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- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

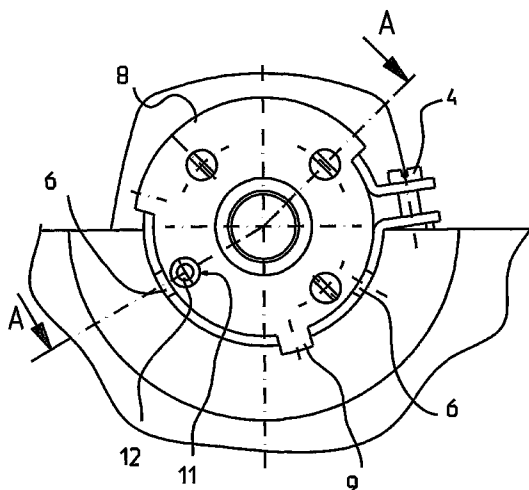
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(54) Title: LOCKING MECHANISM FOR SAFETY GUARDS OF HANDHELD METALWORKING MACHINES



(57) Abstract: A locking mechanism for the safety guards of handheld metal-working machines, particularly grinders, for safe operation assurance and injuries prevention in accidental tool damage. Locking mechanism includes a safety guard (1) with an inner metal band (2) covering (3) grinder's case. Metal band two ends (2) are connected via an adjustable screw joint (4). On the metal band outer edge (2) above the case level (3), locking teeth are located in sectors (6). Safety guard (2) metal band (1) is pressed by a fixing plate (7). Along its periphery a locking sector (8) and an angle catch (9) are oppositely located. Their diameter is larger than metal band diameter (2). Fixing plate is attached to the grinder case (3) via fastening screws (10). On the fixing plate a locking hole is drilled (11) where a locking pin is placed (12); it's on the case. Locking teeth height (6) exceeds fixing plate thickness (7).

WO 2007/016755 A1

LOCKING MECHANISM FOR SAFETY GUARDS OF HANDHELD METALWORKING MACHINES

Scope of application

The preferred embodiment relates to a locking mechanism for the safety guards of handheld metal-working machines, especially angle grinders and straight grinding machines.

Background of the invention

A locking mechanism for the safety guards of angle grinders, which is described in (1), is known.

The concept of that mechanism is that a locking disk, on the surface of which ruffles are cut to point towards one direction, is concentrically fixed to the safety guard. On the locking disk there is a catch disk on the periphery of which locking teeth are cut symmetrically in relation to one another. The teeth can go into ruffles. A clamping ring, on which attachment holes are drilled, is mounted on the locking disk. The attachment holes are coaxial in relation to the fastening holes drilled on the catch disk. Through the attachment and fastening hole pass clamping bolts which are screwed into the case of the grinder.

One disadvantage of the construction described above is that the number of ruffles is large thus they are of low height. This results in a small common contact surface between the locking disk and the catch disk and insufficient strength when considerable forces are applied in the blocked direction. This can be very dangerous in the event of accidental damage of the tool inside the safety guard.

Another disadvantage is the possibility of placing the safety guard in any position in relation to the machine. When a worker is operating the metal-working machine not every position of the safety guard can guarantee his safety.

Furthermore, the fact that the safety guard is retained in the desired position by means of a limited number of locking teeth makes it possible for that position to be changed during operation by the accidental application of a force onto the safety guard which might move into a position that does not guarantee the worker's safety.

A design described in (2) is known. Its concept is that a metal band, which goes partly round the case of the grinder, is attached in sectors to the safety guard of the grinder. An elastic band goes round the other part of the case. One of its ends is hinged by means of an eye ring to a pin which is attached to the safety guard. The other end of the elastic band is a screw joint with the screw in the form of a tightening handle.

One disadvantage of said design is poor reliability of mounting and possibility of turning the safety guard in the process of operation as a result of the use of an elastic band.

Another disadvantage is that due to the hinged type of attachment of the metal band and the fact that the band goes partly round the case of the grinder it is possible for the safety guard to tilt in one direction and get into contact with the tool during the process of operation.

