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(54) Wood shredder

(57) The present invention is related to a wood shredder (1) for reducing wood branches to splinters and/or chips, characterised in that it comprises a cylinder (2), rotating around an axis (A), on which a flat knife (3) is mounted, the plane (α)of said knife (3) being perpendicular to the radius of said cylinder (2), and a counterknife (4) that is mounted parallel to the axis (A) of said cylinder (2).

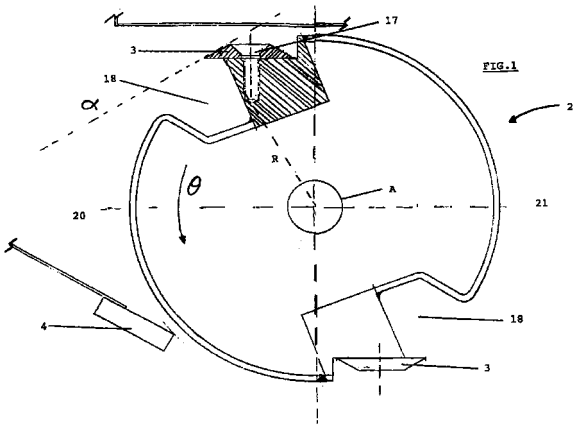

FIG.1

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Description

Field of the invention

[0001] The present invention is situated in the field of wood shredders, that are usually used to transform pruned branches, sticks and other waste wood into wood chips or splinters.

State of the art

[0002] Different types of wood shredders are being used in gardens or for park maintenance by private persons or public services. Wood shredders have two major purposes : waste wood such as pruned wood, dead wood, and sometimes even fallen trees can be transformed into a much more manageable bulk product (wood chips or splinters), which is an ecologically sound way of getting rid of waste wood, certainly when compared to the formerly used methods such as burning.

[0003] A second application of wood shredders is to provide wood chips and splinters which are excellent ground cover for e.g. flowerbeds.

[0004] Several models of wood shredders have been built, varying from small machines for domestic use to huge machines, adapted to be powered by a tractor, usually used for the maintenance of a large park or a golf playground.

[0005] Small models are usually very limited in capacity (allowing the treatment of wood sticks going up to a few cm in wood diameter) and can be described as a knife rotating around its centre, the wood being fed from one side perpendicular to the orientation of the knife. The wood chips obtained are evacuated at the other side of the rotating knife by making advantage of the centrifugal force the chips are subjected to when being cut from the branch. These domestic models have a low capacity and usually a very low throughput, due to their design, and cannot be used for professional purposes.

[0006] Bigger shredders having a professional use are characterised by a higher throughput. They usually have, apart from the higher performance cutting system, a feeding system that reduces the amount of jams. However, these systems are not easy to operate when jams have occurred.

[0007] Most often, the feeding system has to be put in reverse to be able to free the knives, and this is usually time-consuming.

[0008] Usually, the construction of the wood shredder's feeding channel is conical. However, such a construction is vulnerable to jams when too much branches (or, e.g. heavily branched trees) are fed at a high rate. On the other hand, a cylindrical feeding channel is not suitable for a high feed rate.

Aims of the invention

[0009] The primary aim of the invention is to provide a new wood shredder system which does not present the drawbacks of the state of the art, and which has improved throughput, capacity and maintenance, especially a wood shredder which would jam less often and, when jams occur, would be more swiftly unjammed.

[0010] A further aim is to provide a wood shredder that saves time by providing high throughput and low jamming.

General description of the invention

[0011] The present invention concerns a wood shredder for reducing wood branches to splinters and/or chips, which comprises a cylinder, rotating around its main axis, on which at least one flat knife is mounted, the plane of said knife being perpendicular to the radius of said cylinder, and a counterknife that is mounted parallel to the axis of said cylinder. The cylinder rotates in the direction the cutting edge of the knife is pointing to. The wood shredder of the present invention can comprise two or more knifes. Preferably, said knifes have two cutting sides, so that when one side is blunted, the knife can be mounted backwards and the other, sharp side of the knife can be used without the need for sharpening or replacing the knife. Said counterknife is preferably in the form of a beam, of which all four sides can be used as knife side before the counterknife has to be replaced.

