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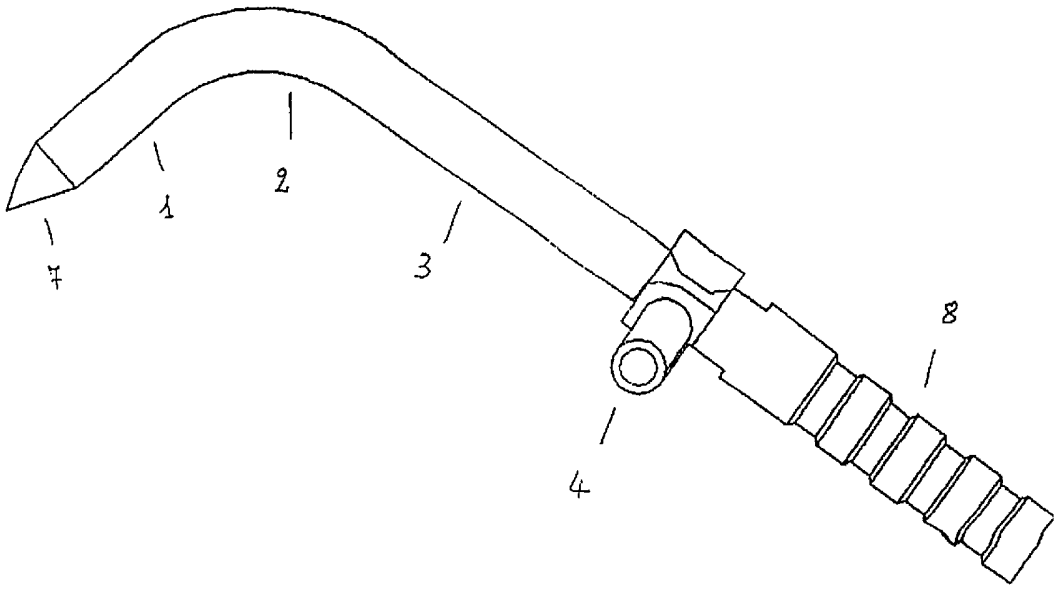
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(54) **Title:** CURVED TROCAR FOR THORACOSCOPY



(57) **Abstract:** A curved trocar for thoracoscopy to obtain a multidirectional vision and operativity of the pleural cavity with less discomfort to patients undergoing thoracoscopy under local anesthesia. The trocar consists of an external rigid cannula which short arm (1) continues through a 60°-70° curve (2) into a long arm (3) provided with blocking system (4); an internal stylet formed by a body (5) with blocking spheres (6), conic tip (7) and handle (8), in nylon or other resistant material. Introduced the short arm into the pleural cavity through the intercostals space, the stylet is removed and a flexible fiberoptic device may be introduced in the cannula. Inclinating and rotating the cannula altogether with the fiberoptic device, vision and operativity are multidirectional. It is also possible to insert a thoracostomic tube in the chosen position.

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DESCRIPTION

TITLE: Curved trocar for thoracoscopy.

DESCRIPTION: the curved trocar for thoracoscopy consists of a rigid cannula which short arm continues throughout a 60°-70° angle curve into a long arm provided with support and blocking system; an internal stylet formed by a body, conic tip and handle, in nylon or other resistant material.

TECHNICAL FIELD: medical field; surgical device (support for thoracoscopy and thoracocentesis).

BACKGROUND ART: straight trocars for introducing rigid or flexible thoracoscopes are still in use in medical field since 1910 (1). Such devices consist of a straight cannula mounted on a straight stylet. The thoracic wall is pierced by a mounted trocar. The stylet is removed and the cannula is left as a temporary, artificial path to introduce the thoracoscope. The cannula, inserted perpendicularly through the intercostal space, sustains the thoracoscope, as illustrated in the fig. 3A, B, C. Maintaining perpendicularly the system cannula-thoracoscope, the internal vision may vary from 0° to 135°, depending on the direct or lateral prisma used. To overcome such limit, it is necessary to incline the cannula from the perpendicular position to a very oblique one, as illustrated in the fig. 3 B, C. This movement is necessary to observe and treat structures or lesions far from the point where the cannula is inserted. The movement in the intercostal space may be carried on in two manners: 1) along its major or, 2) minor axis. In the former case the pressure is carried on the intercostal muscles inclinating the cannula by backward-frontward anterior-posterior movements; in the latter, the pressure is carried on the ribs by cranio-caudal movements. In both cases, especially in the second one, a strong, painful pressure is carried on the patient. Observing the thoracic cavity may result limited. Such a limit may manifest when particular treatments are needed (scraping, biopsy, resection, etc.). A wider visual field may obtain using a flexible fiberoptic bronchoscopes (fiberbronchoscope) (2); but, even flexibile be the visual-operative system, the straight cannula maintains much of the mentioned limitations. The recent thoracofiberscope (Thoracofiberscope LFT, Olympus Optical Co Ltd; Tokio, Japan) (3) is simply a modified fiberbronchoscope. Using a straight cannula as support, it partially

maintains the same limits.

