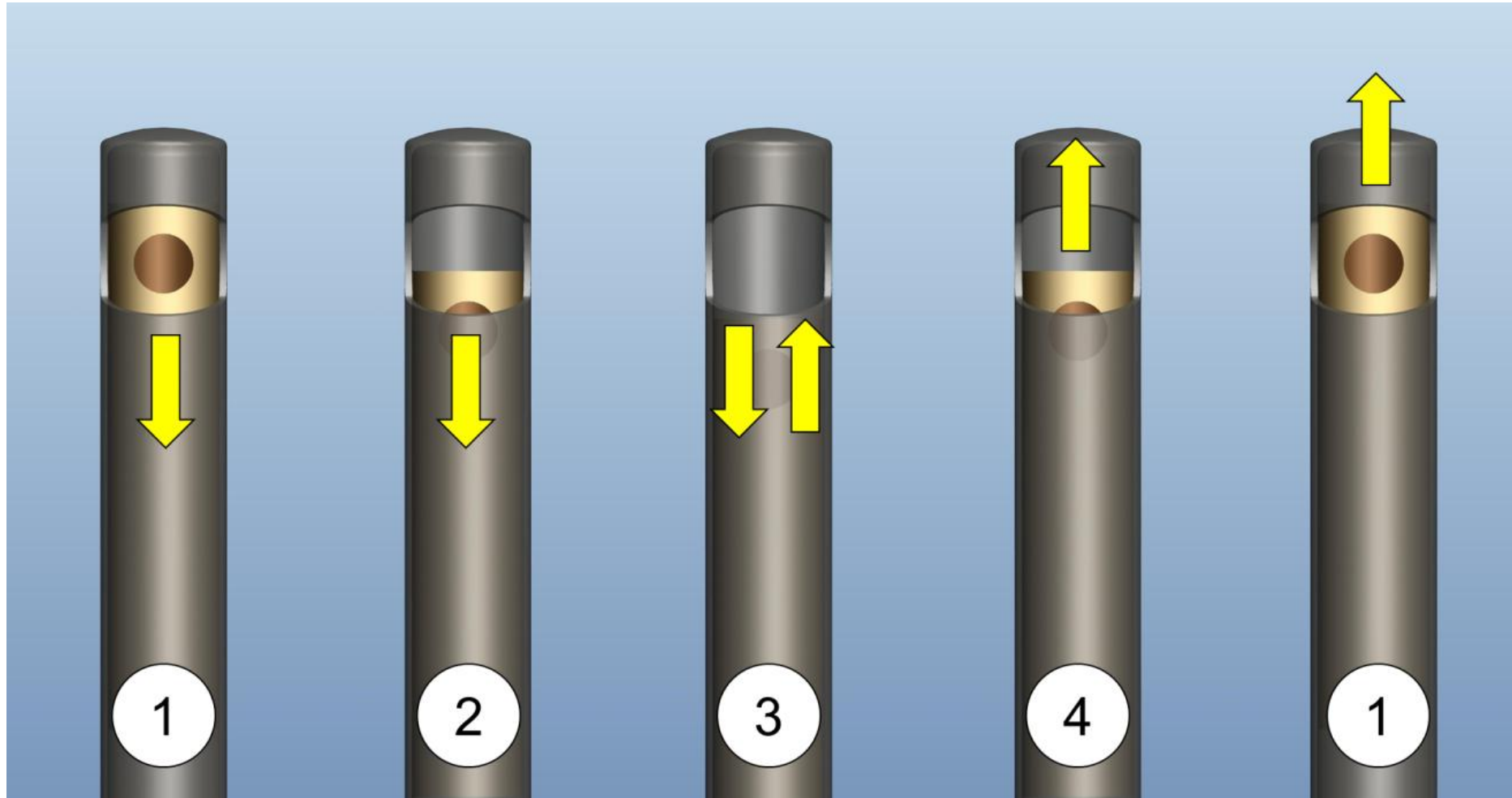
Inventing & Designing around

The idea to be developed



Inventing & Designing around

The idea to be developed



... but

Hayafuji et al., 1992, US0051063641

Fig. 3