[0012] The wood shredder of the invention can be further characterised in that the cylinder rotates at a speed of about 2000 revolutions per minute. This speed provides an optimal balance between throughput and ease of cutting.

[0013] The wood shredder preferably further comprises a feeding channel for safety reasons. Preferably said feeding channel is about 1 meter long, not permitting arms or legs to reach the knife when drawn in accidentally. Said feeding channel preferably consists of an essential straight portion and a truncated essential pyramidal portion. The straight portion is advantageously more than 2 times longer than the pyramidal portion.

[0014] In a preferred embodiment, the straight portion is a beam and the pyramidal portion has a rectangular base.

[0015] In another preferred embodiment, the straight portion has a cylindrical form and the pyramidal portion is a truncated cone. This form of feeding channel permits a minimisation of jams.

[0016] The feeding channel, being cylindrical with a short truncated conical portion at the end, shows a jam-reducing behaviour. The cylindrical knife construction eliminates the need for a feeding system. If a jam occurs, it can be easily undone by pulling up some wood, which saves time compared to the state of the art.

[0017] The wood shredder can further comprise a transmission that is connected to the cylinder. In a pre-

ferred embodiment, it further comprises an engine able to rotate the cylinder and which is connected to said transmission. In another preferred embodiment, it further comprises means to connect the transmission to a driving means, said driving means being preferably a cardan shaft of a tractor or gardening machine.

[0018] The present invention will be further described in the following non-limiting examples and figures.

Brief description of the drawings

[0019]

Figure 1 represents a base plane view of a cylinder as used in the present invention.

Figure 2 represents a preferred embodiment of the present invention, adapted to fit a Walker front lawnmower.

Example 1: Description of the cylinder according to the invention

[0020] Figure 1 describes a cylinder 2 according to the invention. The cylinder according to the present invention rotates around its axis (A) at a speed of about 2000 revolutions per minute. On said cylinder 2, 2 knives (3) are mounted using bolts 17. The plane of the knife (α) is perpendicular to the radius (R) of the cylinder 2. The counterknife 4 is mounted parallel to the axis A. The wood is shredded at the cutting side 20. The cut-away 18 that is provided in the cylinder before the knife (in view of the rotation direction θ of the cylinder 2) transports the obtained wood chips from the cutting side 20 to the evacuation side 21, where the wood chips leave the cut-away due to centrifugal force. The cylinder as described is used in the preferred embodiments of examples 2 and 3.

Example 2 : Description of a first preferred embodiment of the invention : a stand-alone wood shredder

[0021] The shredder 1 according to the invention comprises a cylinder 2 with two or more knives 3 thereon. The wood is fed through a feeding channel 6, dimensioned so that there is no danger for the limbs of the operator. Preferably, said feeding channel 6 is about 1 meter long. The opening of the feeding channel 12 is dimensioned so that trees of certain dimensions that will not jam the machine can be inserted. Preferred opening dimensions are about 40x30 cm.

[0022] The cylinder present a diameter about 23 cm and a length about 30 cm. The knives are also 30 cm long and about 4 cm broad.

[0023] In this preferred embodiment, the feeding channel comprises a portion in the form of a beam 13 and a truncated pyramidal portion 14. The pyramidal portion ends on a rectangular opening 16 (with dimensions 30x15 cm), through which the wood can reach the rotating cylinder 2.

[0024] No feeding system is necessary to ensure a high rate, since the cylinder 2 pulls in the wood sticks at a sufficient rate. The cylinder rotates at about 2000 revolutions per minute, and is protected by a cylinder chamber 15. At the lower end of the rectangular opening 16, a counterknife 4 is mounted parallel to the cylinder axis on the cylinder chamber 15. The minimal distance between the knives 3 mounted on the cylinder 2 and the counterknife 4 determines the thickness of the wood chips, and the throughput rate. Preferably, this distance is about 5 mm.

[0025] The obtained wood ships are evacuated through a hose or dirigible evacuation channel 7 to a container or just on a pile. There is no need for an additional powered evacuation system since the velocity at which the chips are ejected from the cylinder 2 is enough to blow them through the evacuation channel 7.