Technical description of invention

The purpose of the preferred embodiment is to create a locking mechanism for the safety guards of handheld metal-working machines, which has to ensure the fixed position and stable attachment of the safety guard in specified limits that guarantee safe operation of the tool, and prevent the safety guard from coming off, tilting and turning into a position that does not guarantee the worker's safety in the event of accidental loosening of the joint between the machine and the safety guard as well as in the event of damaging of the tool during operation.

The purpose is achieved by means of a locking mechanism for the safety guards of handheld metal-working machines, which includes a safety guard with a metal band which is tightly fixed to the internal end of the guard and goes round the case of the grinder. The two ends of the band are connected by means of an adjustable screw joint. According to the invention, locking teeth are cut and located in sectors on the outer edge of the metal band above the level of the case of the grinder. The metal band of the safety guard is pressed towards the case of the grinder by means of a fixing plate. Along its periphery there is a locking sector and an angle catch which are located opposite each other. Their diameter is larger than the diameter of the metal band. The fixing plate is mounted to the case of the grinder by means of fastening screws.

On the fixing plate there is a locking hole in which there is a locking pin which is made on the case of the grinder.

The height of the locking teeth exceeds the thickness of the fixing plate.

One advantage of the locking mechanism for safety guards of handheld metal-working machines is that it ensures very good attachment of the safety guard to the case of the grinder due to the possibility of turning the guard within optimum limits.

Another advantage is that in the event of accidental damage of the tool during operation unwarranted turning of the safety guard and getting the worker hurt by pieces of the tool are impossible.

Yet another advantage is that the fixing plate prevents one-sided slipping and tilting of the safety guard during operation and its getting into contact with the tool.

Description of the enclosed drawings

Figure 1 gives a front view of the locking mechanism for the safety guards of handheld metal-working machines. The view is in the direction of the axis of the tool.

Figure 2 is a section along A-A of Figure 1.

Figure 3 is a view of the safety guard.

Figure 4 is a section along B-B of Figure 3.

An example of the preferred embodiment

The locking mechanism for the safety guards of handheld metal-working machines comprises a safety guard **1** with a metal band **2** which is tightly fixed to the internal end of the guard and goes round the case **3** of the grinder. The two ends of

the metal band 2 are connected by means of an adjustable screw joint 4. The locking teeth 6 are cut and located in sectors on the outer edge 5 of the metal band 2 above the level of the case 3 of the grinder. The metal band 2 of the safety guard 1 is pressed by the fixing plate 7. Along its periphery there is a locking sector 8 and an angle catch 9 which are located opposite each other. Their diameter is larger than the diameter of the metal band 2. The fixing plate 7 is mounted to the case 3 of the grinder by means of the fastening screws 10. On the fixing plate 7 there is a locking hole 11 in which there is a locking pin 12 which is made on the case 3 of the grinder. The height of the locking teeth 6 exceeds the thickness of the fixing plate 7.

Application of preferred embodiment

The locking mechanism for the safety guards of handheld metal-working machines is used in the following way. By means of screw joint 4 the safety guard 1 is mounted in desired operation position. The fixing plate 7 is mounted to the case 3 of the grinder by means of fastening screws 10. The locking sector 8 and the angle catch 9 press the metal band 2 and the whole safety guard 1 to the case 3 of the grinder. The angle catch 9 is located between the locking teeth 6 of the metal band 2. The locking pin 12 of the case 3 of the grinder goes into the locking hole 11 of the fixing plate 7 and then the fastening screws 10 are tightened. The design ensures minimum turning of the safety guard only the locking teeth 6 and complete safety of the worker.