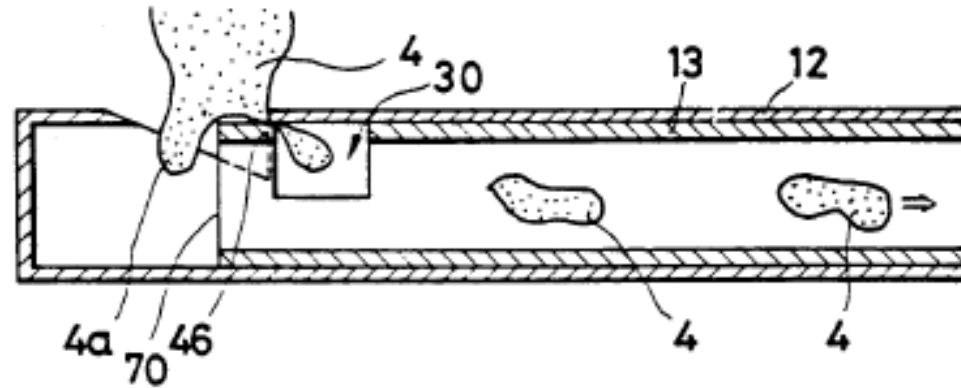
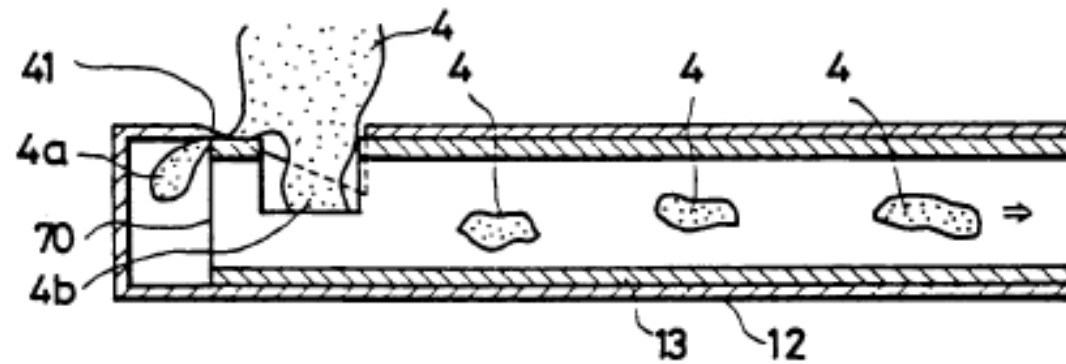


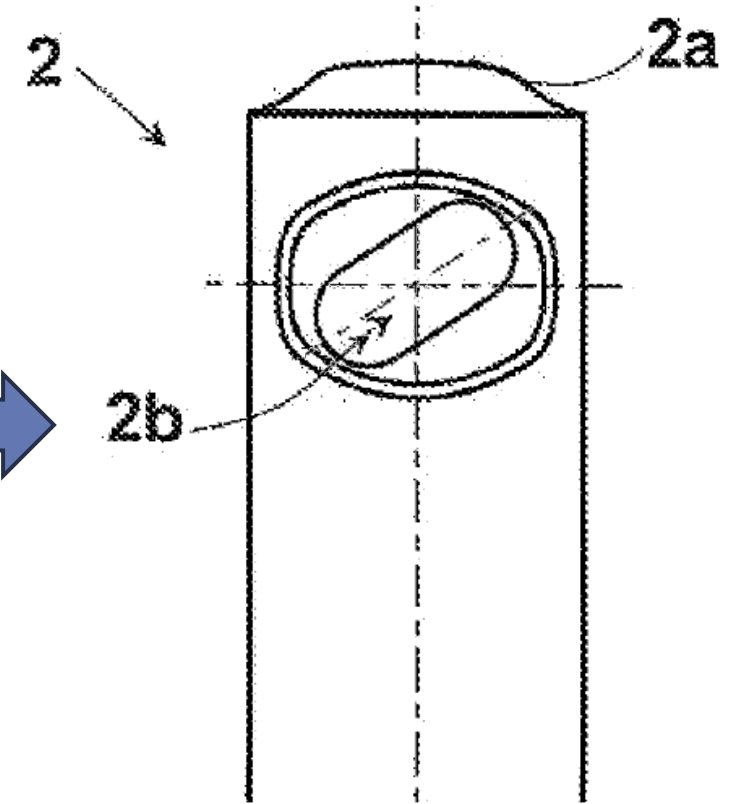
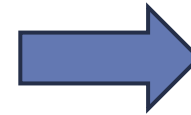
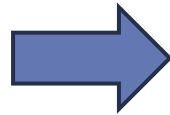
Fig. 4