[0026] The wood shredder is preferably powered by an atmospheric engine capable of providing enough torque to spin the cylinder 2 at a speed of about 2000 revolutions per minute. If necessary, a transmission device is placed between the engine and the cylinder to adjust the amount of revolutions per minute. The transmission can be made of the straight type or with at straight angles.

[0027] The stand-alone wood shredder can also be powered by an electric motor.

[0028] This machine can cope with wood until a diameter of about 8 cm.

Example 3 : Description of a second preferred embodiment of the invention : a wood shredder adaptable to an existing driving means

[0029] The stand-alone wood shredder as described in example 2 can easily be adapted for an existing driving means, such as a cardan axle of a tractor or gardening machine such as a Walker front lawnmower.

[0030] In the case of the Walker machine, the wood shredder can be driven by the cardan axle. This cardan axle rotates at 3000 revolutions per minute. The assembly as in fig 2 can be attached to the Walker by inserting the pins emerging from the front of the Walker into the cylinders 8 and secured with locking pins 9. Wheel assemblies 11 are placed on either side of the cylinder, allowing to drive the assembled machine (when the wood shredder is attached). Foot supports 10 provide more comfort when driving around.

[0031] The revolving speed the cardan axle needs to be transformed down about 1,5 times and redirected in a right angle to the axis of the cylinder (2), which is about perpendicular to the Walker's cardan axle.

[0032] The evacuation of the wood chips can be obtained by using the evacuation system of the Walker. Through evacuation channel 7, connected to the evacuation system of the Walker, the wood chips are transported via the internal turbine of the Walker to the

container. If desired, the container can be left open, resulting in the spreading of the wood chips behind the machine.

[0033] It is clear that the skilled person can easily transpose the wood shredder to be used in conjunction with other driving means, such as e.g. the cardan axle of tractors. The transmission is such that a cylinder speed of about 2000 revolutions per minute can be ensured and that the machine is well secured and stable.

Claims

1. A wood shredder (1) for reducing wood branches to splinters and/or chips, characterised in that it comprises a cylinder (2), rotating around an axis (A), on which a flat knife (3) is mounted, the plane (α)of said knife (3) being perpendicular to the radius (R) of said cylinder (2), and a counterknife (4) that is mounted parallel to the axis (A) of said cylinder (2).

2. Wood shredder as in claim 1, characterised in that said cylinder (2) comprises two or more knives (3).

3. Wood shredder as in claim 1 or 2, characterised in that the cylinder (2) rotates at a speed of about 2000 revolutions per minute.

4. Wood shredder as in any of the claims 1 to 3, characterised in that it further comprises a feeding channel (6), said feeding channel (6) having a straight portion (13) and a truncated pyramidal portion (14).

5. Wood shredder as in claim 4, characterised in that the straight portion (13) is more than 2 times longer than the truncated pyramidal portion (14).

6. Wood shredder as in claim 4 or 5, characterised in that the straight portion (13) is a beam and the truncated pyramidal portion (14) has a rectangular base.

7. Wood shredder as in any of the claims 4 to 6, characterised in that the straight portion (13) has a cylindrical form and the truncated pyramidal portion (14) is a cone.