(1) Jacobaeus, 1910.

(2) Seno, 1974.

(3) Maclean, 1998.

DISCLOSURE OF INVENTION: the curved trocar for thoracoscopy consists of an external rigid cannula which short arm (1) curves continues throughout a 60°-70° angle curve (2) into a long arm (3) provided with support and blocking system (4), as shown in the fig. 1 and 2A; an internal stylet formed by: body (5) with blocking spheres (6), conic tip and handle (7, 8), in nylon or other resistant material. Once inserted the trocar short arm in the pleural space through the intercostals space, the stylet is removed and the fiberbronchoscope is introduced through the cannula. The system is shown in the fig. 1 and 2B. By cranio-caudal and backward-frontward movements, the inclination, vision and operativity are more accentuated and multidirectional.

The cannula-fiberbronchoscope system, shown in the fig. 4 D, E) works mainly on the own longitudinal axis with up-down and rotation movements. The lateral inclination is minimal. The curved cannula together with the flexibility of the optic fibers increases the possibility to inspect and operate in the remotest parts of the pleural cavity. That reduces difficulties and discomfort to the patients who underwent the examination under local anesthesia.

BRIEF DESCRIPTION OF DRAWINGS: Fig. 1: a view of the mounted trocar. Fig.2: a view of the unmounted trocar. Fig. 3A: a view of the classic straight cannula inserted in the pleural space through the intercostal space, in perpendicular position for a direct vision. Fig. 3B: a view of the classic straight cannula inserted and held in oblique position. Fig. 3C: a view of the classic straight cannula, inserted and held in extreme oblique position, guiding the straight thoracoscope. Fig. 4D: curved cannula inserted and held in perpendicular position; as in the drawing, the cannula may be rotated in any direction; pulling it up or introducing it the direct vision is possible. Fig. 4 E: curved cannula inserted and held in oblique position; introducing and flecting the tip of a fiberbronchoscope, a

retrograde vision and operativity is possible.

BEST MODE FOR CARRYING OUT THE INVENTION: the curved trocar may be produced in steel, nylon or plastic material in the respect of the rules for the applicability to medical field. Plastic material should be sufficiently resistant to pierce the chest wall and not be deformed by the intercostal muscles or by the procedures.

CLAIMS:

1) CLAIM 1 Curved trocar for thoracoscopy characterized in that is composed by an external rigid cannula having a curved short arm and a long arm provided with a handle-blocking system, internal stylet formed by a body with blocking spheresanchored to it, a conic point and said handle, respectively to the head and tail of said body, said stylet being removed when said curved trocar is introduced into the pleural cavity and a flexible fiberscope being introduced trough said cannula.

2) CLAIM 2 A curved trocar for thoracoscopy AS CLAIMED IN CLAIM 1 characterized in that said cannula has a curve comprised between 60°-70°.

3) CLAIM 3 A curved trocar for thoracoscopy AS CLAIMED IN CLAIM 1 characterized in that said body is made of flexible and resistant material to overcome the curve of said cannula.

4) CLAIM 4 A curved trocar for thoracoscopy AS CLAIMED IN CLAIM 3 characterized in that said body is made of nylon.

5) CLAIM 5 A curved trocar for thoracoscopy AS CLAIMED IN CLAIM 1 characterized in that said spheres are anchored to said stylet's body to maintain it firm toward the internal wall of said cannula.

6) CLAIM 6 A curved trocar for thoracoscopy AS CLAIMED IN CLAIM 5 characterized in that said spheres are in nylon.