List of positions

1. Safety guard
2. Metal band
3. Case
4. Screw joint
5. Outer edge of the metal band
6. Locking teeth
7. Fixing plate
8. Locking sector
9. Angle catch
10. Fastening screws
11. Locking hole
12. Locking pin

(54) PATENT CLAIMS

1. A locking mechanism for the safety guards of handheld metal-working machines, which comprises a safety guard with a metal band which is tightly fixed to the internal end of the guard, goes round the case of the grinder and has its two ends joined by means of an adjustable screw joint; the locking mechanism features locking teeth (6) which are cut and located in sectors on the outer edge (5) of the metal band (2) above the level of the case (3) of the grinder; the metal band (2) of the safety guard (1) is pressed towards the case of the grinder by the fixing plate (7) along whose periphery there is a locking sector (8) and an angle catch (9) which are located opposite each other; their diameter is larger than the diameter of the metal band (2), and the fixing plate (7) is mounted to the case (3) of the grinder by means of fastening screws (10).

2. As described in Claim 1, a locking mechanism for the safety guards of handheld machines, which features a fixing plate (7) on which there is a locking hole (11) in which is located a locking pin (12) which is made on the case (3) of the grinder.

3. As described in Claim 1, a locking mechanism for the safety guards of handheld machines, which features locking teeth (6) whose height exceeds the thickness of the fixing plate (7).

(1) - DE 101 15 635 C1

(2) - DE 41 02 483 A1

AMENDED CLAIMS

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1. A locking mechanism for the safety guards of handheld metal-working machines, which comprises a safety guard with a metal band which is tightly fixed to the internal end of the guard, goes round the case of the grinder and has its two ends joined by means of an adjustable screw joint, characterized in that on the outer edge (5) of the metal band (2) above the level of the case (3) of the grinder there are locking teeth (6) which are cut and located in sectors, and the metal band (2) of the safety guard (1) is pressed towards the case of the grinder by the fixing plate (7) along whose periphery there is a locking sector (8) and an angle catch (9) which are located opposite each other; their diameter is larger than the diameter of the metal band (2), and the fixing plate (7) is mounted to the case (3) of the grinder by means of fastening screws (10).

2. As described in Claim 1, a locking mechanism for the safety guards of handheld metal working machines, characterized in that on the fixing plate (7) there is a locking hole (11) in which is located a locking pin (12) which is made on the case (3) of the grinder.

3. As described in Claim 1, a locking mechanism for the safety guards of handheld metal working machines, characterized in that the height of the locking teeth (6) exceeds the thickness of the fixing plate (7).