Searching for new solutions

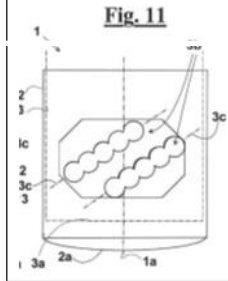
Patent searches...

- Reduce the traction on the retina



Patent analysis

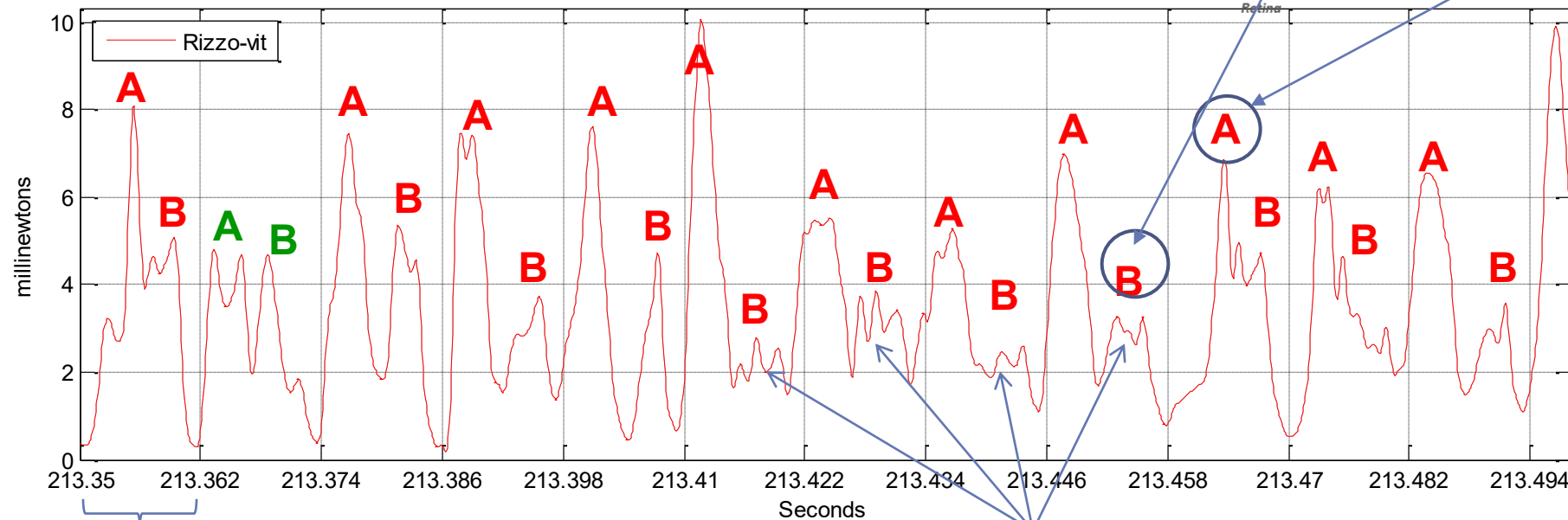
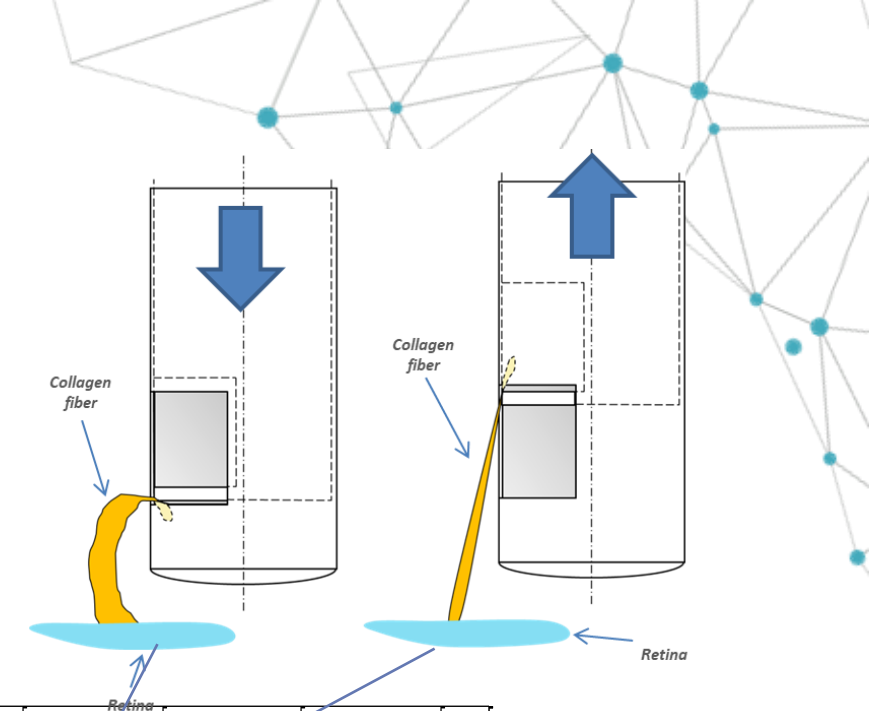
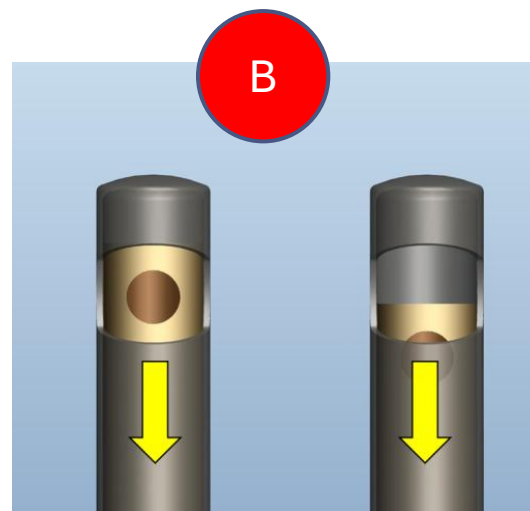
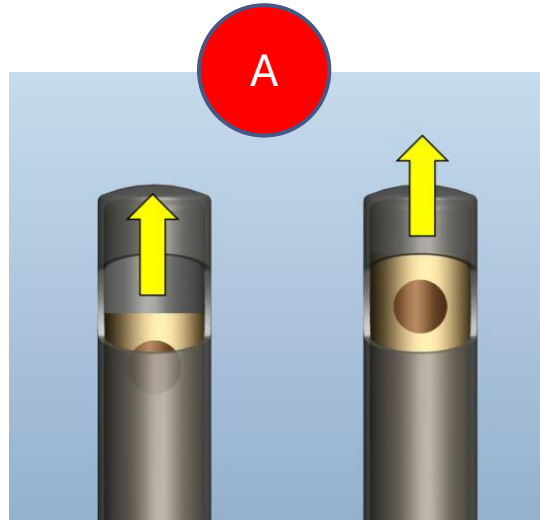
Problema	Riferimento	
Asola inclinata (Geuder)	WO2012059092A1 =US20130211439	In a further variant, it can be contemplated that the cutting edges of the inner tube have a different angle with respect to the longitudinal axis than the cutting edges of the outer tube.
Scissor effect (Geuder)		As such, the stroke movement of the inner tube results in a type of scissor effect with respect to the cutting edges sliding by each other. This further enhances the cutting performance.
Continuity (Geuder)		With respect to preventing pressure fluctuations in the body, it is particularly very advantageous if the device is constructed on the basis of a simple constructive measure using simple control technology, in such a manner that no pressure fluctuations occur during operation in any body, even though each opening, when considered in isolation, is covered differently by the inner tube. In a more refined manner, it can be contemplated that the openings and therefore the cutting edges of the tubes are arranged with respect to each other over the entire movement process of the inner tube in such a manner that the openings are sized in such a manner and that the movement of the inner tube is limited and/or controlled in such a manner - that at every point in time of the movement process, meaning over the entire forward stroke and backward stroke of the inner tube, the same cross-section for flow into the inner tube is present.
Stessa superficie di passaggio esposta durante l'intera corsa.		This means that, by way of example, a frontal opening in the outer tube is completely opened while a second rear opening in the outer tube is completely closed by the inner tube; during the backward stroke of the inner tube, the frontal opening is gradually closed, particularly to the same degree as the rear opening of the outer tube is opened by the backward stroke of the inner tube.
		Claims 25. An apparatus according to claim 16, wherein the cutting edges (4, 6) run diagonally to the longitudinal axis of the



