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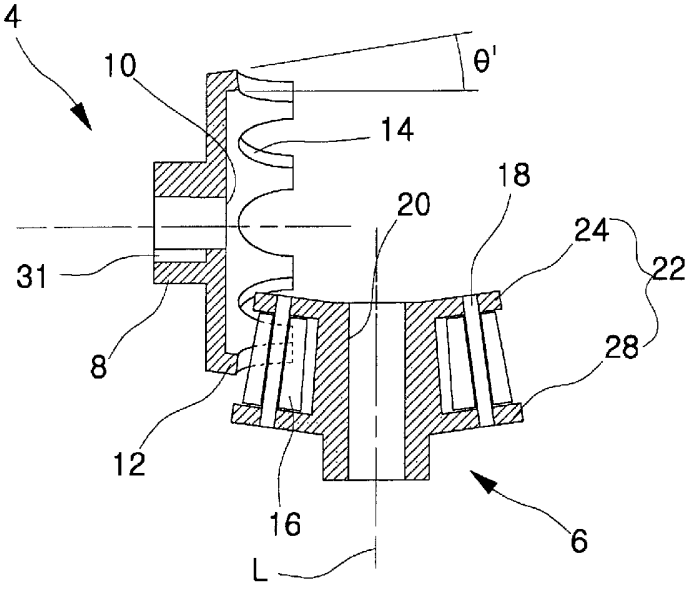
(54) Title: GEAR MEMBER FOR POWER TRANSMISSION



(57) Abstract: The present invention relates to gear member for power transmission that is capable of transmitting power accurately and reducing friction by acting based on rolling friction even though the shafts for power transmission are arranged parallel, vertical, or tilted to each other. The gear member for power transmission comprises: a a crown gear comprising a circular disk part and a plurality of gear teeth positioned along the verges of the circular disk and tilted outward at an angle, where tooth grooves with a curvature are formed between the gear teeth; and b one or more roller gears comprising a plurality of roller teeth arranged at an interval and an angle to engage perpendicularly with the gear teeth of the crown gear, and a multistage circular disk part tilting to a central shaft tube at an angle, which multistage circular disk is formed by assembling and fixing upper and lower ends of shaft pins in the roller teeth.

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GEAR MEMBER FOR POWER TRANSMISSION

TECHNICAL FIELD

The present invention relates to a gear member for power transmission and more particularly, the present invention relates to gear member for power transmission which is capable of transmitting power accurately and reducing friction by acting based on rolling friction by comprising a crown gear having teeth tilted at an angle and one or more roller gears having a plurality of tilting teeth to go in the crown gear placed parallel, vertical, or tilted to the roller gears.

PRIOR ART

The power transmission is generally accomplished by gears which are used in broad scope from a watch of small size to an airplane or a craft turbine developing several ten thousands horsepower.

There are various gears according to shape and arrangement of their teeth and each gear can be grouped to applied variously.

For example, there are spur gear being one of cylindrical gear, in where two shafts are arranged parallel to each other to transmit rotation power and the outer side of its teeth is straight and parallel to shaft, helical gear having teeth wired with a curvature, and double helical gear formed by joining two helical gear having teeth wired to opposite direction to one shaft.

In addition, there are bevel gear transmitting rotation power by two shafts crossed and screw gear, hypoid gear and worm gear transmitting rotation power by two shafts uncrossed.

The above conventional gears have problems that abrasion and noise occur due to contact friction caused when their teeth engage with each other and rotate.

When the conventional gears are used, there are some problems such as error occurrence by abrasion and severe damage in instrument working.

The present inventors have made the present invention in view of the above problems, and accordingly, it is an object of the present invention to provide gear member for power transmission which is capable of transmitting power accurately and reducing friction by acting based on rolling friction by comprising a crown gear having teeth tilted at an angle and one or more roller gears having a plurality of tilting teeth to go in the crown gear placed parallel, vertical, or tilted to the roller gears.

