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(11) **EP 1 273 550 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
08.01.2003 Bulletin 2003/02

(51) Int Cl.7: **B66C 19/00**

(21) Application number: **02077582.1**

(22) Date of filing: **28.06.2002**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: **04.07.2001 NL 1018455**

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(54) **Portal truck for moving freight containers**

(57) The invention relates to a portal truck for moving freight containers, of the type comprising an undercarriage (A) composed substantially of two parallel longitudinal runners (1) and having running wheels (2,3); a portal structure (B) rising from the longitudinal runners

of this undercarriage, and a frame (C) that can move up and down in the portal space of the portal structure, in order to pick up, lift and carry a container that is to be moved, and a driver's cab (16), in which the cab can move up and down with the container-bearing frame.

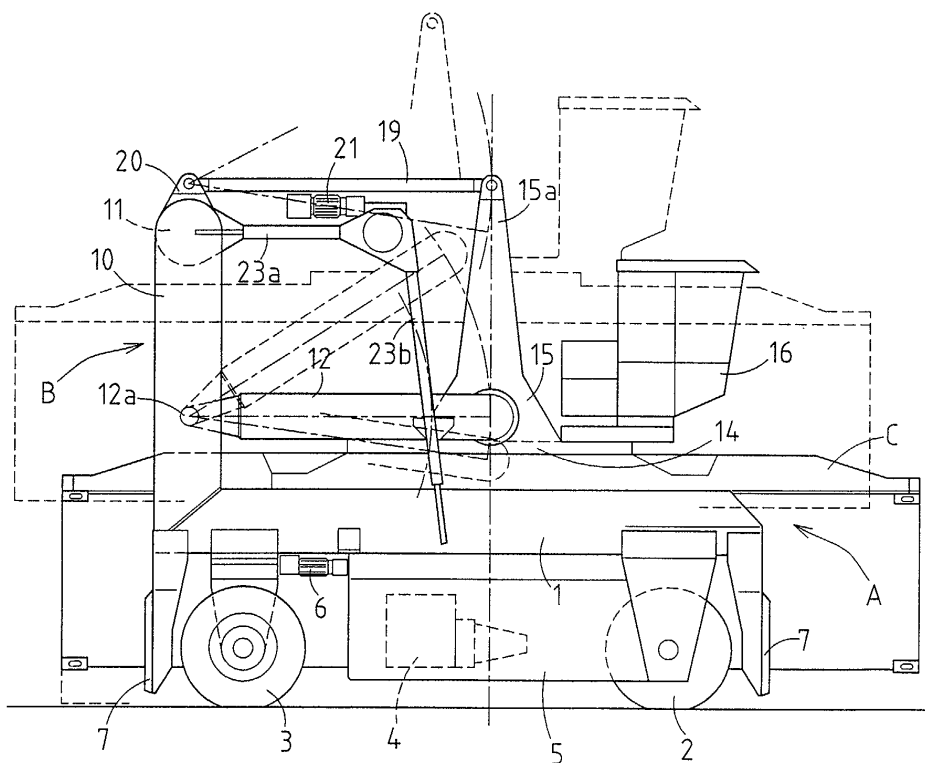


FIG. 1.

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Description

[0001] The invention relates to a portal truck for moving freight containers, of the type comprising an undercarriage composed substantially of two parallel longitudinal runners and having running wheels; a portal structure rising from the longitudinal runners of this undercarriage, and a frame that can move up and down in the portal space of the portal structure, in order to pick up, lift and carry a container that is to be moved, and a driver's cab.

[0002] Such a portal truck, often called a straddle carrier, is generally known and is used, inter alia, for transferring containers one by one from an unloading point on a quay to a collection or storage location. In general, the portal truck is also used at the last-mentioned location for stacking the containers there to, for example, a four-high position. With a view to this stacking function, it must be possible to lift the container-bearing frame over a height that is greater than the desired stacking height, and the portal therefore has a height that is a multiple of the width of the portal truck. Owing to this height-width ratio that is a disadvantage from the point of view of stability, the speed at which the known portal truck can "shuttle" between the two locations is limited. It is also a disadvantage with a view to the manoeuvrability of the known portal truck that the driver's cab is situated in a fixed position at a height above the container-bearing frame in its maximum raised position.