ADVANTAGES/TECHNICAL PROBLEMS

US5106364 Hayafuji: invalida quasi tutto il brevetto WO2012059092A1 =US20130211439 di Geuder	Specifically, during the cutting of the affected tissue 4, the annular peripheral edge of the distal end 70 of the inner tube 13 passes beneath a portion 80A of the rounded distal edge 80 intermediate the width thereof, and subsequently beneath the opposite ends 80B of the distal edge 80, thereby accomplishing a progressive scissor action which cuts the affected tissue 4 smoothly.
Sciabola	“Sciabola” (Fig. 10 del nostro brevetto) probabilmente da US5106364 Hayafuji
Fig. 8	
Opportunità	Ri.
n° fori su asse inclinato	WO2014002040 Erre Quadro
rimane di nuovo ed inventivo	In particolare dalle figure 1 e 2 ed 8 in US20090088784 De Bøer i fori sono disposti solo orizzontalmente, mai inclinati, e mai sovrapposti; non vi è accenno ad un'azione di taglio progressivo, che è il nostro step inventivo, ed i fori sono praticati sul tubo esterno anziché su quello interno come nel nostro caso.
	02040 Erre Quadro
	reference to Figs 6-11, in other words, each lateral opening 3b has a plurality of holes, for instance 15 (Fig. 9 and 11), whose longitudinal extension directions are with 15° respect to the longitudinal axis according to the angle α.
	Ma la disposizione anche fori sovrapposti, che eviterebbe lo scivolo di collagene che si produce sulla lama inclinata. Inoltre, il taglio variabile si può migliorare progressivamente del tutto. Oltretutto i dentini dei fori agirebbero come sistemi di bloccaggio, scorrendo delle fibre di collagene, la loro continuità aumenta la superficie esposta, pur limitando la possibilità di scivolamento. Nessun riferimento a continuità della trazione, ma solo riferimenti a flusso in WO2012059092A1 (=US20130211439 Geuder) e in US5106364 Hayafuji. Inoltre non c'è mai scritta la parola “continuo”.
	In WO2012059092A1 (=US20130211439
	Rispetto a WO2012059092A1 =US20130211439 Geuder invece il nostro design ha come vantaggio l'eliminazione dello scivolamento delle fibre lungo l'asola e la variabilità continua dell'angolo fra i taglienti della lama fissa e di quella mobile
	Forse potrebbero essere adottati problemi di novità sulla disposizione dei fori lungo delle direttrici inclinate. L'examiner potrebbe dire che esistono le lame seghettate verso le lame non seghettate di un coltello, ma qui il paragone migliore è con le forbici che però di solito presentano la stessa lama sia sopra che sotto.