(1) - DE 101 15 635 C1

(2) - DE 41 02 483 A1

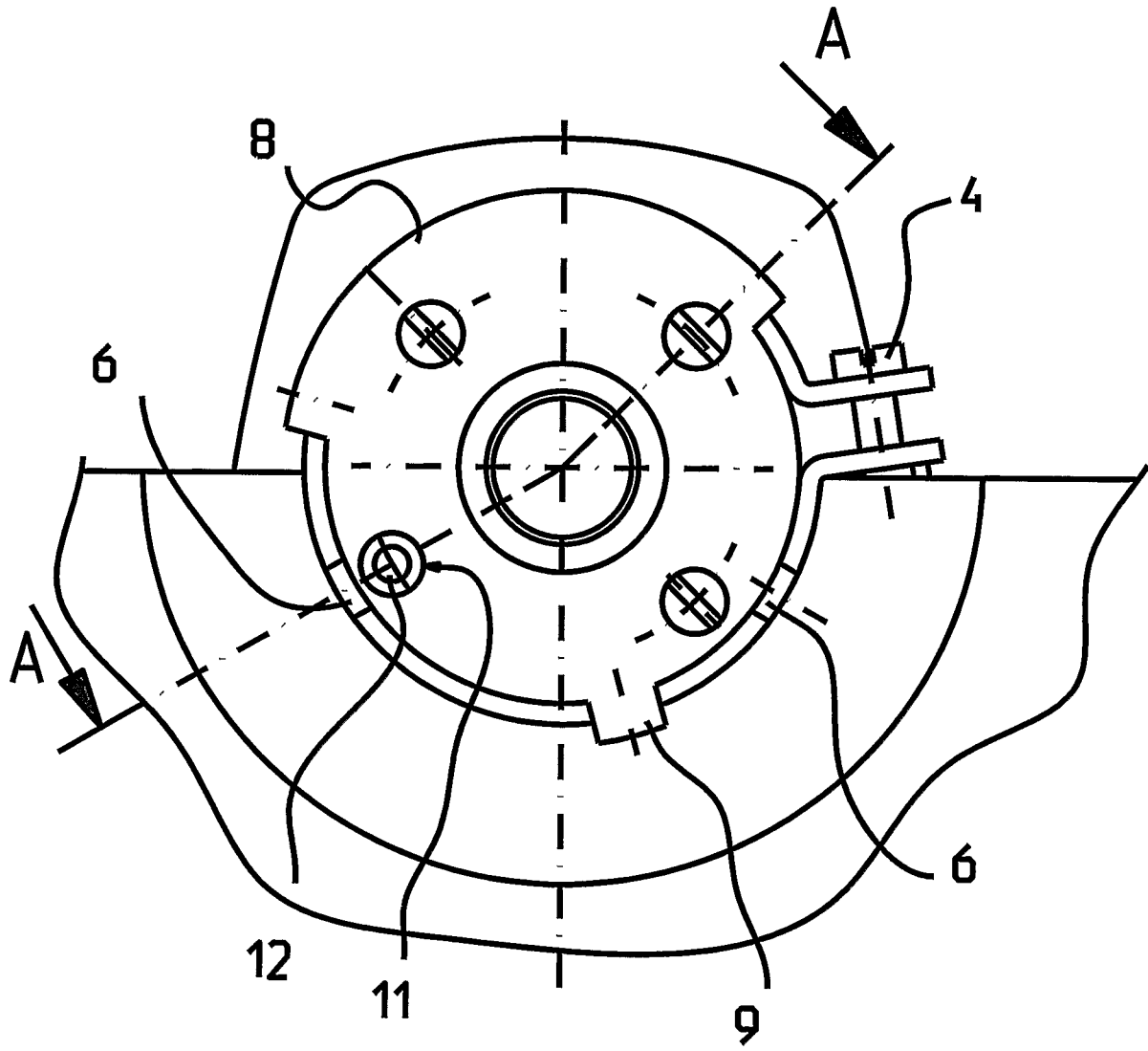


FIG. 1

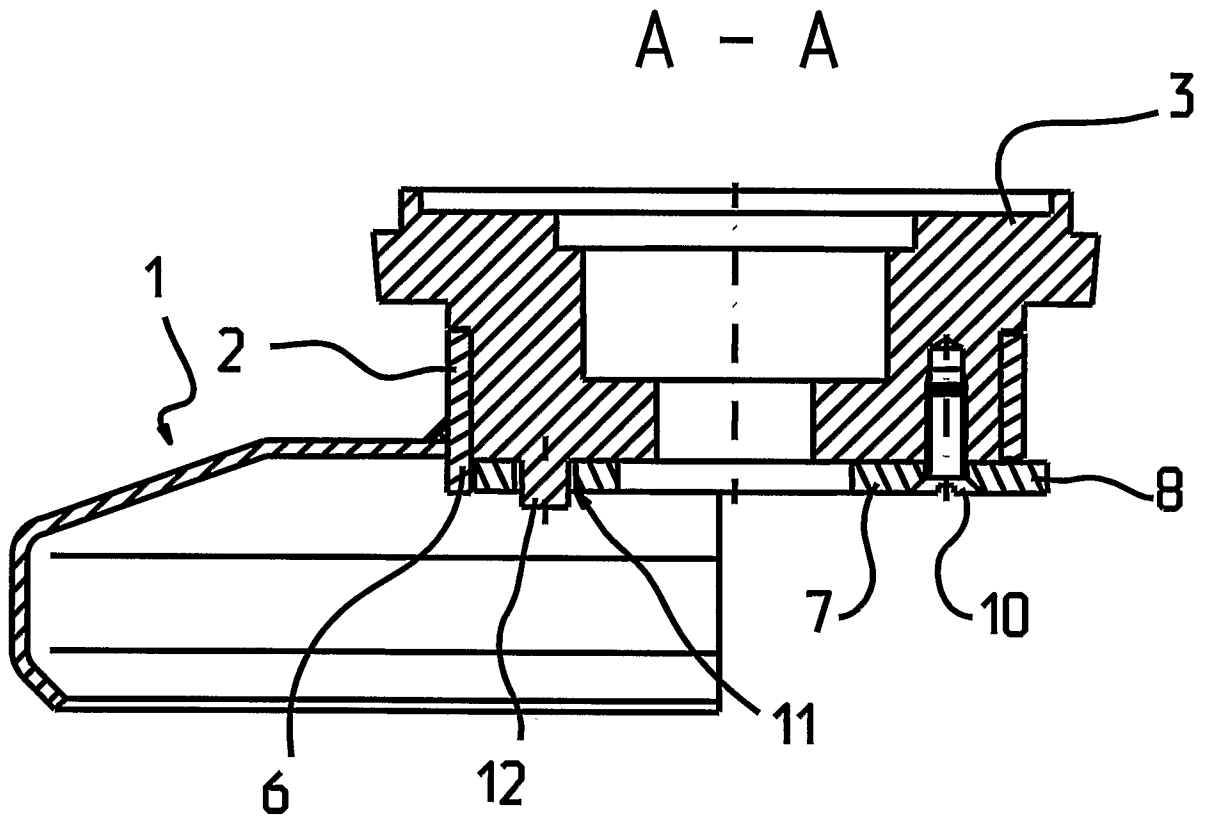