[0003] In order to overcome the above mentioned disadvantages, it has already been proposed for container transport between unloading point and collection location that use be made of a truck travelling independently along a path defined by control loops, on which truck a container can be deposited in each case by a quay crane. However, this did not prove to be a practical solution, since the speed of an unmanned truck by definition cannot be high, and it is a disadvantage that the unloading crane can actually unload only when a truck is available at the unloading point.

[0004] The object of the present invention is to at least partly overcome the above mentioned disadvantages, or to provide a useful alternative. More particularly the present invention aims to provide more effective, faster container transport between unloading point and storage location.

[0005] To that end the invention provides a portal truck according to claim 1. The driver's cab is connected directly or indirectly to the moveable container-bearing frame, and moves up and down together with this frame, for example when a container is lifted by it. Thus a driver is always in a good position to overview his surroundings during transport of a container, and is able to travel in a relatively low position when no container is carried by the frame.

[0006] By comparison with the conventional portal truck with fixed cab, designed for stacking containers up to four or more times the container height, the portal

truck according to the invention may have a considerably reduced height, while the cab can be situated only at container height during travel. This means that the stability and manoeuvrability are considerably improved, and the portal truck can "shuttle" correspondingly faster.

[0007] In particular the maximum height of lift of the container-bearing frame above ground level is just greater than twice the height of a container, wherein the portal structure is of a height that corresponds to that height. Owing to the fact that the maximum height of lift of the container-bearing frame has been reduced no further than to twice the height of a container, it is still possible to pick up any desired container at the unloading point from a row of containers standing in a "head-tail" arrangement, to lift them to above the adjacent containers in the row and to carry them away.

[0008] In the case of the known portal truck the portal structure is in fact composed of two single portals rising from the rear end and the front end of the undercarriage respectively, which portals are connected at the top by means of a platform on which a hoisting device is situated, by means of which hoisting device the container-bearing frame can be moved up and down.

[0009] Apart from the reduced height, the portal structure and the means for moving the container-bearing frame up and down could be designed in a corresponding manner in the case of the portal truck according to the invention.

[0010] A preferred embodiment of the portal truck according to the invention is, however, characterized in that the portal structure is formed by a single portal, the two columns of which are each disposed near the rear end of the truck on a longitudinal runner of the undercarriage, in which portal truck the means for moving the container-bearing frame up and down comprise two interacting lifting arms, which are each mounted with one end pivoting on a portal column and are rotatable from a substantially horizontal, forward-directed position just above container height to a slanting, upward-directed and forward-directed position, with the free ends of the arms just above twice the container height, and vice versa. With this in particular auxiliary means are present, by means of which the container-bearing frame and the driver's cab are held in a horizontal position between the free ends of the lifting arms. This preferred embodiment in fact became possible by restricting the height of the portal structure to practically twice the container height. The great advantage here is that the visibility from the driver's cab is considerably improved through the absence of front portal columns, while the design of the portal truck as a whole has become simpler and lighter.

[0011] A practical embodiment according to the invention is one in which the auxiliary means comprise an auxiliary platform, which is suspended between the ends of the lifting arms in a manner that enables it to pivot about a horizontal transverse axis, and against the underside of which the container-bearing frame is re-

tained, the driver's cab being fitted on the front part of the auxiliary platform. With this in particular a stabilizer rod extends upwards from the platform, the top end of which stabilizer rod is pivotally connected to the front end of an articulated rod extending forwards from the transverse part of the portal, all the above in such a way that the portal columns, the lifting arms, the stabilizer rod and the articulated rod form a parallelogram.

[0012] The invention is explained in greater detail below by means of an exemplary embodiment with reference to the drawing.

Fig. 1 is a side view of the portal truck according to the invention;

Fig. 2 is a top view of the portal truck according to Fig. 1;

Fig. 3 is a rear view, viewed from the left in Fig. 1; and

Fig. 4 is a front view, viewed from the right in Fig. 1.