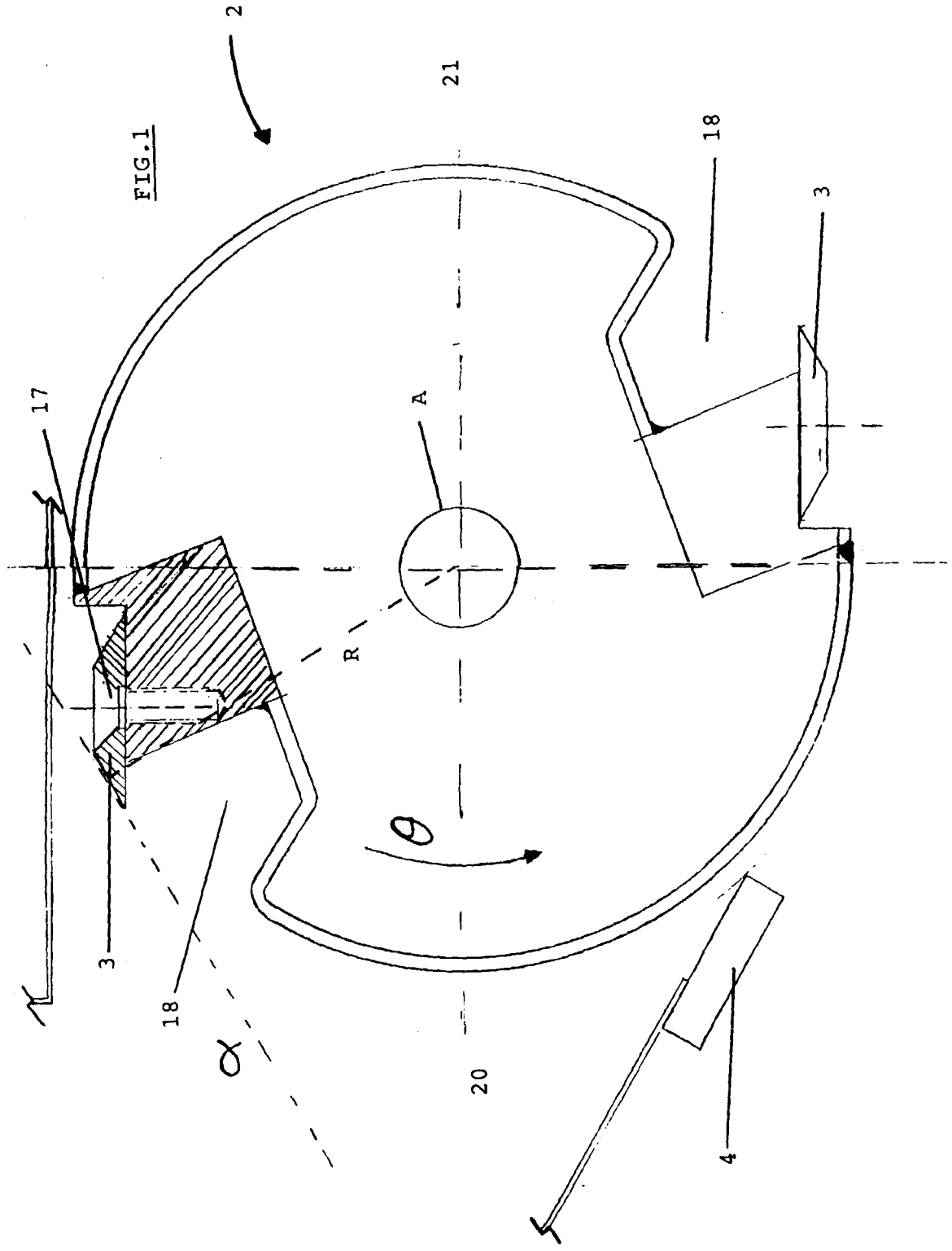
8. Wood shredder as in any of the claims 1 to 7, characterised in that it further comprises a transmission device that is connected to the cylinder (2).

9. Wood shredder as in claim 8, characterised in that it further comprises an engine which drags the rotation of the cylinder (2) around its axis (1) through said transmission device.

10. Wood shredder as in claim 8, characterised in that it further comprises means to connect the transmission to a driving means.

11. Wood shredder as in claim 10, characterised in that said driving means is a cardan shaft of a tractor or gardening machine.

