

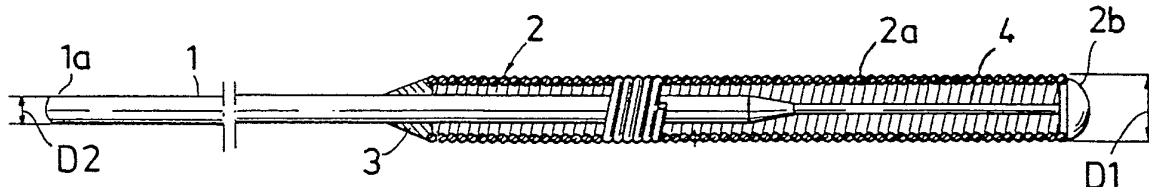


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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: A WIRE-GUIDE INTENDED TO BE INSERTED INTO BODY-DUCTS



## (57) Abstract

A wire-like guide intended for insertion in body ducts, such as blood vessels, urinal ducts and bile ducts, includes an essentially rotationally stiff metal wire core (1) and a readily flexible guide nose (2) of coil spring wire (2a), which is attached to the metal wire core (1) at the insertion end of the latter, the diameter (D1) of the guide nose (2) being greater than the diameter (D2) of the metal wire core (1).

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## 1

A wire-guide intended to be inserted into body-ducts.

The present invention relates to a wire-like guide intended to be inserted into body ducts such as blood vessels, urinary ducts and bile ducts, particularly to serve as a guiding means for a catheter which is to be arranged in the body duct.

5 It is often desirable to insert catheters and the like in such as blood vessels, particularly arteries, in order to diagnose and/or localize and/or treat a disease condition therein, e.g. in selective angiography, peripheral angioplasty etc. As an example may be mentioned the introduction of so-called balloon catheters for treating stenoses (vascular strictures) in arteriosclerosis. Such  
10 catheters are provided with an expandable portion (a "balloon") which is placed opposite the stricture. By expanding the balloon portion of the catheter in this position, e.g. by injecting a liquid, the stenosis can be pressed into the vessel wall and the vessel thus expanded. In such a case it is essential that the position of the balloon portion can be exactly determined in relation to the stenosis,  
15 which primarily is effected by the injection of an X-ray contrast liquid.

A wire-like guide or guiding means is customarily used for inserting the catheter into the blood vessel, and the guide means must be sufficiently flexible and controllable for it to follow the often serpentine blood vessel paths. The flexible guide serves as a guiding for the catheter which is normally arranged  
20 around the guide. A usual conductor of the kind in question consists of a flexible metal wire surrounded along its entire length by a readily flexible coil wire. The coil wire is attached to the metal wire core at least at the operating end of the guide (the proximal end).

Although this known type of guide often functions well, it has certain  
25 disadvantages, however. For example, its guidability is not very good, since the turning movement at the proximal end is not transmitted entirely to the insertion end (the distal end) due to torque absorption in the coil spring along the guide. In addition, due to the implementation of the guide, it is often not possible to inject X-ray contrast liquid into the catheter without first  
30 withdrawing the guide, which is an obvious disadvantage.

The present invention has the object of eliminating or mitigating these and other disadvantages of known guides of the kind in question, and it is primarily intended to provide a guide which is extremely easy to guide and maneuver on insertion into body ducts, and which enables injecting contrast  
35 liquid into a surrounding catheter while the guide is still in the catheter.

These objects of the invention are achieved by the guide having been given the characterizing features defined in the subsequent claims and

explained in detail below.

A salient feature of the guide in accordance with the invention is thus that it includes a substantially rotationally stiff metal wire core which is firmly connected at its insertion end with a readily flexible guide nose of coil spring wire, and that the diameter of the guide nose is greater than the diameter of the metal wire core. The ratio of the diameters of the guide nose and metal wire core is preferably at least 1.2:1, particularly 1.2:1 - 2.5:1, and even more particularly about 1.4:1 - 2:1.

These and other objects, advantages and distinguishing features of the invention will be understood more clearly from the following description of some special embodiments, although the invention is not intended to be restricted to them. The description is made with reference to the accompanying drawings, on which

Figure 1 is a schematic longitudinal sectional view of an embodiment of a guide in accordance with the invention,

Figure 2 is a schematic longitudinal sectional view of a blood vessel, in which a guide according to Figure 1 and a surrounding balloon catheter have been inserted, and

Figure 3 schematically illustrates the inventive guide and a surrounding catheter, in connection with a stenosis.

As will be seen from Figure 1, the inventive guide essentially consists of a rotationally stiff metal wire of the desired length, and a readily flexible guide nose 2, which is attached to the wire 1 at the insertion end of the latter. According to the invention, the guide nose 2 has a greater diameter D1 than the diameter D2 of the wire 1. The diameter ratio D1/D2 is preferably at least about 1.2, particularly 1.2-2.5.