DISCLOSURE OF THE INVENTION

To achieved the object, the present inventors provide gear member for power transmission which comprises: a a crown gear comprising a circular disk part and a plurality of gear teeth positioned along the verges of the circular disk and tilted outward at an angle, where tooth grooves with a curvature are formed between the gear teeth; and b one or more roller gears comprising a plurality of roller teeth arranged at an interval and an angle to engage perpendicularly with the gear teeth of the crown gear and a multistage circular disk part tilting to a central shaft tube at an angle, which multistage circular disk part is formed by assembling and fixing upper and lower ends of shaft pins in the roller teeth.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects, features and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of a gear member for power transmission according to the present invention;

Fig. 2 is a cross section of A-A in the Fig. 1;

Fig. 3 is a cross section of another crown gear which can be used for a gear member of power transmission according to the present invention;

Fig. 4 is a perspective view of a gear member for power transmission according to the present invention wherein a crown gear and a roller gear are arranged parallel to each other; and

Fig. 5 illustrates a gear member of power transmission according to the present invention wherein a crown gear engages with a plurality of roller gears.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Now, specific embodiments of the present invention will now be described by the following examples of the figures attached hereto. However, it should be understood that the scope of the present invention is not limited thereto.

Fig. 1 is a perspective view of a gear member of power transmission according to the present invention and Fig. 2 is a cross section of A-A in the Fig. 1.

Fig. 3 is a cross section of a modified crown gear that can be used for a gear member of power transmission according to the present invention and Fig. 4 illustrates a arrangement example of a gear member of power transmission according to the present invention.

Fig. 5 illustrates a gear member of power transmission according to the present invention wherein a crown gear engages with a plurality of roller gears.

A gear member for power transmission according to the present invention comprises of a crown gear and one or more roller gears.

A crown gear 4 according to the present invention comprises;

a circular disk 10 on which hollow tube 8 is mounted; and

a plurality of gear teeth 12 being positioned along the verges of the circular disk 10, tilting outward at an angle Θ^1 and having tooth grooves 14 with a curvature formed

between the gear teeth 12.

The hollow tube 8 is positioned at the center of the circular disk 10 for connecting with a length of shaft. The length of the hollow tube 8 and the area of the circular disk 10 aren't limited and enough if they are proposed in a design.

The gear teeth 12 are arranged at an interval making it possible to engage with a roller gear teeth most suitably. The curvature of the tooth grooves 14 formed between the gear teeth 12 matches with the outside diameter of the roller teeth 16.

In addition, the gear teeth 12 of the crown gear 4 can be tilted outward at larger angle Θ^2 on the verges of the circular disk 10 see Fig. 3.

A roller gear 6 according to the present invention comprises;

a plurality of roller teeth 16 arranged at a interval, tilting at an angle to shaft axis L to engage with the gear teeth 12 of the crown gear 4; and

a multistage circular disk part tilting at a angle to shaft tube 20, which is formed by assembling and fixing upper and lower ends of shaft pins 18 in the roller teeth 16.

The roller teeth 16 are tapered from the base to the top but can be a cylindrical form.

In addition, the shaft pins 18 assembled in the roller teeth 16 are fixed to the multistage circular disk part 22 tilting at a angle. The number of the roller teeth 16 can be adjusted according to the size of the multistage circular disk part 22.

The multistage circular disk part 22 forms the shaft tube 20 on the center for connecting with a shaft. The verges of the multistage circular disk part 22 ascends by tilting at a angle, thereby the arrangement and the rotation of the roller teeth 16 can be facilitated.

The multistage circular disk part 22 comprises a upper circular disk 24 with a diameter and a lower circular disk 26 with a lager diameter.

The roller gear 6 can be applied to various crown gear 4 by increasing and decreasing the outer diameter of the multistage circular disk part 22 or the roller teeth 16.

In addition, a plurality of the roller gears 6 can be arranged to the crown gear 4 with a fixed outer diameter by the roller gear 6 being formed in a size that make it possible for the virtual center point P to be located on the center of the crown gear 4 see Fig. 5.

Accordingly, power dispersion can be accomplished by a plurality of roller gears 6 divergence and oppositely dispersed power can converge to the crown gear 4.

It is also possible that the shaft of a crown gear 4 and the shaft of the roller gears 6 are arranged parallel to each other see Fig. 4.

The gear member can realize various rotation velocities by modifying rotation ratio caused by increasing and decreasing either the number of roller teeth 16 of the roller gear 6 or the number of gear teeth 12 of the crown gear 4.