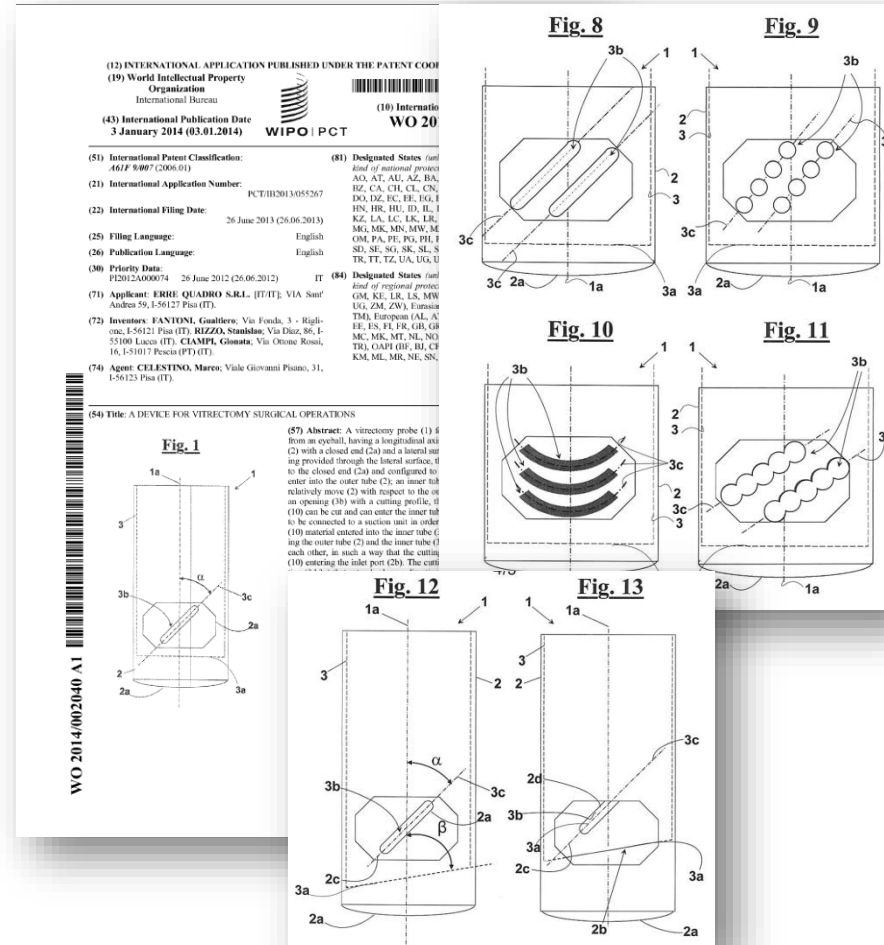
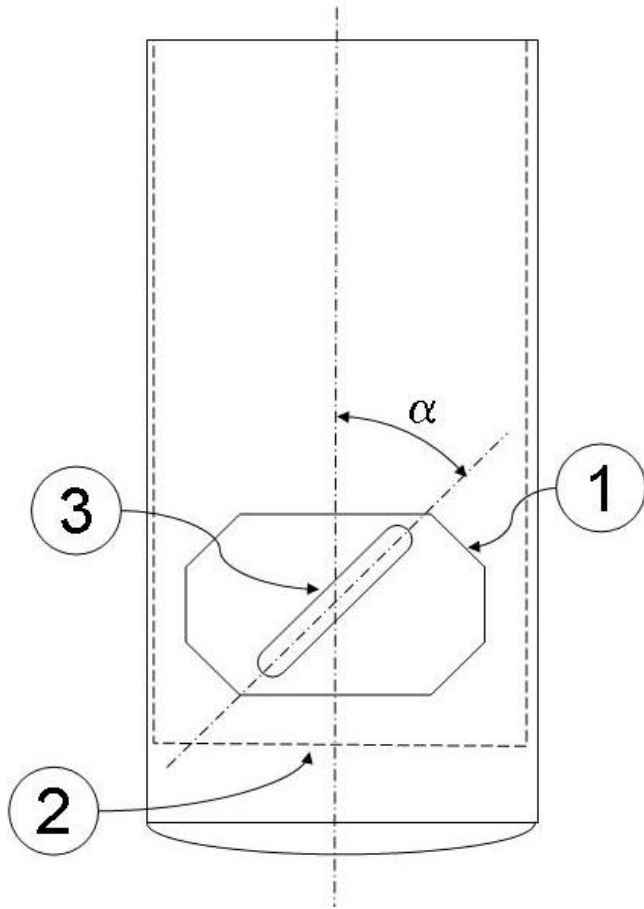
Testing the new solution



A cycle

stick-slip effects

A new solution (IT2012, PTC2013, EU2015, US2015)



Patent
granted in
Europe
and in USA

A new solution (IT2012, PTC2013, EU2015, US2015)

Opposition @EPO

Geuder vs Erre Quadro

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Erre Quadro's EP
Patent confirmed



Searching for new solutions

Patent searches...