The wire 1 is preferably steel, which has been coated with teflon or other suitable friction-reducing material, and it may have a diameter in the order of magnitude 0.5 mm, for example. The wire length is naturally dependent on the intended use, but is often in the order of magnitude 1-2 m.

The illustrated guide nose 2 is a readily flexible coil spring 2a, which is firmly attached to the wire 1 at 3, e.g. by soldering. The forward end of the coil spring 2a is suitably terminated by a rounded-off tip 2b. In the embodiment illustrated on the drawing, the wire 1 projects a distance into the coil spring 2a and merges into a narrower shapable portion 4, which is fastened to the tip 2b. By bending the portion 4, the guide nose can be given the desired shape, as required. However, this is not a critical distinguishing feature of the invention, and the guide nose may merely consist of the coil spring 2a.

Since the metal wire is essentially rotationally stiff, turning movements from its operating end 1a are transferred effectively to the readily flexible and pliant (but not particularly rotationally stiff) guide nose 2, which only extends a short distance, e.g. in the order of magnitude 5-10 cm. Compared with other  
5 known guides, it will thus be very easy for the operator to maneuver and guide the guide during use. For guiding the wire 1, it may be quite simply bent at the end 1a, but a suitable aid locked to the wire is preferably used.

Figure 2, illustrating the guide of Figure 1 inserted in a blood vessel 5 having vessel branches 5a, demonstrates another essential advantage, namely  
10 that it is possible to inject X-ray contrast liquid (illustrated by the arrows K) via a catheter 6 surrounding the guide without the guide needing to be withdrawn from the catheter. The position of the catheter tip and, in the illustrated case where a balloon catheter is used, the catheter balloon 6a (which is only schematically illustrated) may be localized with the use of radioscropy.

15 Injection with contrast liquid with the guide remaining in the catheter 6 is enabled in accordance with the invention by the wire part 1 having a small diameter relative the guide nose 2 and the catheter 6. To enable the contrast liquid to be injected effectively, it must however be ensured that the entire guide nose 2 has been pushed out in front of the catheter end, i.e. as illustrated  
20 in Figure 2:

Figure 3 schematically illustrates how a guide in accordance with the invention can be used in treating a stenosis 7. The guide has in this case been moved completely past the stricture 7 in the blood vessel 5, and the coil spring nose 2 has been moved entirely outside the end of the catheter 6. By the  
25 injection of contrast medium (the arrow K) it has been ensured by X-ray diagnostics that the balloon portion 6a of the catheter 6 is opposite the stenosis 7. The illustrated catheter has a separate duct 6b, via which suitable liquid can be injected (the arrow B) for expanding the balloon 6a and pressing back the stricture.

30 In this application, the inventive guide affords the advantage that it will be easier to pass the stenosis 7 with the catheter 6 if the entire guide nose is first taken through and past the stenosis, so that only the narrow wire 1 is at the same level as the stenosis 7.

The invention is, of course, not intended to be restricted to the embodiments specially described above, and illustrated on the drawing, there being  
35 many modifications and variations possible within the scope of the following claims. Although the use of the guide has been illustrated in conjunction with blood vessels and balloon catheters, it should thus not be understood as restricted to this particular field of use.

CLAIMS

1. A wire-like guide intended for insertion in body ducts such as blood vessels, urinal ducts and bile ducts,  
characterized in that it includes an essentially rotationally stiff metal wire core (1) and a readily flexible guide nose (2) from coil spring wire (2a) which is  
5 fixedly joined to the metal wire core (1) at the insertion end of the latter, and  
that the diameter (D1) of the guide nose (2) is greater than the diameter (D2) of  
the metal wire core (1).
2. A guide as claimed in claim 1,  
characterized in that the ratio (D1/D2) between the diameters of the guide nose  
10 (2) and metal wire core is at least 1.2:1, particularly about 1.2:1 - 2.5:1, and  
especially about 1.4:1 - 2:1.
3. A guide as claimed in claim 1 or 2,  
characterized in that the metal wire core consists of a solid metal wire, which  
is coated with a friction-reducing material such as teflon.
- 15 4. A guide as claimed in any one of claims 1 to 3,  
characterized in that the end of the metal wire core (1) remote from the guide  
nose (2) is provided with an operating means for facilitating turning the metal  
wire.
5. A guide as claimed in any one of claims 1 to 4 for use in selective  
20 angiography or peripheral angioplasty.