FIG. 2

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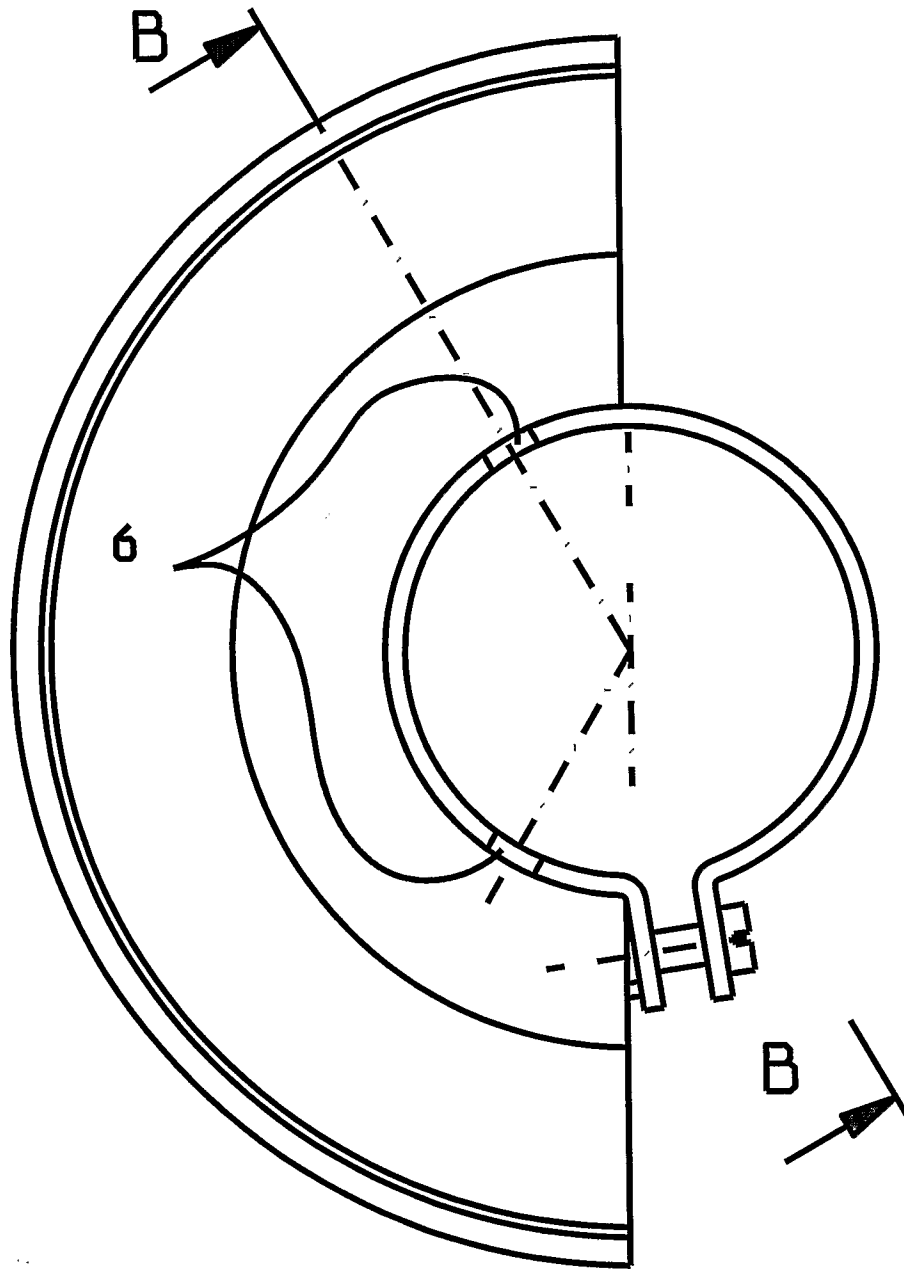


