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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B65G 1/06	A1	(11) International Publication Number: WO 99/35061
		(43) International Publication Date: 15 July 1999 (15.07.99)

(21) International Application Number: PCT/NL99/00001

(22) International Filing Date: 4 January 1999 (04.01.99)

(30) Priority Data:
1008004 9 January 1998 (09.01.98) NL

(71)(72) Applicant and Inventor: VAN RIJN, Nicolaas, Johannes, Petrus [NL/NL]; Tivoliweg 126, NL–4561 HN Hulst (NL).

(74) Agent: DE BRUIJN, Leendert, C.; Nederlandsch Octrooibureau, Scheveningseweg 82, P.O. Box 29720, NL–2502 LS The Hague (NL).

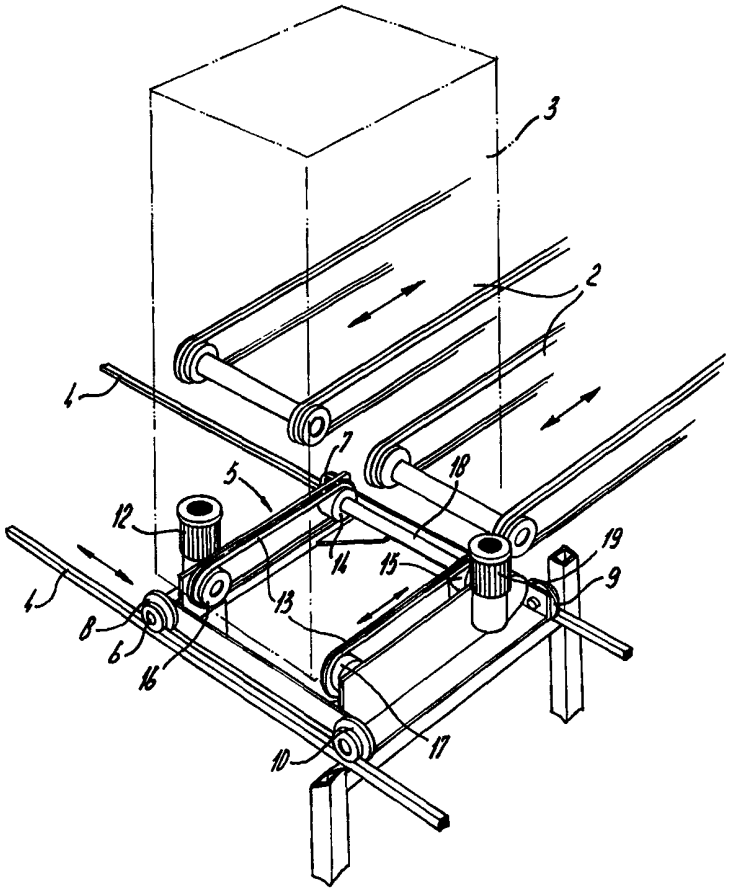
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.
In English translation (filed in Dutch).

(54) Title: RACK FOR STORING ITEMS

(57) Abstract

A rack for storing items comprises a number of storage conveyors (2) positioned alongside and above one another and driven by a motor for supporting and moving items placed thereon, a set of tracks (4) positioned above one another at at least one end of the storage conveyors (2), which tracks extend transversely to the longitudinal direction of the storage conveyors (2), and rolling carriages (5) placed on the tracks. The said rolling carriages are movable on the said tracks and each rolling carriage (5) is provided both with a drive mechanism (11, 12) to drive at least one wheel of the rolling carriage (5) and with a drive mechanism (19) to drive a conveyor (13) which can move items transversely to the direction of movement of the rolling carriage.



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Title: Rack for storing items

The invention relates to a rack for storing items comprising:
a number of storage conveyors positioned alongside and above one another and driven by a motor for supporting and moving items placed thereon,
a set of tracks positioned above one another at at least one end of the storage conveyors, which tracks extend transversely to the longitudinal direction of the storage conveyors,
rolling carriages placed on the tracks to transport items and
means for transferring items from one storage conveyor onto a rolling carriage and vice versa.

Such a rack is disclosed in US-A 5 125 782.

In this known storage rack each level has a number (for example ten) of storage conveyors and one return conveyor in the middle. At each storage level, for example, a transport mechanism provided with one or more rolling carriages is arranged on each side of the rack, which mechanism is able to transport items transversely to the direction of movement of the storage conveyors. The actual construction of the rolling carriages is not specified.