So to speak, the gear member 2 for power transmission can be modified to fit an angle or position demanded in case two shafts are crossed see Fig.2 or parallel to each other see Fig. 4 as long as it isn't out of inherent constitution.

Joining the hollow tube 8 of the crown gear 4 and the shaft tube 20 of the roller gear 60 to a shaft 30 firmly can be accomplished by conventional technique, for example, by inserting key 32 into key way 31.

To describe the mechanism of the present invention, when unillustrated shaft transmits power to the hollow tube 8, the power is transmitted to the crown gear 4, thereby the gear teeth 12 tilting at an angle to shaft axis rotate axially.

The roller teeth 16 of the roller gear 6 lead to rolling friction when they engage with the gear teeth 12, thereby contact friction caused by contacting with the gear teeth 12 decreases. Even though the roller teeth 16 engage perfectly with the teeth grooves 14 of the gear teeth 12, the roller gear lead to slight rolling friction to decrease abrasion caused by contact friction.

Accordingly, when the roller teeth 16 engage with the teeth grooves 14 of the gear teeth 12, the power transmitted to the gear teeth 12 is transmitted the roller gear 6 through the roller teeth 16 and the multistage circular part 22. After that, the power is

transmitted to other instrument or apparatus through the shaft 30 joined to the shaft tube 20.

Where there is need to transmit power transmitted through the crown gear 4 to a plurality of apparatus, parts or instrument, the number of the roller gears 6 can be adjusted as demands. In this case, it should be noted that the diameter of the crown gear 4 should be kept in mind not to incur disturbance between the roller gears 6.

Accordingly, various rotation velocities can be realized by modifying rotation ratio by adjusting either the number of roller teeth 16 of the roller gear 6 or the number of gear teeth 12 of the crown gear 4.

Not only when power is transmitted through the crown gear 4 but also when power is transmitted through the roller gear 16 in the opposite direction, the power is transmitted by the same mechanism except transmission direction.

On the other hand, the gear member 2 for power transmission can be arranged variously based on design of any specific instrument or apparatus applied and can transmit power easily by being set up on one of two separate shafts where the shafts are arranged parallel or tilled at a regular angle to each other.

INDUSTRIAL APPLICABILITY

A gear member according to the present invention can transmit power without loss when it is used for shafts arranged with various mode such as crossed and connected, thereby the gear member can be applied variously to such as a bicycle and a engine.

In addition, roller teeth lead to rolling friction when they engage with gear teeth of a crown gear, thereby abrasion and noise decrease.

Accordingly, the gear member according the present invention comprising one or more roller gears on one side differently from the conventional gears, can be used for machine demanding silence, thereby it is useful invention in fundamental parts industry.

CLAIM

1. A gear member for power transmission which comprises:

a a crown gear 4 comprising a circular disk part 10 and a plurality of gear teeth 12 positioned along the verges of the circular disk 10and tilted outward at an angle, where tooth grooves 14 with a curvature are formed between the gear teeth 12; and

b one or more roller gears 6 comprising a plurality of roller teeth 16 arranged at an interval, tilting to shaft axis L at an angle to engage perpendicularly with the gear teeth 12 of the crown gear 4 and a multistage circular disk part 22 comprising upper stage 24 and lower stage 28 tilting to a shaft tube 20 at an angle, which multistage circular disk part 22 is formed by assembling and fixing upper and lower ends of shaft pins 18 in the roller teeth 16.

2. The gear member for power transmission according to claim 1, wherein the crown gear 4 comprises a plurality of gear teeth 12 tilting outward to the circular disk part 10 at an fixed angle Θ.

3. The gear member for power transmission according to claim 1, wherein the crown gear 4 engages with the roller gear 6 arranged perpendicular to the crown gear 4.

4. The gear member for power transmission according to claim 1, wherein the number of the gear teeth 12 of the crown gear 4 is a multiple of the number of the roller teeth 16 of the roller gear 6, or vice versa.

5. The gear member for power transmission according to claim 1, wherein the roller teeth 16 of the roller gear 6 is arranged and fixed tilting at an angle for a virtual center point P to be located on the extension line of the outer side of the

multistage circular disk part 22.