FIG. 3

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B - B

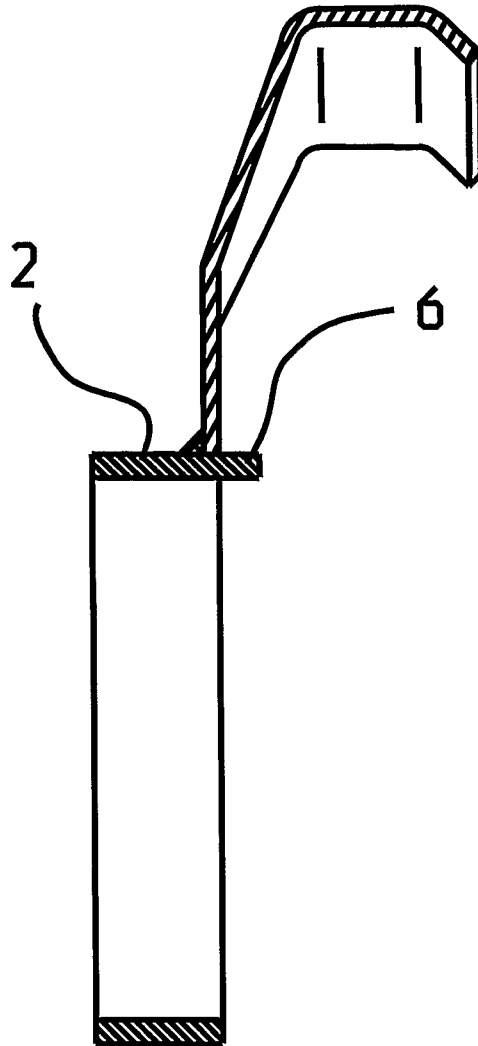


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/BG2005/000014

A. CLASSIFICATION OF SUBJECT MATTER
B24B55/05 B23Q11/06

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)
B24B B23Q B23D B27G

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	DE 101 15 635 C1 (FLEX-ELEKTROWERKZEUGE GMBH) 24 October 2002 (2002-10-24) cited in the application	1-3
A	US 2004/203330 A1 (KLEIDER ALBERT) 14 October 2004 (2004-10-14)	1-3
A	US 5 339 572 A (EICHER ET AL) 23 August 1994 (1994-08-23) cited in the application	1-3

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
E earlier document but published on or after the international filing date	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
O document referring to an oral disclosure, use, exhibition or other means	*Z* document member of the same patent family
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Date of the actual completion of the international search 15 March 2006	Date of mailing of the international search report 28/03/2006
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/BG2005/000014

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