[0013] The portal truck shown in the drawing comprises first of all the undercarriage indicated by A, having on it a portal structure B. The undercarriage A is formed substantially by two parallel longitudinal runners 1, each provided with a front, driven running wheel 2 with fixed axle, and a rear, non-driven, steerable running wheel 3. The front running wheels 2 are each driven by a drive unit, formed by, for example, a diesel engine 4, which diesel engine is accommodated in a housing 5 suspended underneath the longitudinal runner in question. Electric control motors 6 are present for steering the rear running wheels 3. Wheel guards 7, hanging down from the longitudinal runners 1, are used both on the front side and on the rear side of the undercarriage.

[0014] The portal structure B in the example shown is formed by a single portal with columns 10 and a transverse part 11 connecting said columns, the columns 10 of which portal each extend upwards from the rear end of a longitudinal runner 1.

[0015] As can be seen from the drawing, the longitudinal runners 1, the columns 10 and the transverse part 11 are made of a tubular section.

[0016] A frame (generally called a spreader) is indicated by C, which frame extends in the longitudinal direction through the space of the portal structure B and serves to pick up, for example, a container deposited on the ground by a harbour crane, to lift it a little and subsequently to transfer it by means of the portal truck to another location. For this purpose, the container-bearing frame C is mounted in a manner that it is movable up and down.

[0017] The means for moving the container-bearing frame C up and down comprise first of all a pair of lifting arms 12 extending forwards from the portal B, which lifting arms are each mounted with one end on the inside of a portal column 10 in such a way that they can pivot about a horizontal axis, and the front ends of which are connected to each other by means of a transverse part

13. Both the lifting arms 12 and the transverse part 13 connecting said lifting arms are made of a tubular section. The transverse part 13 in this case acts as a bearing shaft for an auxiliary platform or bearing platform 14, which is suspended by means of lateral bearing supports 15 in a pivoting manner from the transverse part 13. On the front side, the auxiliary platform 14 is broadened towards one side (in Fig. 2 towards the left), the driver's cab, indicated by 16, being mounted on the broadened platform part.

[0018] The container-bearing frame C is also in turn supported by the auxiliary platform 14. In this case adjusting devices 17 and 18 are present, by means of which adjusting devices a container-bearing frame driven above a container to be picked up off the ground can be taken into the correct connecting position relative to the container.

[0019] In the transport position of the container, i.e. in the travel position of the portal truck, with the container-bearing frame and the container suspended from it just clear of the ground, the two lifting arms 12 are directed forwards horizontally. In order to keep the auxiliary platform 14 - and therefore the container-bearing frame C - horizontal, one of the bearing supports 15 is extended upwards to a stabilizer element 15a, which is connected by its top end in a pivoting manner to a rod 19, which at the other end acts, in a manner pivoting about a horizontal axis, at 20, on the transverse part 11 of the portal B. The columns 10, the lifting arms 15, the extended bearing support 15, 15a and the articulated rod 16 form a parallelogram in this case. The bearing support 15 extended upwards consequently always remains parallel to the columns 10, and therefore vertical, and the platform 14 is held in the horizontal position.

[0020] In the exemplary embodiment shown, the movement up and down of the lifting arms 12 is achieved by means of a hoisting drum 22 driven by an electric motor 21. Said hoisting drum is mounted in a rotatable manner between two light supporting frames 23, each fitted on one side of the truck. The supporting frames 23 are each composed of a tubular section 23a projecting forwards horizontally from a portal column 10, a tubular section 23b extending upwards from a longitudinal runner 1, and a connecting corner piece 23c. The upright tubular sections 23b in this case run parallel to the cables 24 running from the hoisting drum 22 to the lifting arms 12 (see Fig. 4), so that they are subjected only to a compressive load.

[0021] Besides the embodiment shown a large number of alternatives are possible. For example there are alternative possibilities for operating the lifting arms 12, such as the use of hydraulic piston-cylinder devices.

[0022] Thus the invention provides a portal truck which is save and efficient during use, and allows for a faster transport of containers.