The aim of the invention is to provide such an efficient construction of the rolling carriages on the tracks that the storage of items and the removal of desired items can be largely automated.

According to the invention the rack mentioned in the preamble is to this end characterised in that said rolling carriages are movable on rails, and that each rolling carriage is provided both with a drive mechanism to drive at least one wheel of the rolling carriage and with a drive mechanism to drive a conveyor which can move items transversely to the direction of movement of the rolling carriage.

The invention will now be explained with reference to the figures.

Figure 1 shows a perspective diagrammatic view of the rack according to the invention.

Figure 2 shows in perspective a more detailed view of one section of the rack according to Figure 1.

Figure 3 shows a plan view of the rolling carriage section for the rack according to Figures 1 and 2.

The section of the rack for storing items, such as loaded pallets, boxes, crates, which is shown in the figures, comprises a number of storage conveyors 2, for example belt conveyors, chain conveyors and rollers, positioned alongside and above one another, which can move items 3 placed thereon in two directions, indicated by an arrow.

A rail track 4 is arranged at the end shown and, if desired, also at the opposite end of each set of storage conveyors positioned alongside one another, on which track one or more rolling carriages are movable in a direction transverse to the longitudinal or transport direction of the storage conveyors.

The rail tracks 4 have the same mutual vertical spacing as the storage conveyors 2 and essentially extend over the width of the rack.

Each rolling carriage 5 has two wheels 7, 8 arranged on a common axle 6 and two wheels 9, 10 optionally arranged on a common axle. The axle 6 of the wheels 7, 8 can be driven by a chain drive 11 by a first motor 12 which is supported by the chassis of the rolling carriage.

A conveyor is arranged on each rolling carriage 5, the transporting surface of which conveyor is essentially in the same plane as that of the storage conveyors at the same level of the rack.

In the illustrative embodiment shown, the conveyor consists of two parallel endless duplex chains 13 which are fed round two driven double sprockets 14, 15 and round two double guide sprockets 16, 17. The sprockets 14, 15 are arranged on a common axle 18 which can be driven by a second motor 19. This motor is also supported by the chassis of the rolling carriage 5.

The rack shown can be used in the following ways:

I. First item in, first item out

The rack has tracks 4 with one or more rolling carriages 5 at one or both ends of the storage conveyors 2. At one side, items are placed on the storage conveyors by means of a rolling carriage 5, and at the other side items are unloaded from the storage conveyors, either by means of a rolling carriage 5 which then travels to an unloading point at the end of the rail track 4 or by means of a fork lift truck. The item which will be unloaded from a storage conveyor will always be that item that, with respect to the other items on said storage conveyor, was the first to be placed on said storage conveyor.

II. First in, last out

The rack has tracks 4 with rolling carriages 5 at only one end of the storage conveyors 2 (or the tracks 4 with rolling carriages 5 at one end of the storage conveyors are used). Items are placed on the storage conveyors by means of a rolling carriage movable on the tracks 4 and are unloaded from the storage conveyors by means of a rolling carriage 5 movable on the same tracks 4. The item which will be unloaded from a storage conveyor will always be that item that, with respect to the other items on said storage conveyor, was the last to be placed on said storage conveyor.

III. Items circulate

The rack has tracks 4 with one or more rolling carriages 5 at both ends of the storage conveyors. A desired item that is located between a number of items on a storage conveyor is unloaded by depositing on another storage conveyor the items that are located between one track with rolling carriage and the desired item, transporting the said items on said other storage conveyor to a track with rolling carriage at the other end of the rack and then returning said items to the original storage conveyor or another storage conveyor.

IV. Sorting

Items of different types are in arbitrary order on the storage conveyors 2. The positions in which items of the same type are located are known to the computer which controls the storage conveyors 2 and the rolling carriages 5. If a command is given to unload a specific number of items of the same type, for example a crate filled with the same vegetables, from the same rack, the relevant storage conveyors and rolling carriages will be controlled in such a way that said items of the same type are moved to an unloading point, for example at the end of a rail track 4, while items of another type which are in the way are permanently or temporarily deposited on other storage conveyors.

The essential feature of the invention is that rails are arranged at at least one side of a rack consisting of storage conveyors positioned alongside and above one another, which rails extend perpendicularly to the direction of movement of the storage conveyors and over which rails rolling carriages run, which rolling carriages have their own drive in order to move them and have a drive for a conveyor which is able to transport items in a direction transverse to the transport direction of the storage conveyor.