Fig. 1

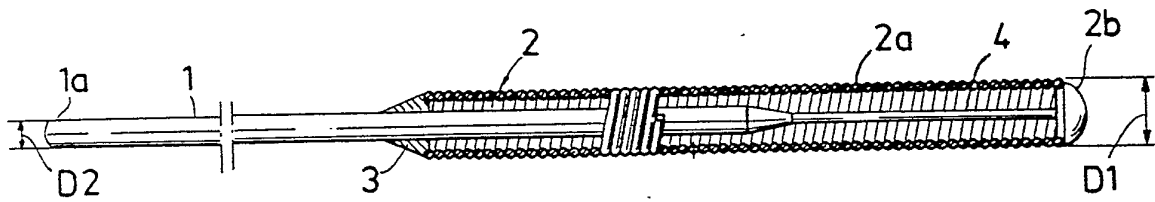


Fig. 2

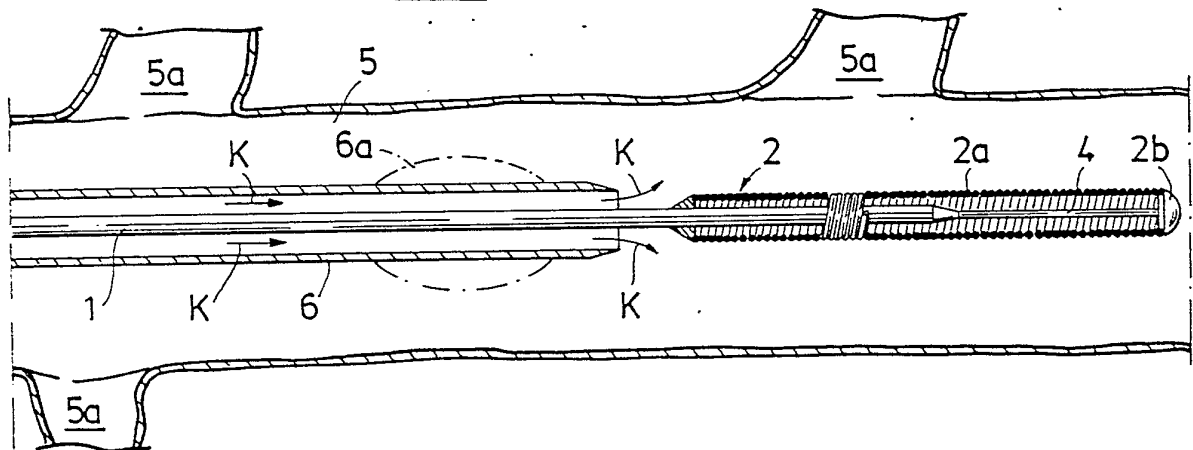
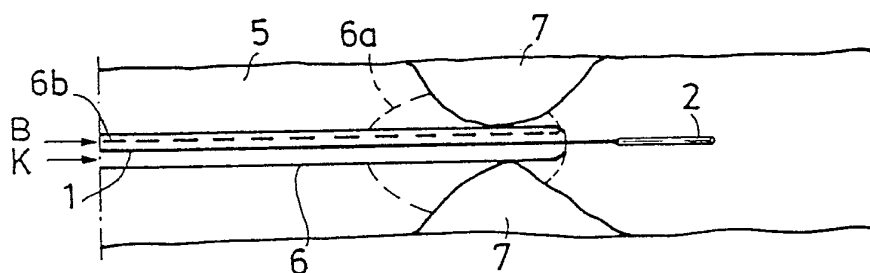


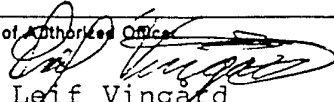
Fig. 3



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/SE86/00090

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC <sup>4</sup>		
A 61 M 25/00		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
IPC 4 US C1	A 61 M 23/00-25/02 128:348-350; 604:27, 28, 93, 96-103, 264, 275-278, 280, 283, 327, 347, 349, 351-353, 355	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched <sup>8</sup>		
SE, NO, DK, FI classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup></b>		
Category <sup>9</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	SE, B, 327 508 (W.F. MULLER) 24 August 1970	1-5
X	DE, A, 1 491 851 (FINCKE ET AL) 16 April 1970 & US, 3452742	1-5
X	GB, A, 1 304 231 (W.A. COOK) 24 January 1973	1-5
X	EP, A2, 0 132 387 (COOK INC.) 30 January 1985 & AU, 30863/84 JP, 60075064 US, 4548206	1-5
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<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
1986-03-21	1986-05-20	
International Searching Authority	Signature of Authorized Officer	
Swedish Patent Office	 Leif Vingård	

L. E

## FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. ☒ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE <sup>1</sup>

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☒ Claim numbers 5, because they relate to subject matter not required to be searched by this Authority, namely:

The manner of claiming does not correspond to PCT Rule 6.3(a) and (b).

2. ☐ Claim numbers \_\_\_\_\_, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☒ Claim numbers 4, 5, because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING <sup>2</sup>

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

## Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.