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FIG. 1

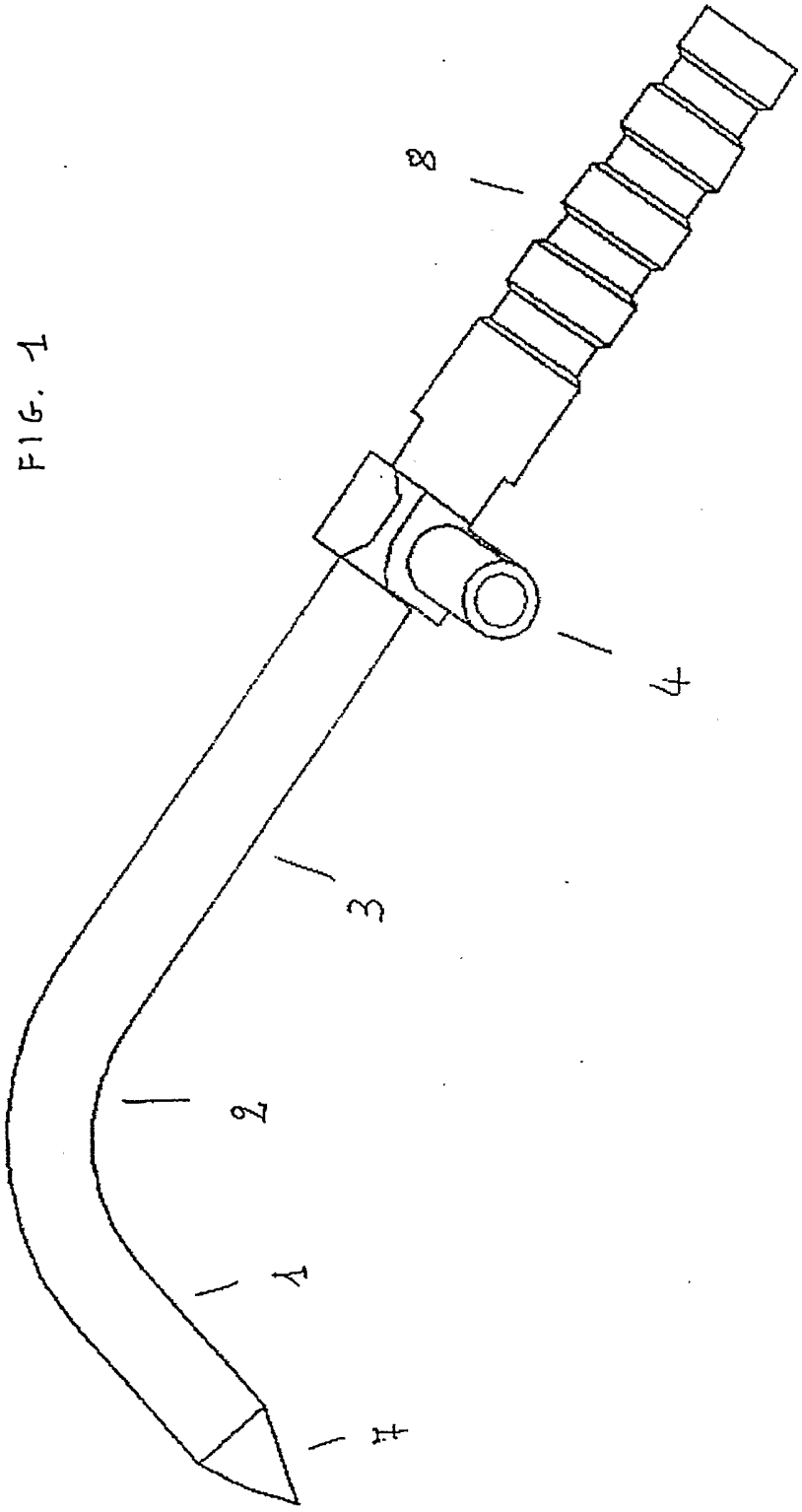
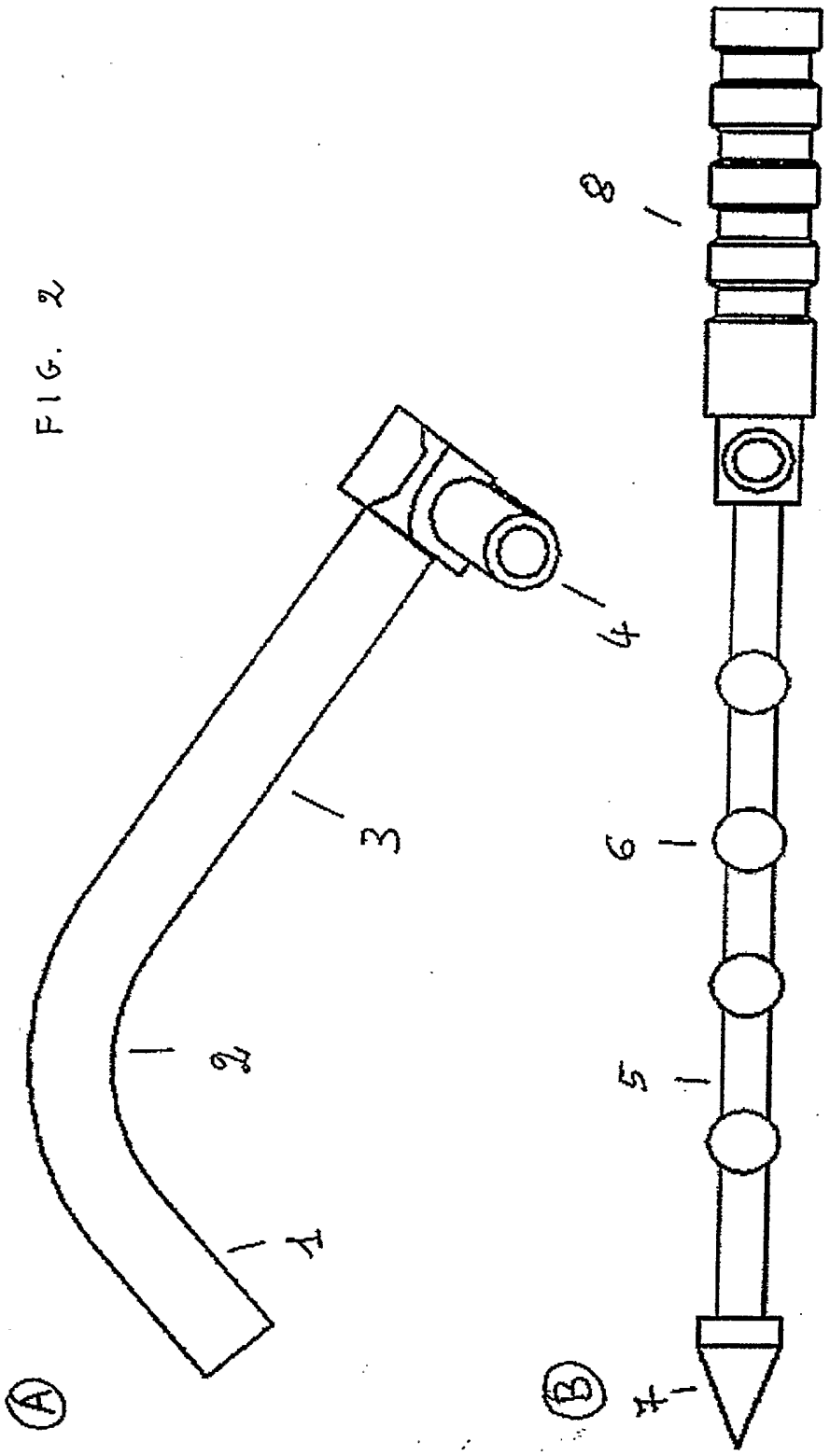