It is not precluded that each rolling carriage 5 has a motor which at one point in time drives the rolling carriage itself and at another point in time drives the transverse conveyor arranged on the rolling carriage.

One or more lifts can have been added to the rack to bring items from one level to another.

Claims

1. Rack for storing items comprising:

a number of storage conveyors (2) positioned alongside and above one another and driven by a motor for supporting and moving items (3) placed thereon,

a set of tracks (4) positioned above one another at at least one end of the storage conveyors (2), which tracks extend transversely to the longitudinal direction of the storage conveyors,

rolling carriages (5) placed on the tracks (4) to transport items and

means for transferring items from one storage conveyor onto a rolling carriage and vice versa,

characterised in that said rolling carriages (5) are movable on rails (4) and that each rolling carriage (5) is provided both with a drive mechanism (11, 12) to drive at least one wheel of the rolling carriage and with a drive mechanism (19) to drive a conveyor (13) which can move items transversely to the direction of movement of the rolling carriage (5).

Fig-1

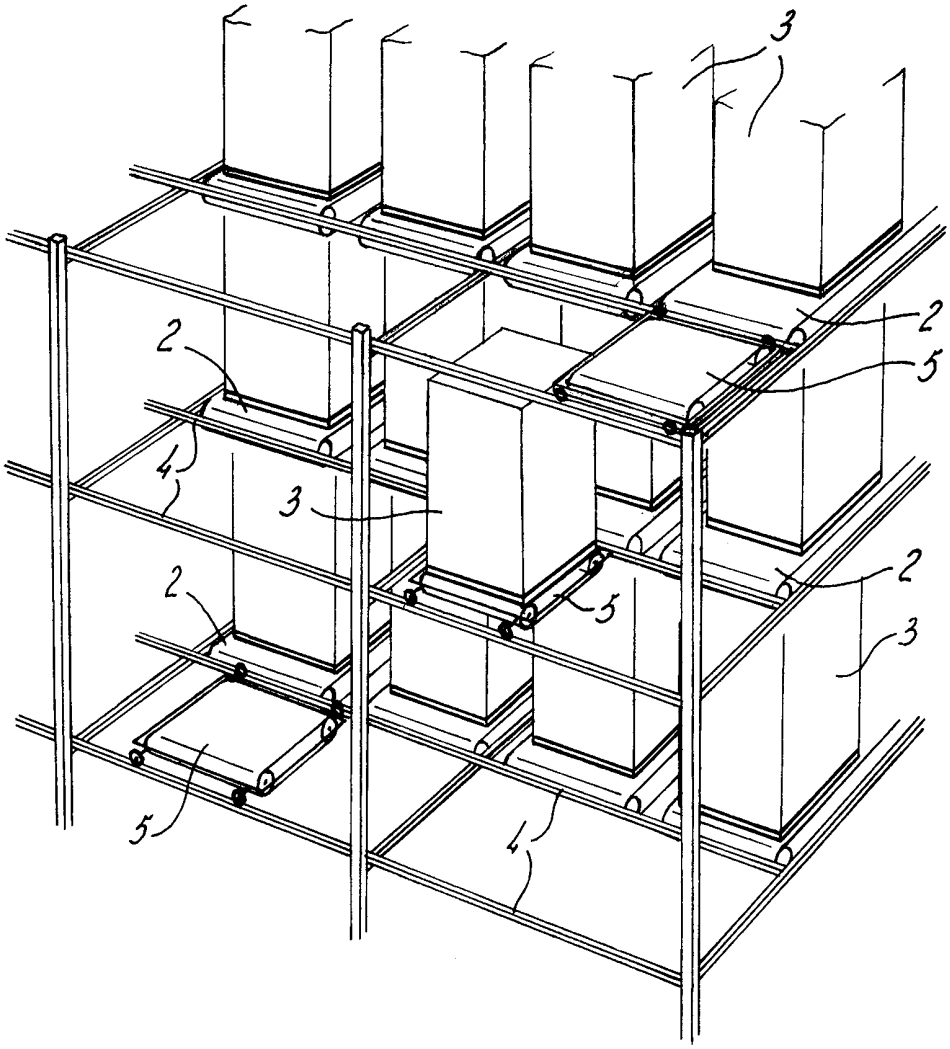
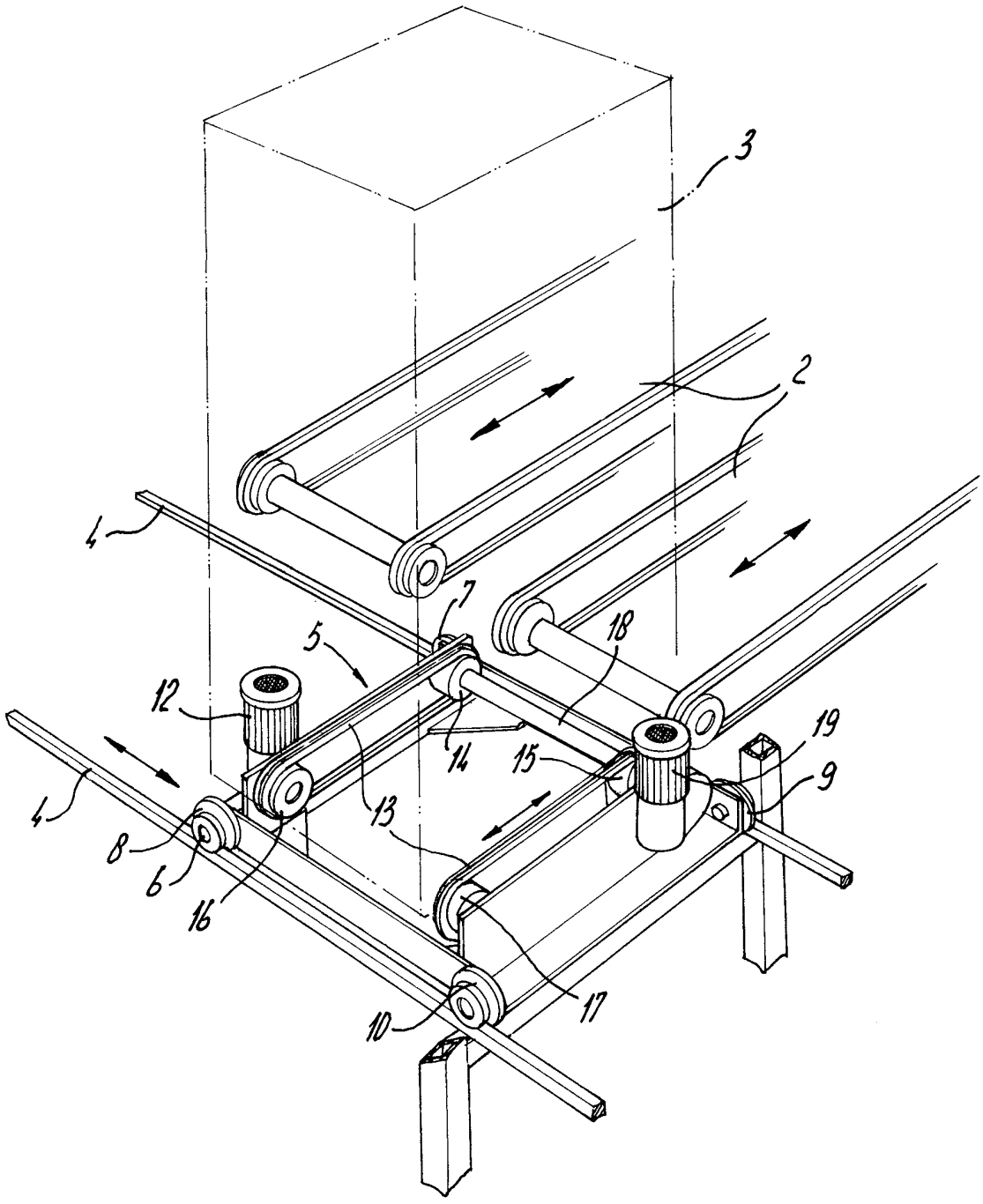