6. A gear member for power transmission according to any one of claim 1 to 5, wherein a plurality of roller gears 6 are arranged for the virtual center point P on the extension line of the outer side of the roller teeth 16 to be located on the center of the crown gear 4.

FIG. 1

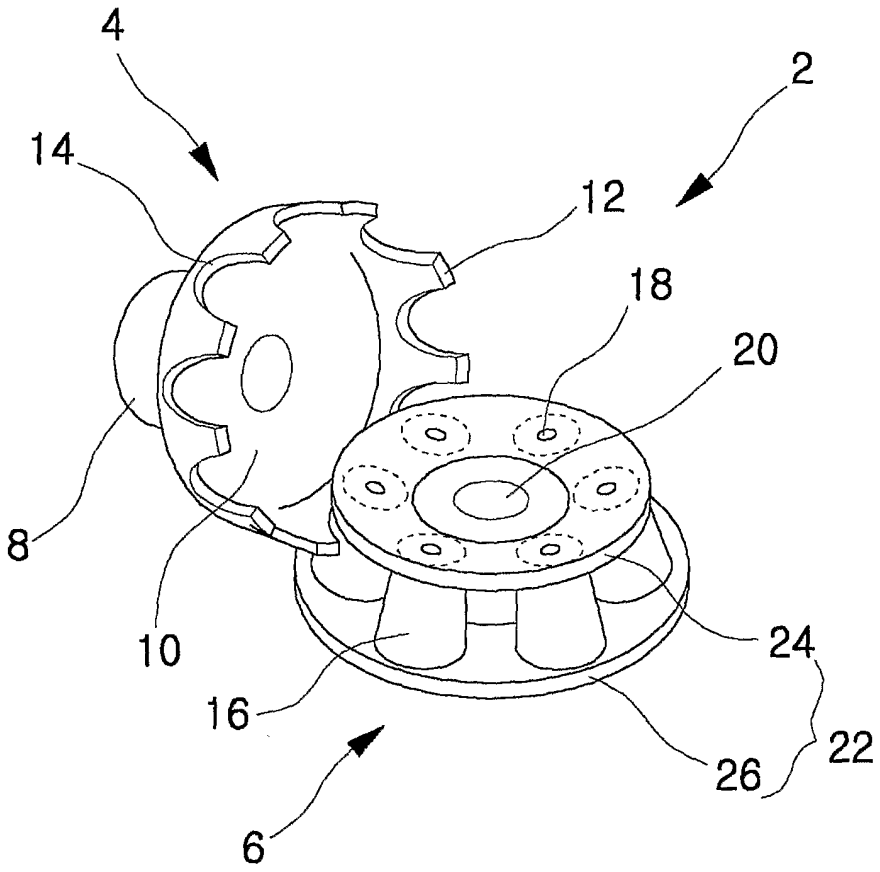


FIG. 2

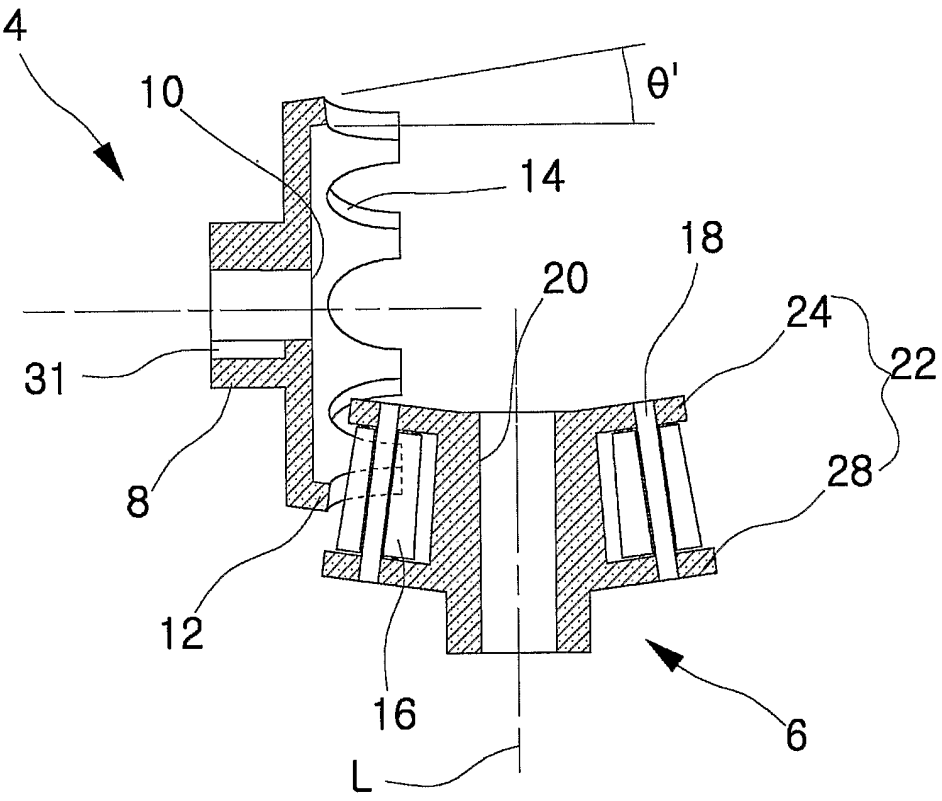


FIG. 3

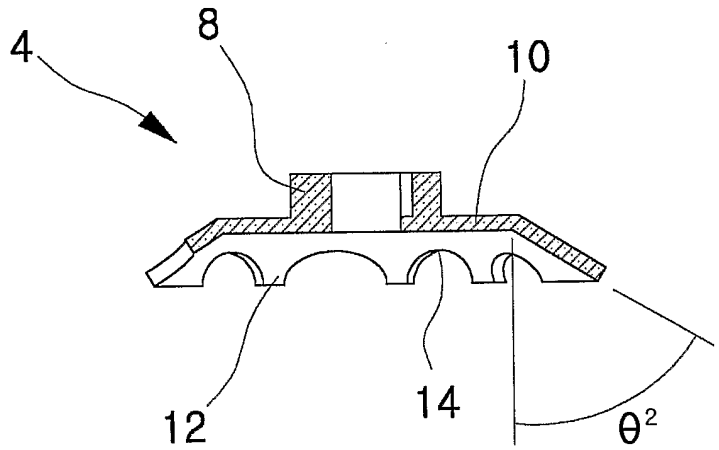