FIG. 2



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FIG. 3

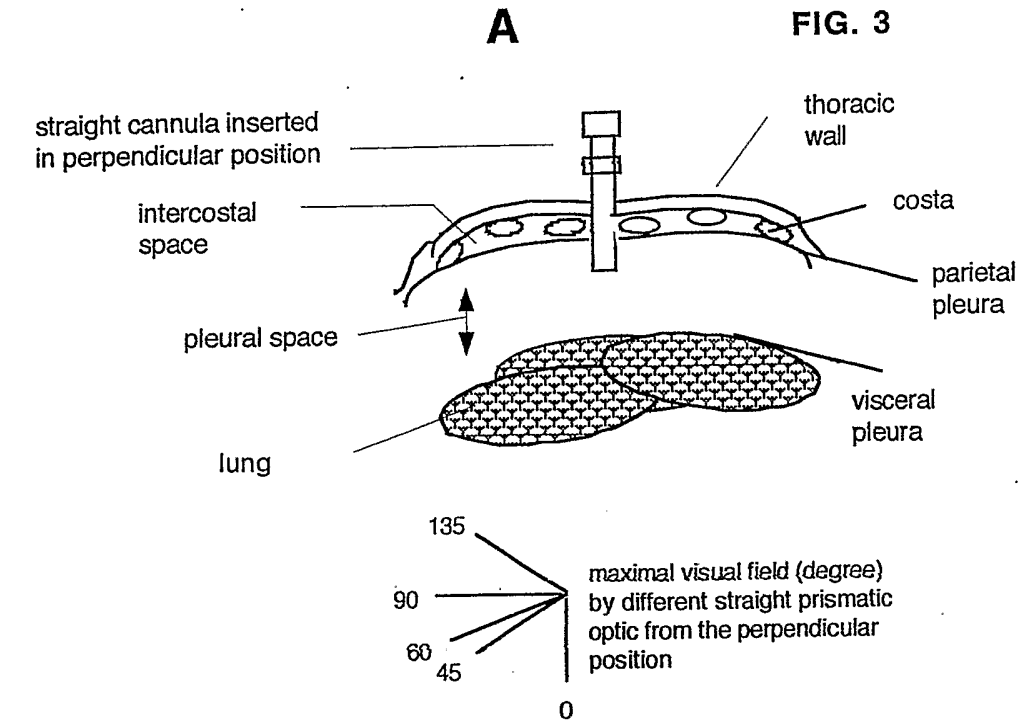
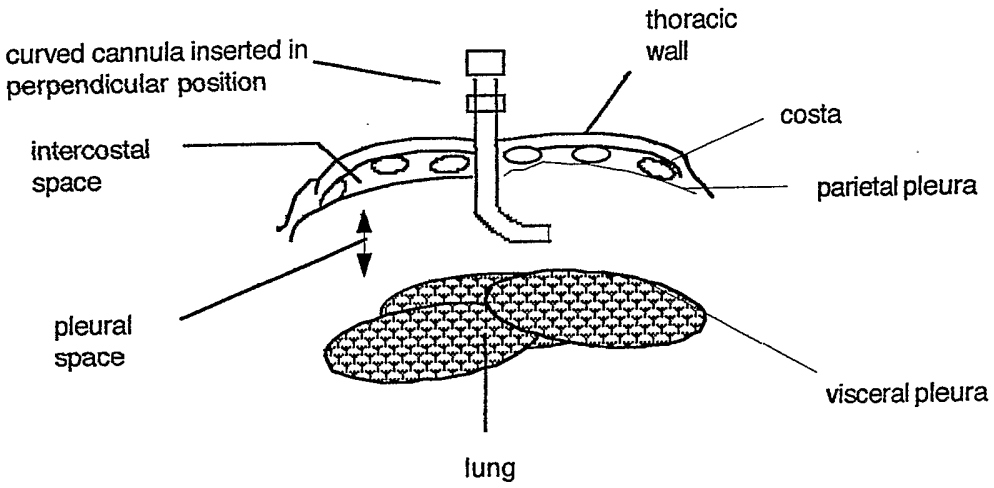
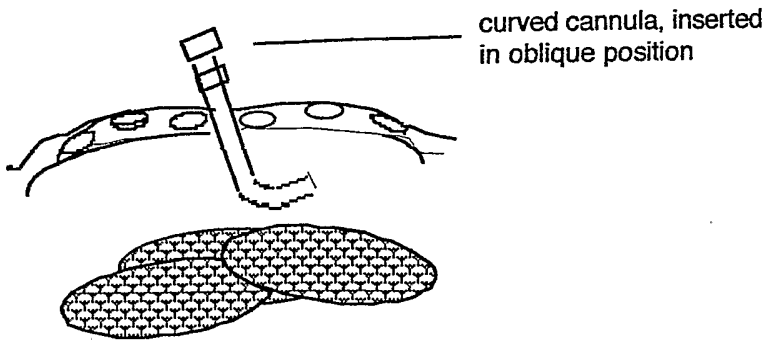

A
straight cannula inserted in perpendicular position
thoracic wall
intercostal space
costa
parietal pleura
pleural space
visceral pleura
lung
135
90
60
45
0
maximal visual field (degree) by different straight prismatic optic from the perpendicular position
B
straight cannula in oblique position
C
straight cannula in extreme oblique position with thoracoscope or rigid operative forceps

FIG. 4

D


curved cannula inserted in perpendicular position
thoracic wall
costa
intercostal space
parietal pleura
pleural space
visceral pleura
lung

E


curved cannula, inserted in oblique position

INTERNATIONAL SEARCH REPORT

Internat pplication No
PCT/IT 03/00501

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61B17/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 877 037 A (KO SU-SEN ET AL) 31 October 1989 (1989-10-31) column 5, line 41 -column 6, line 23	1
A	US 1 906 678 A (WAPPLER REINHOLD H) 2 May 1933 (1933-05-02) page 1, line 75 - line 97	1
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A	US 4 863 430 A (KLYCE HENRY ET AL) 5 September 1989 (1989-09-05) column 5, line 10 - line 68; figure 5	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Angeli, M

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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