fig-2



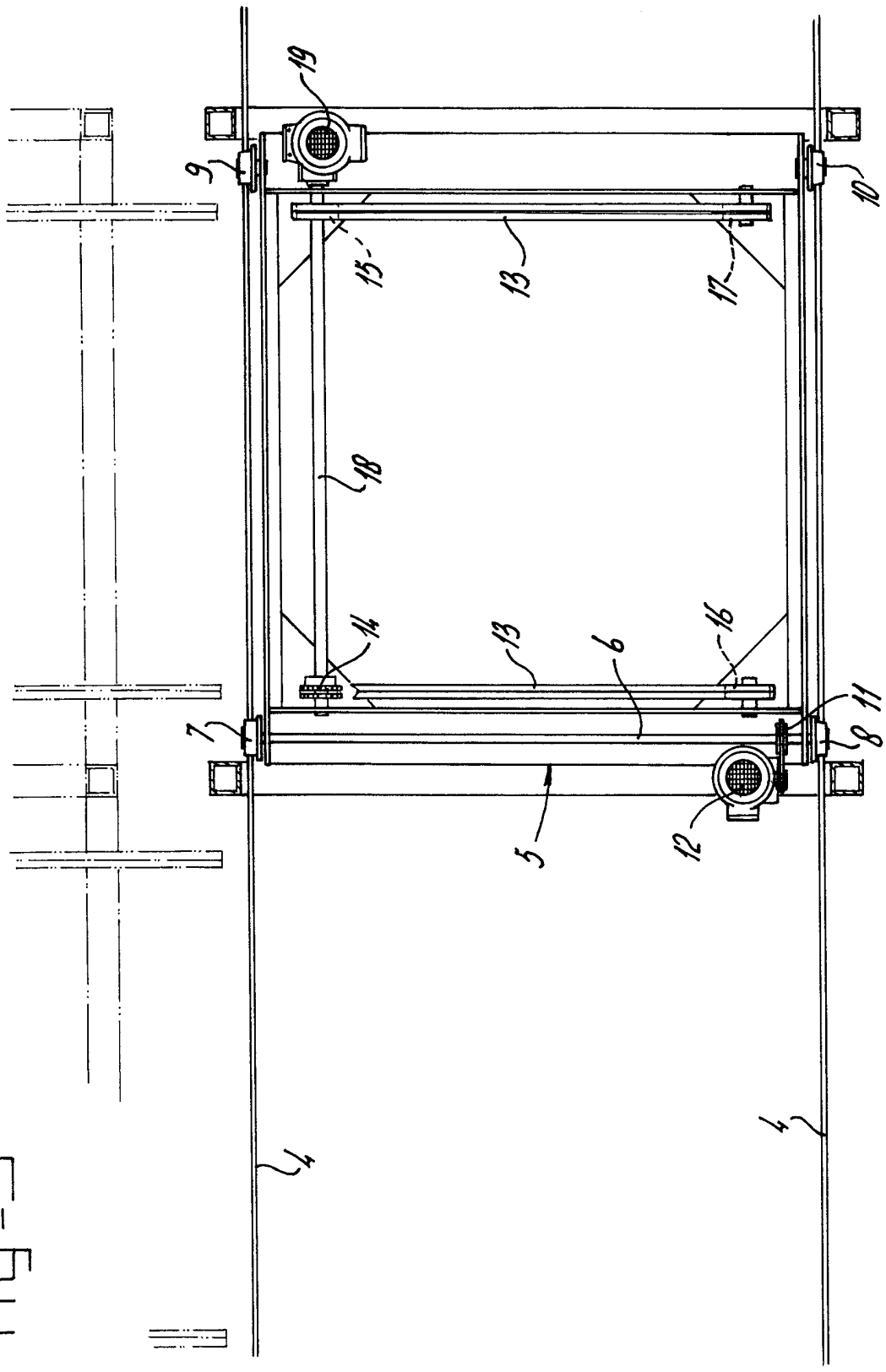


Fig-3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/NL 99/00001

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65G1/06

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)
IPC 6 B65G

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

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 125 782 A (S. GOLDSCHMIDT ET AL.) 30 June 1992 cited in the application see column 3, line 56 - column 9, line 23 see figures 1-15	1
Y	FR 2 595 335 A (ASTIN-FRANCE SARL) 11 September 1987 see page 4, line 3 - page 9, line 24; figures 1-5	1
A	DE 17 56 596 A (K. GREBE) 30 April 1970 see the whole document	1
A	EP 0 514 613 A (W. STERNAD) 25 November 1992 see column 4, line 34 - column 8, line 44 see figures 2,3,6,12-31	1

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[X] Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
23 April 1999	03/05/1999

Name and mailing address of the ISA	Authorized officer
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

International Application No
PCT/NL 99/00001

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