Claims

1. Portal truck for moving freight containers, of the type comprising
 - an undercarriage composed substantially of two parallel longitudinal runners and having running wheels;
 - a portal structure rising from the longitudinal runners of this undercarriage, and a container-bearing frame that can move up and down in the portal space of the portal structure, in order to pick up, lift and carry a container that is to be moved, and a driver's cab,

characterized in that, the cab can move up and down with the container-bearing frame.
2. Portal truck according to claim 1, wherein the maximum height of lift of the container-bearing frame above ground level is just greater than twice the height of a container, wherein the portal structure is of a height that corresponds to that height.
3. Portal truck according to claim 2, wherein the portal structure is formed by a single portal, the two columns of which are each disposed near the rear end of the truck on a longitudinal runner of the undercarriage, in which portal truck:
 - the means for moving the container-bearing frame up and down comprise two interacting lifting arms, which are each mounted with one end pivoting on a portal column and are rotatable from a substantially horizontal, forward-directed position just above container height to a slanting, upward-directed and forward-directed position, with the free ends of the arms just above twice the container height, and vice versa.
4. Portal truck according to one of claims 1-3, wherein auxiliary means are present, by means of which the container-bearing frame and the driver's cab are held in a horizontal position between the free ends of the lifting arms.
5. Portal truck according to claims 3 and 4, wherein the auxiliary means comprise an auxiliary platform, which is suspended between the ends of the lifting arms in a manner that enables it to pivot about a horizontal transverse axis, and against the underside of which the container-bearing frame is retained, the driver's cab being mounted on the front part of the auxiliary platform.
6. Portal truck according to claim 5, wherein a stabilizer rod extends upwards from the platform, the top end of which stabilizer rod is pivotally connected to the front end of an articulated rod extending for-

wards from the transverse part of the portal, all the above in such a way that the portal columns, the lifting arms, the stabilizer rod and the articulated rod form a parallelogram.

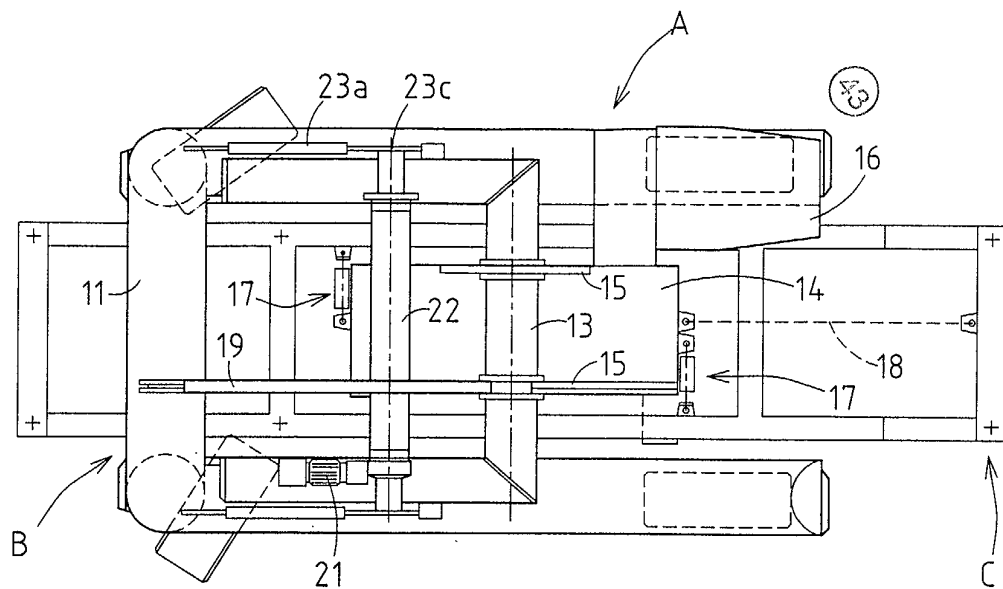


FIG. 2.