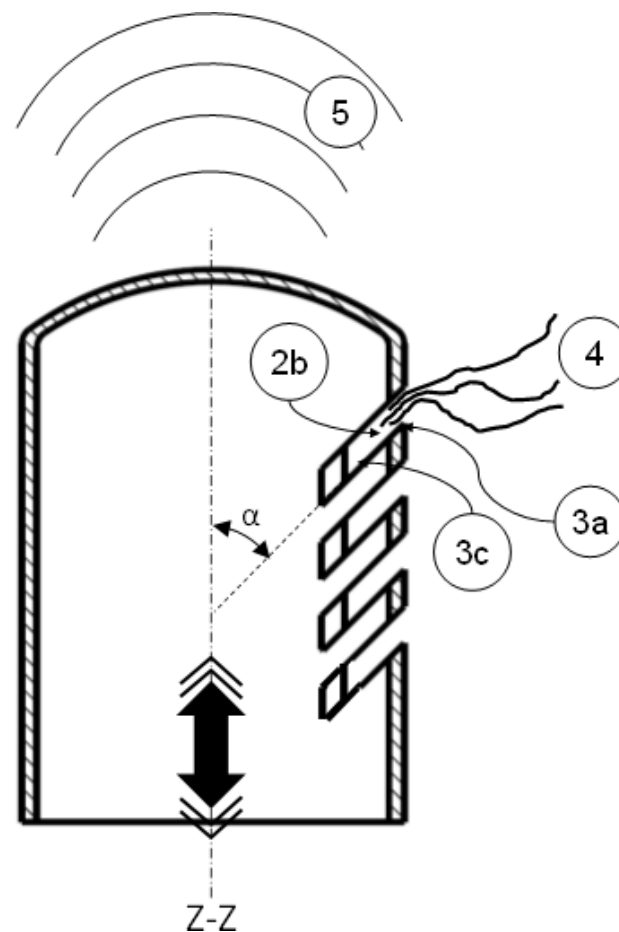
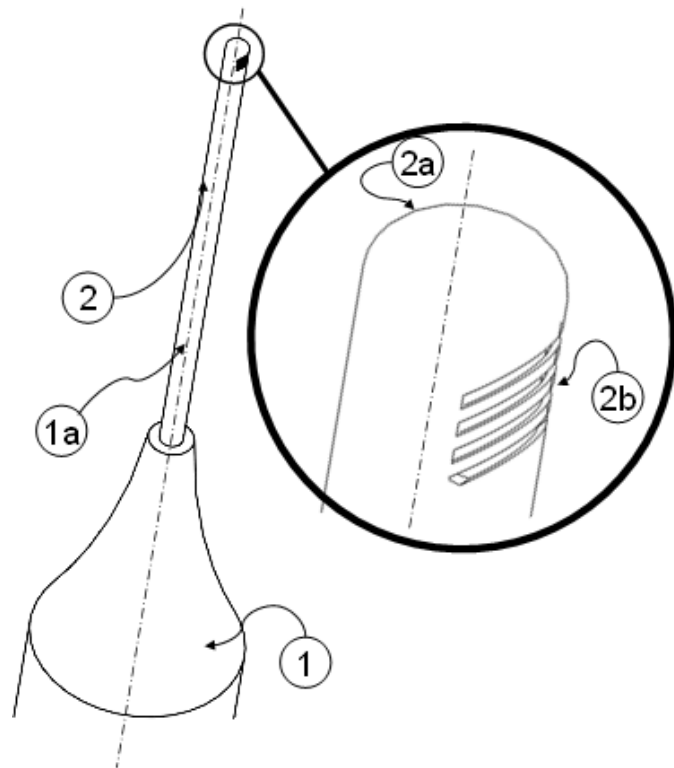
Problem: cutting



Alternative solutions / different physical principles



A new solution – Ultrasound vitrectomy probe



Patent
granted in
Europe
and in USA

Let's Innovate Together!



Contacts

✉ sales@errequadrosrl.com

📍 Largo Padre Renzo Spadoni – 56126 – Pisa

📍 Via dei Solteri, 38 – 38121 Trento, TN

📍 Fruebjergvej 3 2100 København Ø, Denmark