FIG. 4

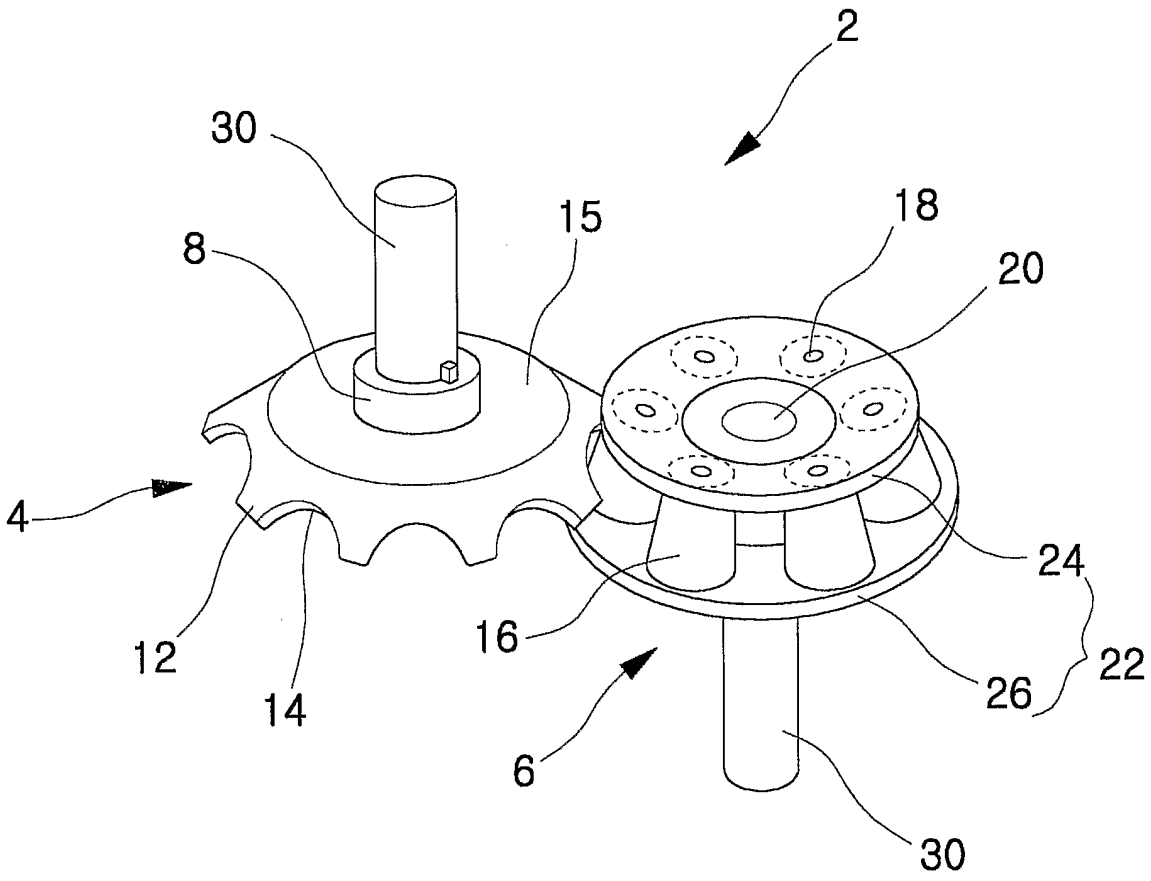
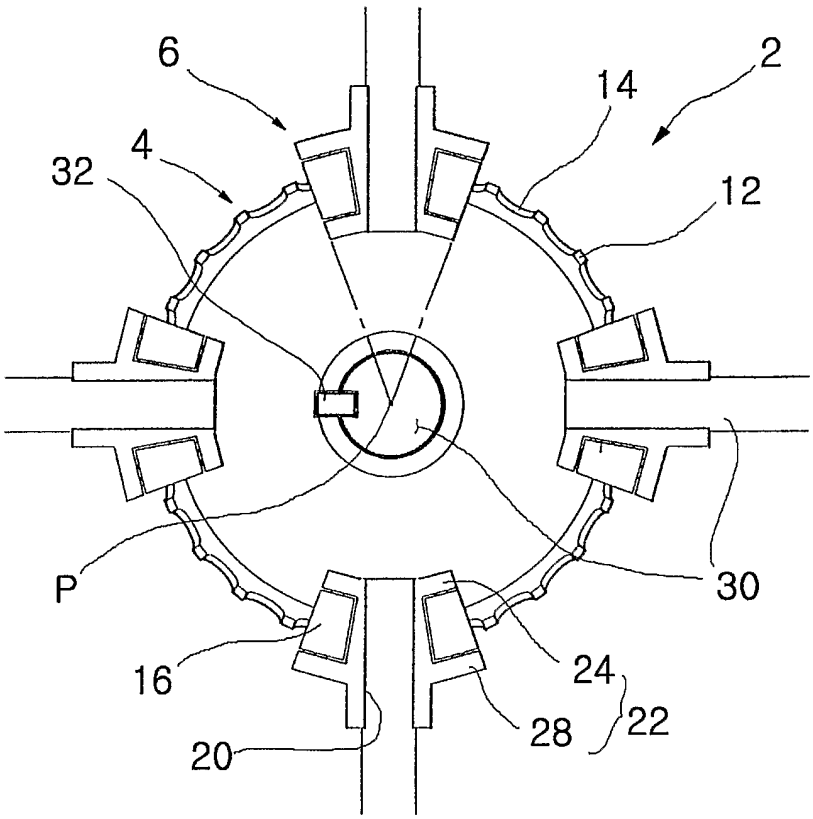


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR02/01291

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 F16H 1/12

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)

IPC7 F16H

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

KR, JP : IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,960,668 A (NATIONAL SCIENCE COUNCIL) 5 OCTOBER 1999 see the whole document	1 - 6
A	KR 93-4657 A (KU, IN HOI) 22 MARCH 1993 see the abstract	1 - 6

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

☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
02 APRIL 2003 (02.04.2003)	02 APRIL 2003 (02.04.2003)

Name and mailing address of the ISA/KR	Authorized officer
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