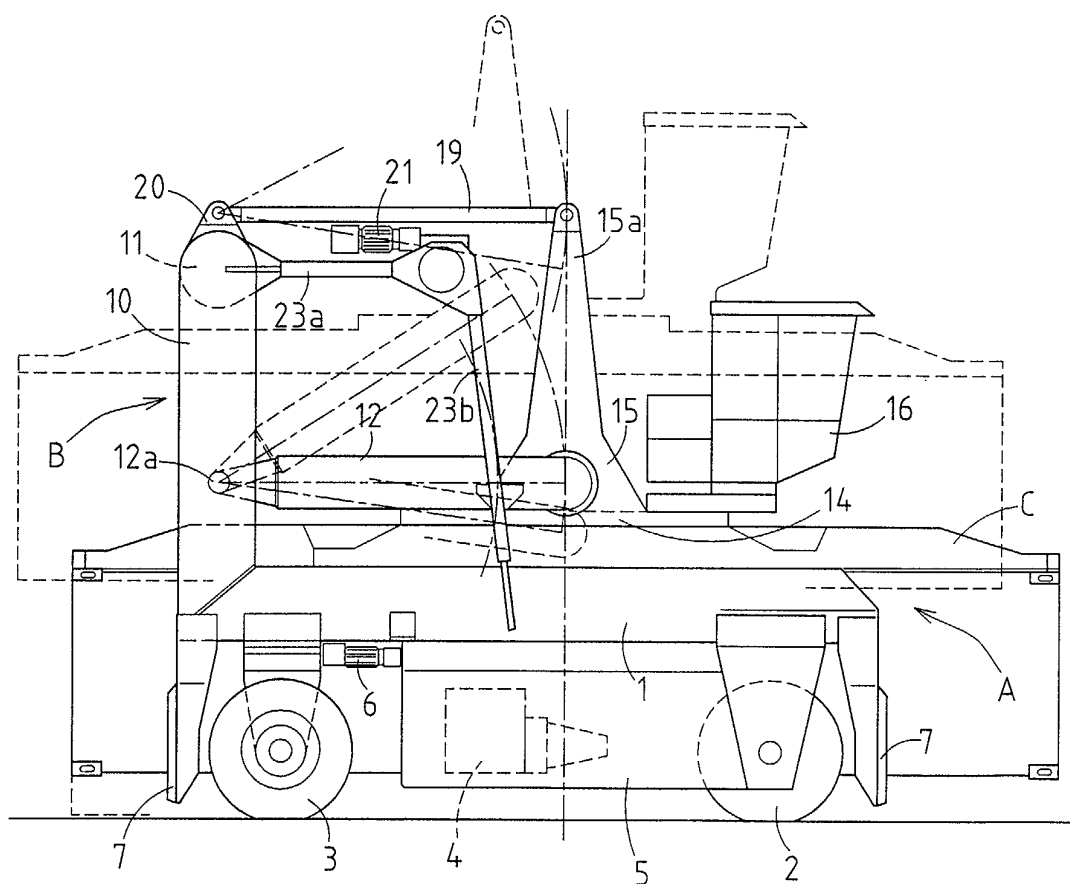
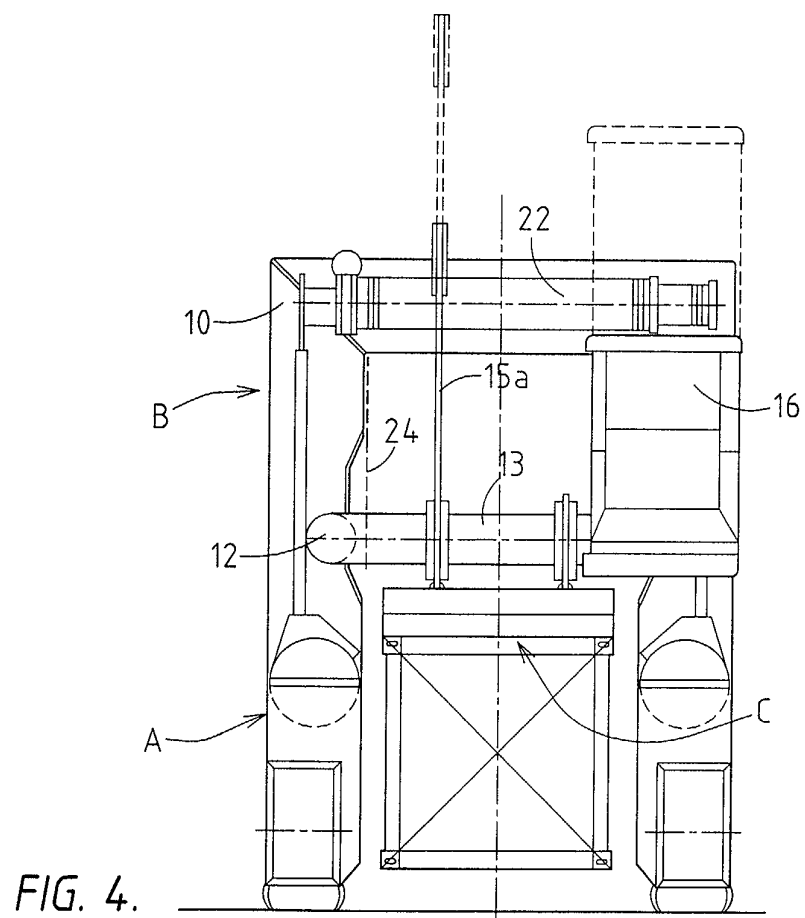
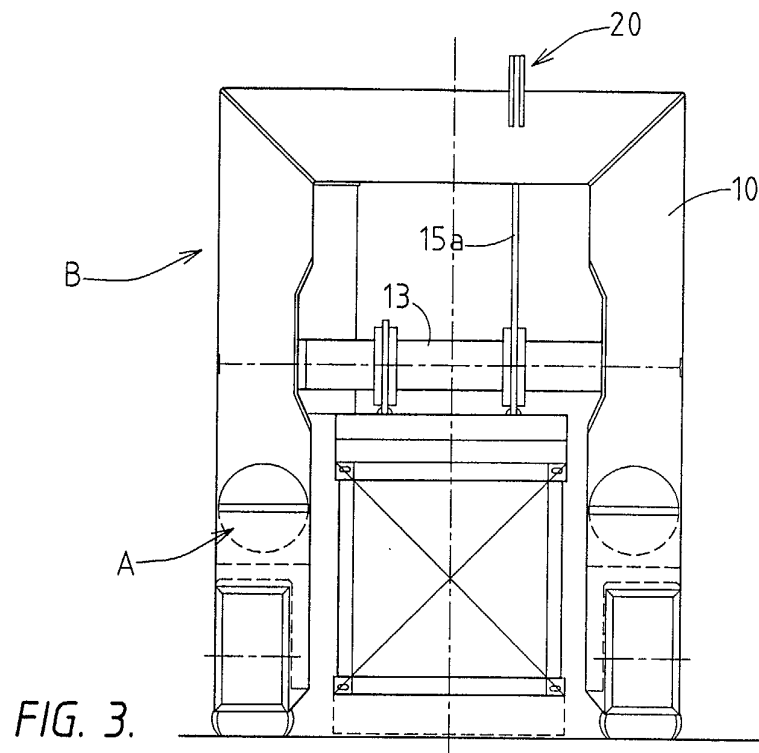


FIG. 1.





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EUROPEAN SEARCH REPORT

Application Number
EP 02 07 7582

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
X	US 3 570 695 A (SCHWARTZ WILLIAM H ET AL) 16 March 1971 (1971-03-16)	1,2	B66C19/00
Y	* abstract * * column 2, line 35 - column 4, line 62 * * figures 1,2 *	3-6	
X	NL 6 700 903 A (MEEUSEN PETER) 22 July 1968 (1968-07-22) * the whole document *	1,2	
Y	US 3 387 726 A (MCKEE DALE W ET AL) 11 June 1968 (1968-06-11) * abstract * * column 1, line 22 - line 65 * * column 2, line 12 - column 3, line 60 * * figures 1-3 *	3-6	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.CI.7)
			B66C
Place of search		Date of completion of the search	Examiner
THE HAGUE		11 October 2002	Sheppard, B
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 02 07 7582

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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11-10-2002

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