FIG.1



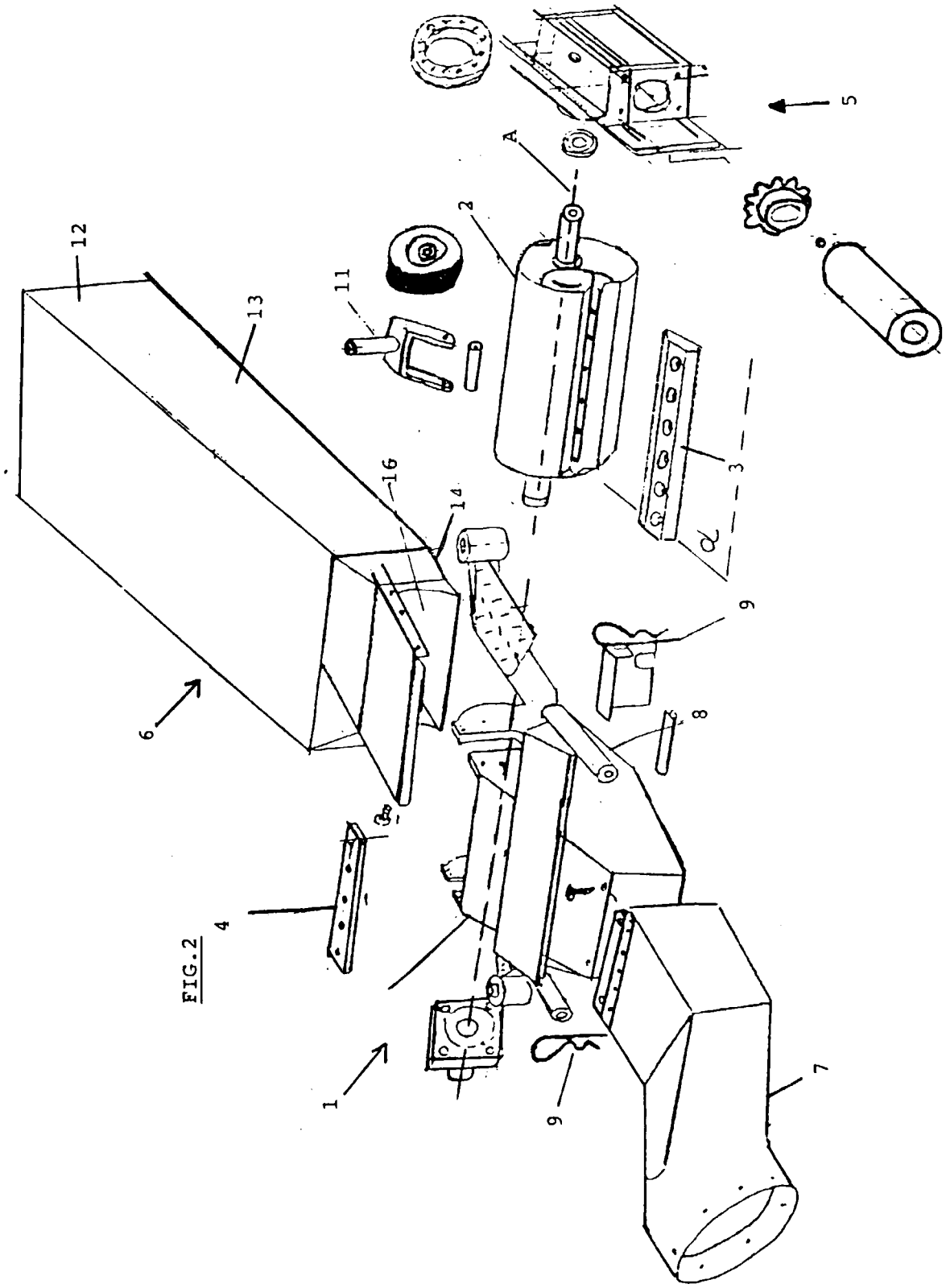


FIG.2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 87 0187

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB 703 956 A (ASPLUNDH TREE EXPERT CO.) 10 February 1954 * page 3, line 17 - page 5, line 30; figures 1-8 * * page 3, line 42 - line 46 *	1,2,4,6, 8-11	B02C18/14 B02C18/18 B27L11/00
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A		5	
X	US 5 076 503 A (COOK ROBERT L) 31 December 1991 * column 4, line 24 - line 60; figures 1,4 * * column 3, line 5 - line 19 *	1,2,8,9	
A		3-7,10, 11	
Y	US 3 944 147 A (PLETCHER ROBERT E) 16 March 1976 * column 5, line 57 - line 59 *	3	
Y	EP 0 134 378 A (FASER PLAST AG) 20 March 1985 * page 6, line 1 - line 3; figure 1 *	7	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B02C B27L A01G
A	US 3 870 239 A (LAUTZENHEISER ROBERT D ET AL) 11 March 1975 * figures 1,2 *	5	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 January 1999	Verdonck, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 98 87 0187

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82